The Moderated Consequences of Post-industrial Employment

A thesis submitted to The University of Manchester for the degree of Doctor of Philosophy in the Faculty of Humanities

2014

Ewan Carr

School of Social Sciences
Contents

List of Figures 7

List of Tables 10

1 Introduction 19
   1.1 From macro to micro, and back again .............. 20
   1.2 Overview of the conceptual model ................. 22
   1.3 Original contribution to knowledge ............... 23
   1.4 Overview of the thesis ............................. 24

2 Literature Review 27
   2.1 The Big Picture: post-industrial society ........ 28
      2.1.1 The roots of post-industrial society .......... 28
      2.1.2 Alternative forms of society .................. 30
      2.1.3 A critique of the ‘new society’ claim ....... 33
      2.1.4 A risk perspective .............................. 37
      2.1.5 New Social Risks ............................... 42
      2.1.6 Summary ........................................ 46
   2.2 The Small Picture: labour market change .......... 47
      2.2.1 Job insecurity ................................. 48
      2.2.2 Job insecurity and subjective well-being .... 52
      2.2.3 Work intensity .................................. 58
      2.2.4 Trends in job insecurity and work intensity ... 73
   2.3 Summary ............................................. 86

3 Methods 89
   3.1 Muddling through .................................... 89
   3.2 Why a quantitative methodological perspective? .. 91
      3.2.1 Origins in Social Policy ....................... 91
      3.2.2 Introduction to Quantitative Methods ........ 94
      3.2.3 The PhD: a focus on moderation ............... 97
      3.2.4 Simplify ........................................ 99
   3.3 Methodological choices ............................... 100
4 Job insecurity and family context: job dependency or social support? 119

4.1 Introduction 119
4.1.1 Defining family 120

4.2 Dependency and support as moderators of job insecurity 122
4.2.1 Job dependency 122
4.2.2 Social support 123

4.3 Analytic approach 124

4.4 Measurements 126
4.4.1 Subjective well-being 126
4.4.2 Job insecurity 128
4.4.3 Social support and job dependency 129
4.4.4 Control variables 131

4.5 Findings 131
4.5.1 Moderation effects 133
4.6 Conclusions 136

5 Job insecurity and the national economic climate 139

5.1 Economic climate as a moderator 140
5.1.1 Economic climate 140
5.1.2 Economic climate and well-being 141

5.2 Analytical approach 142
5.3 Null and base models 145
5.4 Random effects 146
5.5 Direct effects 148
5.6 Moderation effects 149
5.7 Discussion and conclusions 155

6 Job insecurity and labour market policies 157

6.1 Introduction 157
6.2 Job insecurity and labour market policies 159
6.3 Existing evidence 162
6.4 The analytical model 163
6.5 Data and measurements 165
6.6 Methods 167
6.7 Findings ................................................. 169
6.7.1 Descriptive statistics .......................... 169
6.7.2 Base model ....................................... 170
6.7.3 Moderation effects ............................ 173
6.7.4 Moderated moderation ....................... 178
6.8 Discussion ............................................. 180

7 A mixture regression analysis of the JD-R model 185
7.1 Approaches to the study of moderation ........ 185
7.2 Data and measurements .......................... 187
7.3 Descriptive statistics ............................... 190
7.4 An LCA approach to work intensity .......... 194
7.4.1 Predicting class membership .................. 197
7.5 Mixture regression models ....................... 200
7.5.1 Base model ...................................... 201
7.5.2 Model specification ............................ 202
7.5.3 The five-class model ........................... 205
7.5.4 Class profiles for the five-class model ..... 209
7.5.5 Summary ......................................... 215
7.6 Conclusion ........................................... 215

8 Job demands, job resources and occupational stress 217
8.1 Why expect variation between countries? .... 218
8.1.1 National culture ............................... 218
8.1.2 Economic conditions .......................... 222
8.1.3 Trade union density ........................... 223
8.1.4 Summary ......................................... 224
8.2 Methodology ......................................... 226
8.3 Data ................................................... 227
8.4 Measurements ........................................ 227
8.4.1 Perceived risk of occupational stress ...... 227
8.4.2 Job demands .................................... 231
8.4.3 Job resources .................................... 232
8.4.4 Control variables .............................. 233
8.5 Descriptive statistics ............................. 234
8.5.1 Perceived risk of occupational stress ...... 234
8.5.2 Job demands .................................... 234
8.5.3 Job resources .................................... 236
8.6 Null and base models ............................ 240
8.7 Random coefficients for the main effects ... 244
8.8 Fixed interaction effects ......................... 245
List of Figures

1.1 The Conceptual Model ........................................... 23
2.1 *Time*, February 20\textsuperscript{th}, 1980 ..................... 28
2.2 Trend in usage of terms relating to working conditions .... 48
2.3 Different forms of insecurity .................................. 51
2.4 Objective vs. subjective forms of insecurity .................. 51
2.5 Perceived insecurity in the 2006 European Social Survey ... 56
2.6 Karasek’s demand-control model ................................. 64
2.7 The Job-Demand-Resources model .............................. 67
2.8 Illustration of assumptions and empirical analyses .......... 74
2.9 *Time*, 22\textsuperscript{nd} November, 1993 ..................... 74
2.10 *The Guardian*, Jan 27\textsuperscript{th}, 1982 .................... 75
2.11 Use of the term ‘job insecurity’ in the Google Ngrams ...... 76
2.12 Articles mentioning ‘job insecurity’ in North America and the United Kingdom ........................................... 76
2.13 Trends in job tenure across Europe ............................ 77
2.14 Turnover trends across Europe ................................ 77
2.15 Duration of current employment, Australia (1975-1998) .... 78
2.16 Perceived job insecurity in Australia (1975-1998) ............ 78
2.17 Perceived risk of job loss in Germany ......................... 79
2.18 Perceived job security in the GSS (1977-2008) ................ 80
2.19 Trends in perceived job insecurity from the GSS .............. 81
2.20 Dissatisfaction with job security in the British Household Panel Survey (1991-2001) ........................................... 81
2.21 Worries about employment security in the United States ... 82
2.22 Trends in work intensity from the EWCS ...................... 85
2.23 Average weekly working hours for full-time employees, Western European countries (1983-2010) .................... 86
2.24 Average weekly working hours by sector ...................... 87
3.1 The Research Process ............................................. 90
3.2 Development of the thesis ....................................... 93
3.3 The three ontological domains .................................. 96
## List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Work Environment Factors in Four Country Clusters</td>
<td>70</td>
</tr>
<tr>
<td>2.2</td>
<td>Perceived risk of job loss in the UK (1986 to 2011)</td>
<td>80</td>
</tr>
<tr>
<td>2.3</td>
<td>Trends in work effort in Britain (1992 to 2001)</td>
<td>84</td>
</tr>
<tr>
<td>3.1</td>
<td>Summary of methods and data used in this thesis</td>
<td>102</td>
</tr>
<tr>
<td>3.2</td>
<td>Data considered for the thesis</td>
<td>103</td>
</tr>
<tr>
<td>3.3</td>
<td>Sample sizes and response rates for surveys in the thesis</td>
<td>105</td>
</tr>
<tr>
<td>3.4</td>
<td>Measures of subjective well-being available in the 2006 ESS</td>
<td>107</td>
</tr>
<tr>
<td>4.1</td>
<td>Sample information for the 2006 ESS</td>
<td>125</td>
</tr>
<tr>
<td>4.2</td>
<td>Factor loadings for the measurement model</td>
<td>129</td>
</tr>
<tr>
<td>4.3</td>
<td>Measures of social support and job dependency</td>
<td>130</td>
</tr>
<tr>
<td>4.4</td>
<td>Descriptive statistics for the control variables (weighted)</td>
<td>132</td>
</tr>
<tr>
<td>4.5</td>
<td>Regression coefficients for the base model for DEPRESSION</td>
<td>134</td>
</tr>
<tr>
<td>4.6</td>
<td>Wald tests for interaction terms</td>
<td>135</td>
</tr>
<tr>
<td>5.1</td>
<td>Coefficients for the ‘null’ model</td>
<td>145</td>
</tr>
<tr>
<td>5.2</td>
<td>Coefficients from the ‘base’ model</td>
<td>147</td>
</tr>
<tr>
<td>5.3</td>
<td>Direct associations for economic climate</td>
<td>150</td>
</tr>
<tr>
<td>5.4</td>
<td>Moderation effects</td>
<td>152</td>
</tr>
<tr>
<td>5.5</td>
<td>Reduction in DIC for the moderation effects</td>
<td>153</td>
</tr>
<tr>
<td>5.6</td>
<td>Measures of labour market policy</td>
<td>167</td>
</tr>
<tr>
<td>6.1</td>
<td>Correlations between aggregate scores for life satisfaction, job</td>
<td>171</td>
</tr>
<tr>
<td></td>
<td>insecurity, LMP and economic context</td>
<td></td>
</tr>
<tr>
<td>6.2</td>
<td>Unstandardised country-level coefficients for the base model</td>
<td>174</td>
</tr>
<tr>
<td>6.3</td>
<td>Aggregate employment insecurity by subgroup (weighted)</td>
<td>175</td>
</tr>
<tr>
<td>6.4</td>
<td>Aggregate employment insecurity by subgroup (weighted)</td>
<td>175</td>
</tr>
<tr>
<td>6.5</td>
<td>Wald tests for moderated moderation effects</td>
<td>180</td>
</tr>
<tr>
<td>7.1</td>
<td>Methods for the analysis of population heterogeneity</td>
<td>186</td>
</tr>
<tr>
<td>7.2</td>
<td>Unweighted summary statistics for work intensity</td>
<td>188</td>
</tr>
<tr>
<td>7.3</td>
<td>Model fit statistics for 1 to 6 classes</td>
<td>195</td>
</tr>
</tbody>
</table>
7.4 Average latent class probabilities
7.5 Multinomial logistic regression results (relative risk ratios)
7.6 Model fit statistics for 1 to 6 classes
7.7 Coefficients for the 5-class solution
7.8 Most Likely Latent Class Membership
7.9 Descriptive statistics for categorical variables
7.10 Descriptive statistics for continuous variables
7.11 Relative risk ratios for the multinomial logit model

8.1 Methodological options
8.2 Cronbach’s alpha reliability coefficients
8.3 Correlation between PCA factor scores and scales
8.4 Measures of job demands and resources used in this chapter
8.5 Weighted counts and percentages for control variables
8.6 Country ranks for job demands
8.7 Pearson Correlation Coefficients (N = 17)
8.8 Ranks for job resources
8.9 Null model for affect (using MCMC estimation)
8.10 Odds ratios for the base model
8.11 Change-in-DIC for random coefficients
8.12 Change-in-DIC for fixed interactions
8.13 Change-in-DIC for random interactions
8.14 Calculating ‘total effects’ for random interaction terms
8.15 Correlations between national context and means and associations between job demands, resources and perceived risk of occupational stress

A.1 Priors for Bayesian analysis
Abstract

This thesis considers how work has changed in post-industrial society. It shows that while insecure or stressful work can be reliably linked with poor health, individual outcomes depend upon a range of micro- and macro-level moderators. Bad jobs are invariably harmful, but context matters.

It begins by charting the shift in advanced economic nations from industry and agriculture to service sector and knowledge-based employment. Most accounts of post-industrialisation share common flaws. Namely, the tendency for technological determinism; the depiction of discontinuous, all-encompassing social transformation; and the dislocation from individual experience. Such failings, however, do not negate the micro-level impact of these changes. This thesis focuses on two: job insecurity and work intensity. Recent decades have witnessed a destandardisation of employment relations and an intensification of working conditions. These changes have important consequences for well-being, whether or not they collectively constitute a new form of society.

The methodological theme is one of moderation. Successive analytical chapters show how the consequences of insecure or stressful work depends upon (a) family arrangements, (b) economic climate, (c) labour market policies, (d) job resources and (e) national characteristics such as culture or trade union density. The analyses combine European survey data and contextual information using a range of quantitative methods, including multilevel modelling, structural equation modelling and latent class analysis. While the empirical chapters contribute to their respective literatures, they also feed into broader arguments regarding the synthesis of micro- and macro-level perspectives. Work invariably impacts upon health, but a simultaneity of moderating influences results in a diversity of outcomes. These findings underline the contextual sensitivity of work-related policy.
Declaration

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.
Copyright Statement

1. The author of this thesis (including any appendices and/or schedules to this thesis) owns certain copyright or related rights in it (the “Copyright”) and s/he has given The University of Manchester certain rights to use such Copyright, including for administrative purposes.

2. Copies of this thesis, either in full or in extracts and whether in hard or electronic copy, may be made only in accordance with the Copyright, Designs and Patents Act 1988 (as amended) and regulations issued under it or, where appropriate, in accordance with licensing agreements which the University has from time to time. This page must form part of any such copies made.

3. The ownership of certain Copyright, patents, designs, trade marks and other intellectual property (the “Intellectual Property”) and any reproductions of copyright works in the thesis, for example graphs and tables (“Reproductions”), which may be described in this thesis, may not be owned by the author and may be owned by third parties. Such Intellectual Property and Reproductions cannot and must not be made available for use without the prior written permission of the owner(s) of the relevant Intellectual Property and/or Reproductions.

4. Further information on the conditions under which disclosure, publication and commercialisation of this thesis, the Copyright and any Intellectual Property and/or Reproductions described in it may take place is available in the University IP Policy (see http://www.campus.manchester.ac.uk/medialibrary/policies/intellectual-property.pdf), in any relevant Thesis restriction declarations deposited in the University Library, The University Library’s regulations (see http://www.manchester.ac.uk/library/aboutus/regulations) and in The University’s policy on presentation of Theses.
Acknowledgements

I am indebted to my supervisors, Mark Tranmer and Mark Elliot, for their support and guidance during a challenging period. Their sustained encouragement has been invaluable.

I have benefited from the advice of many other members of staff at the Cathie Marsh Centre for Census and Survey Research (CCSR). Tarani Chandola, Nick Shrayne and Mark Brown have all provided help at key stages of the PhD. I am also grateful to friends and colleagues at CCSR, for both their advice and camaraderie. In particular, Stephen Jivraj, Alfonso Echazarra and Rebecca Rhead.

I greatly appreciate the backing of the ESRC, without which this PhD could not have begun.

I would like to thank John Hudson and Stuart Lowe, at the University of York. They inspired me to begin this journey.

Most of all, I want to thank my parents. This would not have been possible without them.
1 Introduction

Over the past half-century, advanced economic nations have witnessed a period of social and economic transformation, collectively described as a shift from industrial to post-industrial society (Bell 1974). From a period based upon manufacturing and industry to more recent decades, where ‘knowledge-intensive’ and service sector employment predominate. Central to this transformation has been the emergence of less stable labour market relations, compared to the post-war period. Working arrangements and trajectories have become increasingly de-standardised, with trends towards atypical or unsocial hours, interrupted career trajectories and intensified working conditions (Burchell et al. 2002). The post-war model of the nuclear family, male breadwinner and job-for-life has been supplemented (but not replaced) by a range of more varied, and less stable, alternatives. Employment security is also purportedly lower than in earlier periods (Heery and Abbott 2000).

These changes have important consequences for individual well-being. Job insecurity has been shown to be positively associated with poor mental health (Chirumbolo and Hellgren 2003) and reduced psychological well-being (Friesen and Sarros 1989; Kuhnert et al. 1989; Wilson et al. 1993; de Witte 1999). Intensified working conditions, increased time pressure and work overload have similarly been linked to psychological illness (e.g. Landsbergis 1988; Ganster and Schaubroeck 1991; Daniels and Guppy 1994).

My starting point, then, is that work arrangements in the 21st century are more variable and uncertain than in earlier periods, and that these changes have harmful consequences for employee well-being. This thesis aims to further our understanding of the relationship between work and well-being. While the negative association between insecure or stressful work and health is widely reported, further research is needed to explain this relationship. Why are some individuals, in some countries, more strongly affected than others? This chapter is in three parts. The first summarises the conceptual model investigated by the thesis. The second justifies why this study, in particular, is necessary. What original
1.1 From macro to micro, and back again

The original motivation for this study was the notion of ‘post-industrial society’ (Bell 1974) and related concepts such as ‘risk society’ (Beck 1992), ‘information society’ or ‘network society’ (Castells 1996). These accounts of social change each characterise modern society in terms of a new underlying logic. Whether emphasising the centrality of risk, knowledge, technological innovation or the interconnectedness of economic relations, these theorists gave an account of advanced economic societies that had changed almost unrecognisably since the post-war years. These changes, moreover, were purported to have important consequences for existing institutions and social divisions – such as the welfare or nation state (Pierson 1998; Jaeger and Kvist 2003; Armingeon and Bonoli 2006), political institutions and processes (Cerny 1997), social class (Giddens 1973; Meyer 1994; Pakulski and Waters 1996) and cultural divisions and norms (Le Roux et al. 2008).

The theories of Beck, Castells and Bell continue to hold considerable sway, both academically and in broader policy and political spheres. Since the mid-1990s countless studies have sought to evaluate how these changes will impact upon society, and policymakers continue to appeal to the need for technological innovation or ‘knowledge-based’ economic activities. Despite this, I became increasingly sceptical about the ability of such ‘grand theories’ to articulate how such, purportedly epochal, societal transformations would impact at the individual level. There may have been a shift from manufacturing towards service-based economies, but what does this tell us about the individual reality of work in either sector? The content of work may be more informational or knowledge-intensive than in earlier periods but how, exactly, does that change working conditions or employment opportunities at the micro-level? Will all employees be affected equally, or will existing social divisions be maintained? To reiterate, the aim of this study is to examine the relationship between changes to the organisation of work and individual well-being. Macro-level accounts, I argue later, can only take us so far. There is a need to focus upon individual circumstances: If the concepts related to ‘post-industrial society’ matter at all they should be evident at the micro-level. This thesis, then, is more concerned with the individual
responses to social change than the question of whether or not these changes collectively constitute any new form of society.

Following this change of focus, I began to consider research that related broader societal shifts to individual experiences and outcomes. At the meso-level, there exists a sizeable literature that considers the consequences of post-industrialisation for particular population subgroups. The concept of ‘new social risks’ (Taylor-Gooby 2004; Bonoli 2007), for example, highlights the predicament of lone-parents, precarious workers and the ‘working poor’ (see Aust and Bonker 2004; Whelan and Maitre 2008). Esping-Andersen (2002) similarly highlights the need for welfare coverage of not only traditional social risks but also “new social risks, such as single parenthood or lack of skills causing long-term unemployment or inferior employment” (p. 10). At the micro-level, many studies examine the link between job characteristics and well-being, with little consideration of societal or historical context. For example, the association between single-parenthood and depression (Cairney et al. 2003) or the health consequences of job insecurity (Ashford 1989; Cuypers and de Witte 2005; Cuypers and de Witte 2007; Scherer 2009) and long-term unemployment (Machin and Manning 1999). This approach is not limited to any particular discipline and is extremely widespread. After all, if European nations are purported to have entered a post-industrial era then any research into recent socio-economic trends could arguably be considered as a study of post-industrial society. If broad shifts towards post-industrial society represent the starting point for this study, the focus quickly moves to the micro-level. Atypical or insecure work may represent facets of a wider socio-economic transformation, but we can assess their consequences without ascribing them to any overarching rhetoric.

The methodological theme of this study is one of moderation. The shift from industrial to post-industrial society may have given rise to new working practices, but not everyone will be affected by these changes in the same way. Job insecurity is linked to psychological well-being, but this relationship will depend on the presence (or absence) of other moderating variables (that is, variables that change the strength or direction of the association). Workers with greater control over their work, or who receive more support from colleagues, are likely to be less affected. Differential outcomes among employees are important when it comes to policy-making. Effective interventions will depend on the ability of research to disentangle such stress-strain relationships. Why do some individuals suffer more severe outcomes than others?
I argued above for the need to move beyond vague notions of large-scale social change and to focus instead upon observable, micro-level trends. That Western European societies can be classified as ‘knowledge-based’ or ‘informational’ tells us little about how these changes play out at the individual level. While emphasising the micro-level, however, it is important to recognise that outcomes will be moderated by meso- and macro-level factors. Individuals live within countries and regions that differ with regard to their social, economic and political structures, cultures and norms. While locating the analysis at the individual level, it is important to consider the moderating role of the wider economic and social context. This, effectively, brings our conceptual model full-circle. At the outset we identified ‘post-industrial society’ (a concept that is defined at the macro-level) as the root of several changes in the organisation and content of work. It was then argued, however, that to make sense of these changes we must consider individual-level circumstances and outcomes. Latterly, the role of macro-level moderating variables was emphasised.

### 1.2 Overview of the conceptual model

The conceptual model is illustrated in Figure 1.1. The starting point is the concept of ‘post-industrial society’ (1), the notion that in the latter half of the 20th century, European nations underwent a period of social and economic transformation. This included a shift from manufacturing to service-based economies, an emphasis on knowledge as a key economic commodity, the increasing importance of high-level skills and education and the inter-connectedness of economic and social relations, facilitated by technological advances. This transition, the argument goes, has ushered in new modes of social and economic organisation. Of these, we focus on changes to the content and conditions of employment in Europe (2). Labour market relations, it is argued, have become increasingly de-standardised. The post-war model of a ‘job-for-life’ has been supplanted by patchwork careers, reduced job security, atypical or unsocial working hours and intensified working conditions. The uncertainty that is endemic to post-industrial employment has serious consequences for individuals, their families and wider society. However we conceptualise the broader societal trends, new working practices in Europe in the 21st century introduce the possibility of detrimental health outcomes.

Policies that reduce the harmful consequences of post-industrial work arrangements are therefore a priority. For these to be effective, however, requires an understanding of why outcomes differ between individuals.
Why are the consequences of insecure or stressful employment more severe for some individuals than others? This was framed above as a question of moderation: what other variables can account differences between individuals? These may exist at the micro- (3) or macro-level (4). Job characteristics, such as autonomy, social support or status, are likely to play a role, but so too are contextual variables at the local or national level. For example, the support provided by family members, regional economic prosperity or strictness of national employment legislation. This thesis, then, seeks to illuminate the black box in Figure 1.1; to unpick the moderated relationships between post-industrial employment and individual well-being.

### 1.3 Original contribution to knowledge

The above discussion provides an outline of what this thesis addresses, but not the why. The existing literature on the conceptualisation and consequences of post-industrial society is vast, so additional research requires justification. Four points are made here.

Firstly, much of the value of this study derives from the explicit synthesis of macro- and micro-level literatures, as described above. While many studies have considered either the macro-level conceptualisation of post-industrial society or the micro-level relationships between working conditions and well-being, few combine these perspectives. By locating...
the association between work and well-being within the wider context of post-industrial change this study provides a valuable cross-disciplinary account of social change.

Secondly, this study addresses topics that, to date, have received little or no attention in the literature. While much research considers the buffering role of work-based social support, few studies consider the role of non-work forms of support, such as that provided by family or friends. Similarly, although numerous studies consider the association between local unemployment rates and life satisfaction, the moderating role of economic conditions has yet to be investigated fully. By tackling hitherto unexplored facets of post-industrial employment this thesis provides incremental extensions to current understanding.

Thirdly, the thesis applies relatively new methods in areas where they have not been used previously. Chapters 7 and 8, for example, consider the long-standing ‘job-demands-resources’ (JD-R) model. Rather than addressing a substantively new aspect of the model, these chapters seek to re-evaluate this existing framework using new statistical techniques. Chapter 7 employs mixture regression analysis to identify differential groupings in the association between work intensity and job strain. Chapter 8 uses multilevel modelling to investigate cross-European variation in the associations between job demands, job resources and the perceived risk of occupational stress. While these methods have been applied to other substantive topics, their application here is novel.

Finally, tying the above points together, this study is justified insofar as it improves the effectiveness of policies aimed at preventing or reducing the harmful consequences of changing employment arrangements. Either by focusing on those topics that have received little attention to date, or by applying new methods to long-standing research questions, this thesis extends our understanding of the link between recent work trends and individual well-being. Better insights, in turn, proffer more effective and appropriate policy responses. Insecure or intensive working conditions ought concern governments, employers, unions and healthcare professionals. To the extent that this study can recommend more effective policy measures, it represents a significant contribution.

1.4 Overview of the thesis

The thesis has three parts. Part 1 is comprised of three chapters (including this one). Chapter 2 sets the substantive and theoretical context for later analyses. It considers both broader issues relating to the conceptualisation
of post-industrial society as well as more detailed trends in the nature of work. Chapter 3 reviews the data and methods used in the thesis. Part 2 contains three chapters that use European data to consider the moderated consequences of perceived job insecurity. Chapters 4, 5 and 6 consider the role family context, national economic conditions and labour market policies, respectively. Chapters 7 and 8 apply contrasting methods to examine a familiar theoretical model: the association between work intensity and psychological well-being. Chapter 7 uses British data to identify differential groupings in the association between intensity and psychological well-being while chapter 8 considers job demands and resources in a European context. The final part is comprised of two chapters. Chapter 9 provides a discussion of the main findings and chapter 10 concludes, outlining the limitations of the study and avenues for future research.
The starting point for this study is the assumption that, in the second half of the 20th century, advanced economic nations underwent a period of social and economic transformation, particularly with regard to labour market structures and processes. This thesis aims to describe how, and explain why, these changes are associated with individual well-being. Throughout the study, there exists a tension between macro- and micro-level processes – the ‘big picture’ of post-industrial change versus the individual experience of everyday life. The literature is awash with theories of how society has changed in the ‘post-industrial’ era. Located at the macro-level, this literature is concerned with changes to existing societal institutions and has informed a great deal of policy-making. This thesis argues for a move beyond such ‘grand theories’ of social change. If our priority is the enhancement of individual well-being, then the debates surrounding the ‘alternative forms of post-industrial society’ will contribute little. It matters not how societal shifts are labelled or conceptualised at the macro-level, but rather how these changes are experienced at the micro-level. Whether European societies in the 21st century can be described as ‘knowledge-based’ or ‘informational’ is of little concern. The focus should instead be on individual-level stressors, such as the fear of job loss or work overload. Whether these stressors collectively constitute a ‘new form of society’ is of little significance: the consequences for individual well-being are felt regardless of how broader trends are defined. Research should therefore seek to unpick the association between ‘stressors’ and ‘outcomes’. Why are some people more strongly affected by job insecurity than others? What factors most effectively buffer the consequences of job stress? The macro-level literature might paint the broader picture, but offers few insights into what post-industrial society means in everyday terms.

This chapter is split into three sections. The first considers the ‘big picture’ – the various macro-level conceptualisations of post-industrial society that have been proposed. While offering few insights into the micro-level experience of labour market change, this literature provides
context for later discussions. The second section provides a more detailed review of how specific work-based stressors operate at the micro-level, focusing upon perceived job insecurity and work intensity. The third section charts trends in these stressors over recent decades.

2.1 The Big Picture: the rhetoric of post-industrial society

Post-industrialisation is a period in which the economic emphasis of western nations shifted from industry and manufacturing to services and finance. Over the past 40 years a plethora of studies have sought to define this transition and evaluate the consequences for society. This literature has had considerable academic, political and cultural influence. This section summarises the historical roots of ‘post-industrial society’, before critically considering some of the alternative models that have been proposed. The central question to establish is, as Carlaw et al. (2006) ask, “whether we are currently living through a period of fundamental change, as radical and extensive as the ‘great transformation’ of the 18th and 19th centuries” (p. 635). Have new economic priorities or technological advances brought about societal transformation? Or is there greater continuity than some theorists would suggest?

2.1.1 The roots of post-industrial society

While it is Bell (1974) who is most enduringly associated with the concept of post-industrial society, its roots can be traced back even further. The first scholarly promulgation of the ‘knowledge society’ was provided by
Machlup’s *The Production and Distribution of Knowledge in the United States* (1962). Based on occupational and national income statistics, Machlup argued that the fastest growing industries in the USA are those engaged in ‘knowledge production and dissemination’ (Webster 1995: 442). Machlup classified knowledge production into six major industries: (1) education, (2) research and development, (3) artistic creation and communication, (4) media of communication, (5) information services and (6) information machines (chapter 14). Overall, he found ‘knowledge production’ for the USA in 1958 to account for almost 29% of GNP (p. 357). A similar approach was adopted by Porat and Rubin (1977), who found total expenditures for ‘knowledge production’ to increase steadily from 1958 to 1980 (from almost 29.1% in 1958 to 34.3% in 1980).

Machlup’s concern with “the role of knowledge as a commodity to be bought, sold, and invested in” (Langlois 1985: 233) resonates with the work of Lyotard (1984) who, some 20 years later, similarly argued that “knowledge is and will be produced in order to be sold” (p. 4). Lyotard’s starting point was that “the status of knowledge is altered as societies into what is known as the post-industrial age” (p. 3). In the face of technological advances, he argues, knowledge can only survive if quantified into units of information. Lyotard’s thesis goes beyond the space available here, but what is important is the emphasis upon knowledge as a dominant force of production, and the connections between knowledge and power:

> Knowledge in the form of an informational commodity indispensable to productive power is already, and will continue to be, a major – perhaps the major – stake in the worldwide competition for power (p. 5).

In 1974, Bell presented his concept of post-industrial society in what has been described as a “march through the employment sectors” (Kumar 2005: 26). Writing in *The Coming of Post-Industrial Society* (1974), Bell argued that, over time, one could see a transfer through three phases of employment: From an economy where agricultural labour provided income for the majority of workers (pre-industrial society), to where manufacturing was dominant (industrial society), and most recently, to where the majority are occupied in service employment (post-industrial society). Bell emphasises the centrality of information and knowledge. Whereas industrial society was based on “the coordination of machines and men for the production of goods” (Pyörä 2005: 119), post-industrial employment is concerned with the creation and transfer of knowledge.
What matters now, “is not raw muscle power, or energy, but information” (Bell 1974: 127).

Bell’s notion of post-industrial society, as the culmination of three distinct phases of employment, shares much with the writings of Toffler. His influential book, *The Third Wave* (1980), argues that there have been two previous ‘waves’ of technological revolution, namely, the agricultural and industrial revolutions. Driven by new information technologies, the information revolution represents a third wave of socio-economic re-organisation. In the transitional period between the second and third wave, society has been remade:

*This remaking is reflected in the way states interact, the way society is organised and the sorts of economic activities which will be valued and provided employment* (Toffler and Toffler 1993: 12).

### 2.1.2 Alternative forms of society

Drawing upon the ideas of earlier theorists, such as Bell and Toffler, several authors have sought to explain post-industrialisation in terms of new societal models. These tend to emphasise a single organising logic (e.g. the ‘knowledge’ or ‘network’ society) and are applied either to the whole of society, or to particular employment classes, such as the ‘creative class’ (Florida 2002) or ‘technocrat’ (Touraine 1971). These models overlap considerably. Most highlight the role of technology (particularly developments in telecommunications) and emphasise the creation, storage and transfer of knowledge.

#### The ‘information’ or ‘knowledge’ society

Bell identifies the emergent ‘information society’, defined as the growth of a new social framework based on telecommunications (Bell 1974). This framework is “decisive for the way economic and social exchanges are conducted, the way knowledge is created and retrieved, and the character of work and occupations in which men are engaged” (p. 8). His argument was that, based on the growing significance of knowledge and enabled by new telecommunications infrastructures, new economic structures were replacing existing frameworks. As Lyon puts it, “knowledge and information supplanted labour and capital as the essential variables of the economy” (Lyon 1995: 56). Moreover, it was argued that these new economic processes were leading to new social frameworks.
The willingness of commentators to employ ‘information society’ rhetoric has been unhelpful. The phrase has become a byword for any number of processes relating to the role of knowledge in society. As Garnham (2000) argues, the term has become largely meaningless, bearing “very little relation to any concretely graspable reality” (p. 139). Garnham takes this argument further, suggesting that the rubric serves as an ideological mantra, “used to elicit uncritical assent to whatever dubious proposition is being put forward beneath its protective umbrella” (p. 139).

The Network Society

In the mid-1990s, the concept of the ‘Network Society’ was popularised by Manuel Castells in his three-volume work *The Rise of the Network Society* (1996). Castells’ starting point was that developed nations were experiencing the ‘information age’, described as “historical period in human society performed their activities in a technical paradigm constituted around micro-electronics and based information-communication technologies” (Castells 2000: 5). Echoing the rhetoric of Bell and Toffler, Castells suggested that the information and communication paradigms of the ‘information age’ had replaced the technological paradigm of the industrial age, which was “organised primarily around the production and distribution of energy” (p. 5). However, whereas Bell and Machlup emphasised information-intensive activities, Castells argues that information, itself, is not what matters, since knowledge and information have been essential to all societies (p. 5). Rather, it is a reliance on networks “as the key feature of social morphology” that is characteristic of the network society (ibid.).

Two points central to Castells’ argument are (a) the notion of a ‘new economy’ and (b) the redefinition of time and space. According to Castells, the ‘new economy’ is characterised by three fundamental features. First, the economy is informational, in that the capacity to generate and process information determines the productivity and competitiveness of the businesses or employees (p. 10). Second, the economy is global insofar as its core activities can be organised “on a planetary scale in real or chosen time” (ibid.). Finally, the economy is networked in that the central pattern of economic organisation adheres to a network structure.

The ‘redefinition of time and space’ refers to how networked social structures are linked to the “redefinition of the material foundations of our life” (Castells 1996: 5), as other theorists have also suggested (Giddens 1984; Lash et al. 1994). Castells proposes the notion of “timeless time
in the space of flows” (Castells 2000: 13) as two emergent forms of time and space. In contrast to the structured notion of time in industrial or pre-industrial societies, timeless time is defined by “the use of new information/communication technologies in a relentless effort to annihilate time” (p. 13). Time is compressed, in that global communications and transactions are now almost instant and de-sequenced. The ‘space of flows’ refers to the “technological and organisational possibility of organising the simultaneity of social practices without geographical contiguity” (p. 14).

The Creative Class

Several authors have focused on particular employment practices or sectors of the labour market in their portrayal of post-industrial change. Florida highlights the role of creativity as “the motor force of economic growth” (Florida and Tinagli 2004: 11), identifying a ‘creative class’ of workers (Florida, 2002). Echoing earlier theorists, Florida states that advanced industrial nations are undergoing a transformation “from an industrial to a creative economy” (p. 11). Whereas the industrial revolution “substituted one set of physical inputs (land and human labour) for another (raw materials and physical labour), the current transformation is based fundamentally on human intelligence, knowledge and creativity” (Florida and Tinagli 2004: 9).

Florida argues that global competition is no longer based on the trade of goods or services “but on the competition for people” (p. 12). Creativity has become the driving force of economic growth and the ability to prosper in world markets requires nations to attract, retain and develop creative workers (p. 5). The creative class represents “a fast-growing, highly educated and well-paid segment of the workforce” who occupy a variety of industries, “from technology to entertainment, journalism to finance, high-end manufacturing to the arts” (Florida 2002: 3). The distinguishing feature of creative workers is that they engage in work whose function is to “create new meaningful forms” (p. 69). Florida defines two components of the creative class: the ‘super-creative core’ (scientists, academics, artists) and ‘creative professionals’ (those working in financial services or legal and healthcare professions). According to this thesis, economic growth is based on the ‘3Ts’: Technology, Talent and Tolerance. New ICTs play a central role in the creative economy but “other factors come into play as well” (p. 40). Talent, operationalised as human capital, is also key. Following the assertion that “every single human being is creative and houses creative potential” (p. 11) and that talented people
are highly mobile (p. 40), the call for tolerance is a recognition that successful economic units (whether countries, regions or firms) are those that most effectively “mobilise their own creative capacities and compete for creative talent” (ibid.).

Globalisation

In recent years ‘post-industrial society’ has been superseded by the broader concept of ‘globalisation’, defined most simply as “a combination of processes that have led to growing worldwide interconnectedness” (Buchholz et al. 2009: 53). Three macro-structural trends are commonly identified as having become increasingly dominant since the 1980s: (a) the internationalisation of markets, (b) the growth of tax competition between countries and (c) increasing social and economic connectedness, facilitated by new ICTs (Mills and Blossfeld 2006; Mills 2009). Beyond this initial consensus, however, the term is highly contested and ideologically motivated with interpretations varying from one context to the next. While globalisation is inherently multidimensional, for example, it is the economic domain that is typically emphasised (Castells 1999). The shift towards a ‘globalised economy’ has been described as “a transition towards a knowledge economy, a model of economic accumulation based on flexible production technology, as a disintegration of corporate hierarchies internetworks, and increasing importance of economic networks” (Benner 2003: 134). As Castells (1999) puts it, a global economy is one “whose core activities work as a unit in real time on a planetary scale” (p. 4). Economic globalisation entails increasing international trade and the opening up of markets, but also “a faster pace, greater pressures to innovate” and more privatisation and deregulation (Draxler 2006; Beck and Beck-Gernsheim 2008).

Given the multi-dimensional nature of globalising trends, and the breadth of economic and socio-cultural discourses surrounding the concept of ‘globalisation’, the term is inherently difficult to conceptualise (Held et al. 1999; Raab et al. 2008). While a more thorough review goes beyond the space available here, Lechner and Boli (2011) provide a useful summary.

2.1.3 A critique of the ‘new society’ claim

Most accounts of post-industrial change share a common assumption: that new economic structures and processes have propagated new forms of social organisation. Associated with the shift from manufacturing to services, and enabled by new information technologies, these changes
mark a departure from previous societal models, and consequently, require new concepts and new ways of thinking.

It is important to evaluate these claims critically. To what extent does the umbrella term ‘information society’ portray the everyday experience of life in the 21st century? Are terms such as the ‘network society’ or ‘knowledge economy’ based on tangible, observable trends, or are they merely theoretical constructions? We cannot unproblematically accept the claim of epochal social change without first interrogating the assumptions upon which these claims are based. Three issues are considered below: (a) whether the purported changes are indeed new; (b) the difficulties of defining large-scale social change; and (c) the tendency for technological determinism.

**Critique 1: Things have not changed that much**

Perhaps the most common critique of the ‘new society’ claim is that the processes associated with post-industrialisation are not as novel or profound as proponents have argued (May 2002). Theorists heralding the arrival of a ‘new economy’ or ‘new society’, based upon a set of new ICTs, often forecast profound impacts at every level of society – “a revolution, remaking of the world” (p. 5). Nora and Minc (1980) argue that “a new age is being ushered in by new information technologies [that will] alter the entire nervous system of social organisation” (p. 3).

A corollary of this argument is that new social structures and processes require new ways of thinking. As May puts it, “all we previously knew about our societies is useless for thinking about this world” (2002: 5). Castell similarly argues that “the grand theories which explicitly and implicitly have produced categories with which we still, inadequately, think about our world, will have proved to be completely obsolete” (1992: 94).

Critical responses to these claims have emphasised the continuity of social and economic practices (Lyon 1995; May 2002; Carlaw et al. 2006). Despite a period of change the “underlying substance of our socio-economic system remains largely the same” (May 2002: 5) and our ideas about society “which have taken so long to develop and refine are not immediately invalidated by the information society” (p. 5). Knowledge and information were of central social and economic importance long before the advent of post-industrial society. Lyon (1995) similarly highlights continuities such as the persistence of labour market inequalities and the growth of state power using ICTs (p. 60). Indeed, it is enduring significance of military, commercial and government forces that have shaped many aspects of information society. As Lyon notes, it was military requirements that
gave birth to modern computing. Built in 1946, the first general-purpose electronic computer, the ENIAC, was intended to assist the aiming of guns and later was used in calculations for the atomic bomb (p. 56). As Edgerton argues in the *The Shock of the Old* (2007), “technology has not generally been a revolutionary force; it has been responsible for keeping things the same as much as changing them” (p. 212). Rather, it is old technologies applied in new social contexts that shape societal development.

In summary, the capabilities of new ICTs to process and transfer information may intensify existing social or economic processes, but existing social cleavages (such as the distribution of wealth) will persist. The forms of capital that drive social divisions may have diversified but the underlying mechanisms have remained broadly constant.

**Critique 2: Problems of terminology**

A second criticism is that there remains little consensus as to what terms such as the ‘knowledge economy’ or ‘information society’ actually entail and how they should be conceptualised or operationalised (Sengupta et al. 2009: 30). These terms often used interchangeably or as a synonym for other concepts (Szabó 2005). Similar trends fall under different labels and definitions vary considerably. Consider the notion of the ‘creative class’ (Florida 2002): Not only are there numerous, often divergent, accounts of the role of creative or cultural labour (Mathur 1999; Seltzer and Bentley 1999; Garnham 2005), but countless alternative ‘new classes’ of employment have been proposed. These include the ‘intellectual proletariat’ (Morris and Bax 1886: 603), the ‘managerial class’ (Burnham 1941: 81), the ‘knowledge workers’ (Drucker 1993) and the ‘technocrat’ (Touraine 1971: 71).

Bell (1974) similarly defines a new ‘knowledge class’ as “the scientists, the mathematicians, economists and the engineers of the new intellectual technology” (p. 344). In terms that resonate with Florida, Bell argues that “talent and the spread of intellectual institutions will become a private concern of society” (p. 345). A more extensive summary is provided by Barbrook (2006), who identifies 78 new classes of employment, from ‘The Philosophers’ (Smith 1791) to the ‘Pro-Ams’ (Leadbeater and Miller 2004).

Overall, the argument is not these ‘classes’ are identical, but that there exists a considerable degree of overlap from one to the next. The structure and organisation of the labour market is rarely as novel as many proponents would argue. Certainly, there have been important changes
in terms of labour market processes, but these are emerging alongside (rather than replacing) existing structures.

**Critique 3: Technological determinism**

Perhaps the most serious weakness of information society theory is the tendency for technological determinism (Yoshimi 2006). That is, accounts that take advances in technology to be the single determinant factor behind societal change (May 2003: 3). Technological determinists see “a logic to technological developments which is beyond our influence” (p. 2), leading writers such as Negroponte (1996) to argue that the information revolution is a natural force that will advance automatically, regardless of the social or political context (p. 230). The emergence of an information society is presented as inevitable outcome of economic development in Western societies: “it is simultaneously the obvious and logical way forward” (Lyon 1995: 73).

Such arguments are problematic insofar as they deny the social shaping of technological advances and innovations. They obscure vested interests that do much to shape the proliferation of technological innovation (Lyon 1995: 73). Rather than accepting the ‘logic of technological development’, a critical account of the information society emphasises the role of social and political choice. The use and deployment of technology has no fixed logic or predetermined trajectory (p. 11), but rather, is “deeply embedded in existing social, political and economic practices and relations of society” (ibid.).

Furthermore, it has been argued that the attempt to present technology as a deterministic, unstoppable force is ideologically driven and “deployed to shape the future and deny other alternatives” (May 2003: 3). As Garnham (2000) argues, the ‘information society’ represents an ideological mantra that merely distracts from actual patterns of social change. The concept is used “to elicit uncritical assent to whatever dubious proposition is being put forward beneath its protective umbrella” (p. 140). This latter argument is important. By granting new patterns of economic organisation this ‘natural’ status effectively forecloses debate over alternatives. Sardar (1999) puts this argument most succinctly:

> In a very subtle way, predictions and forecasts silence debate and discussion. They present technology as an autonomous and desirable force and project the future as unavoidable. The desirable products of technology generate more desire; its undesirable side effects require more technology to solve
them. We are locked in a linear, one-dimensional trajectory that has actually foreclosed the future.

In response to this ‘one-dimensional trajectory’, it is important to reiterate the embeddedness of social and economic relations. While theorists may emphasise globalised interactions and the dislocation of place, these processes are nonetheless mediated by economic, social and cultural contexts from the macro- to micro-level. Moreover, these developments are likely to be strongly path dependent – historical context will filter future developments. As Castells and Himanen (2002) argue, “the paths and outcomes of this transformation are extraordinarily diverse [...] there is no one model” (p. 3). There will be no single, inevitable future, but many different futures. Differing welfare regimes (Esping-Andersen 1990), varieties of capitalism (Hall and Sockice 2001) and political structures (Hudson and Lowe 2004) will all play a moderating role.

2.1.4 A risk perspective

The accounts of post-industrialisation described above emphasise advances in technology and the growing significance of information and knowledge. An alternative model is provided by Beck’s Risk Society thesis (1992), which highlights risk as the central organising logic. This section introduces Beck’s thesis as an alternative framework for thinking about post-industrial change, before outlining the more recent concept of ‘new social risks’ (Bonoli 2007).

Differing sociological approaches to risk

There are many, competing sociological accounts of risk, which remains an “elusive, contested and inherently controversial” concept (Power 2004: 13). Some of the earliest uses of the term are associated with maritime ventures, where risk refers to natural events such as a storm or flood (Lupton 1999: 5). Giddens (1999) similarly notes the association between early mercantile society and the assessment of hazards involved in trading. Early ‘rule of thumb’ approaches (Althaus 2005) were later replaced with scientific-technical probability (Taylor-Gooby 2008), whereby risk was defined as “damage from the event multiplied the probability of the event occurring” (Adams 1995: 8). Reframing the contrast between subjective and technical risks, Adams (2007) distinguishes between three types of risk: (a) directly perceived risks; (b) risks perceived through science; and (c) virtual risks. The latter occurs when science is unable to determine the level or explain the cause of risks, and “people feel liberated to argue from
their pre-established convictions, beliefs, prejudices and superstitions” (p. 2).

The varying definitions of risk are, largely, the result of contrasting institutional or disciplinary contexts, and each carry differing epistemological assumptions. Simplifying greatly, these perspectives can be positioned on a spectrum – from positivism or empiricism, at one extreme, to the social constructivist tradition at the other. Considered above, the scientific-technical approach to risk supposes an empiricist epistemology where ‘risk’ is a purely technical term referring to the known or unknowable probability of an event (Lupton 1999: 22). At the opposite extreme, social constructivism emphasises the socially constructed nature of risks and contends that perceptions of risk will vary from society to society and from person to person (Douglas 1992). Individuals will experience and react to risks differently, according to their cultural and social structural positions (Titterton 2005). This approach can be subdivided into ‘weak’ and ‘strong’ constructivisms. The former argues that risks can be both socially constructed and objective at the same time (Latour 1993; Beck 1999). Risks can exist without us being aware of them, and conversely, we may perceive risk when there is none. Strong constructivism, by contrast, poses that “risk is always a social product” (Thompson et al. 1982: 148) and emphasises how risks are selected and legitimised for public attention (Kemshall 2003: 55). Strong constructivism is closely related to the ‘socio-cultural’ approach (Tulloch and Lupton 2003) and ‘risk culture’ thesis (Lash 2000) which attempt to overcome functionalist views of risk by emphasising the “more complex and dynamic processes of risk issues in everyday life” (Zinn and Taylor-Gooby 2006). Such thick descriptions offer insights into multiple, higher dimensions of risk-taking and risk experiences (p. 3). For example, the notion that risk-taking could be viewed positively as well as negatively (Lupton and Tulloch 2002; Tulloch and Lupton 2003). For a more thorough review, see Lupton (1999) and Jackson et al. (2006).

The Risk Society

The ‘risk society’ thesis is most commonly associated with the writings of Beck (1992; 1999), although Giddens (1994; 1999; 2003) has also been influential. The central claim is that modern societies are increasingly organised around the concept of risk (Stanford 2007: 35), and that risk has changed because of modernisation. Risk has become, in short, “a pervasive and integral aspect of the modern condition” (Mythen 2005: 130). For Beck and Giddens, while perceptions of danger have been
common to all societies, the concept of risk “is a distinctly modern term” (Stanford 2007: 35). As discussed above, risk in early modern society was principally concerned with scientific approaches to the calculation of known risks. Such views contended that risks could be perceived by the senses and identified within the “structural and systemic presuppositions” of modernity (Beck et al. 2003: 4). These were comprised of five key tenets (Stanford 2007): (1) the independent and territorially bounded nation state; (2) structured individualism; (3) the promise of a gainful employment society; (4) the exploitation of nature; and (5) increased scientisation and the functional differentiation between experts and layperson (p. 34). Put another way, modernity interprets risks as being ‘manufactured’ (Beck 1992: 173), as a consequence of modern systems of “political, economic, technological and industrial organisation and their attendant technologies of sovereignty, military power, capitalism and industrialisation” (Stanford, 2007: 36).

In modernity, Beck and Giddens argue, the rise of global and apocalyptic risks, such as the breakdown of the global economy or nuclear war, has introduced unprecedented levels of risk (Cooper 2008). Modern industry produces not only ‘goods’, such as higher living standards, but also ‘bads’, including pollution, radiation, climate change and social problems such as unemployment or the lack of care in old age. In part, risks have increased because of the “unravelling of traditional forces” (Cooper 2008: 1232) such as marriage and lifetime employment. Individuals are purported to face greater levels of insecurity, and in the absence of traditional life trajectories to rely upon, must instead produce their own biographies self-reflexively (ibid.). The production of ‘bads’ becomes an important element in “the framework of ideas and fundamental institutions of modernity” (Taylor-Gooby and Zinn 2005: 6). Political contests increasingly focus upon the avoidance of ‘bads’ rather than the gain of ‘goods’. Moreover, these unwelcome side-affects can affect social groups indiscriminately: “smog is demographic” (Beck 1992: 36).

The risk society perspective has been deployed for a range of purposes that go far beyond the scope of this chapter (see Ericson 1997; Jackson and Scott 1999; Boden 2000; Adam et al. 2000; O’Malley 2004; Mythen 2005; Mythen and Walklate 2006). The remainder of this section focuses on two key tenets of Beck’s thesis: the concepts of ‘individualisation’ and ‘cosmopolitanism’.
**Individualisation**

Proposed initially by Beck (1992) in the German context, the individualisation thesis states that individual behaviour is becoming less determined by traditional norms and sources of collective identity such as social class (Layte and Whelan 2002: 214). In the context of globalisation, the notion of class is “blurred away” by processes of individualisation (Bernardi 2000: 2). Central to this process is the shift towards reflexivity, whereby “individuals are conscious of their social context and their own role as actors within it” (Taylor-Gooby and Zinn 2005: 5). Not only has the need to manage social risks become more apparent, but this is increasingly an issue for individuals. As confidence in expert opinions and accredited authorities tends to decline, individuals become increasingly aware of the limitations of “official decision makers” (ibid.) The erosion of established structures – such as those provided by marriage, lifetime employment, family and community – further compounds the processes of individualisation, leading to heightened uncertainty and anxiety. In risk society, then, individuals increasingly required to act on their own initiative, to construct their own life trajectories.

The concept of individualisation has been applied to a range of sociological perspectives (e.g. Roberts et al. 1994; Kelly 2001; Layte and Whelan 2002). Of particular interest here is how the term is used in relation to poverty risks (Layte and Whelan 2002), where individualisation is framed as an alternative to the mainstream European tradition of class analysis, as typified by Erikson and Goldthorpe (1992) and Marshall (1997). Rather than seeing poverty as “the predetermined outcome of accumulated disadvantage” (Layte and Whelan 2002: 10), an individualisation perspective suggests that poverty is a more transient occurrence associated with particular stages of the life-course. The poor are thus seen as a heterogeneous group “affected by a variety of causal processes of whom only a small minority risk ‘cumulative decline’ into long-term poverty” (p. 214).

**Cosmopolitanism**

Closely related to individualisation is Beck’s (2006; 2007) call for a ‘cosmopolitan sociology’ in order to understand the “situations, impacts, division, contradictions, and desires the global generations” (Beck and Beck-Gernsheim 2008: 1). Cosmopolitanism is a contested term, lacking any established definition and overlaps with other terms, such as globalisation, transnationalism, universalism and glocalisation (Beck and Sznaider 2006: 2). Nonetheless, Beck and Sznaider insist that
cosmopolitanism in the social sciences is an “identifiable intellectual movement, united by at least three interconnected commitments” (Beck and Sznaider 2006: 2). The first is the critique of ‘methodological nationalism’, the tendency for social research to assume the theoretical framework of the national society or national state. In taking for granted the idea that ‘society’ is equated with ‘national society’, Beck argues, social scientists are blind to the “multi-dimensional process of change that has irreversibly transformed the very nature of the social world and the place of states within that world” (p. 2). In contrast to methodological nationalism, cosmopolitanism takes as its starting point “global variability, global interconnectedness, and global intercommunication” (Beck and Beck-Gernsheim 2008: 1). The second tenet of cosmopolitanism is the assertion that the 21st century is becoming an ‘age of cosmopolitanism’ (Beck 2006a). Whereas earlier theorists sought to understand the ‘Human Condition’ (Arendt 1958) or the ‘Postmodern Condition’ (Lyotard 1984), we are required, at the beginning of the 21st century, to “discover, map and understand the Cosmopolitan Condition” (Beck and Sznaider 2006: 3). Thirdly, Beck argues that to achieve this understanding requires a ‘methodological cosmopolitanism’.

**Critiques of Beck’s thesis**

While influential, the risk society thesis (and related concepts of individualisation and cosmopolitanism) have been subject to considerable critique, both theoretical (Lash 1993; Elliot 2002; Boyne 2003) and empirical (Tulloch and Lupton 2003). One common critique focuses on Beck’s conceptualisation of risk (Zinn 2006). Specifically, it is argued that risk is narrowed to “the responses of technical and environmental risks as unforeseen consequences of industrialisation” (p. 6). This definition, Zinn argues, fails to capture the broader societal developments regarding risk “as a specific historical strategy to manage uncertainties” (ibid.). Such a limited articulation of risk is insufficient to grasp the complexity arising from, for example, governmental risk strategies and rationalities (Mitchel 1999) and emotional and aesthetic (Lash 2000) or socio-cultural responses to risk (Tulloch and Lupton 2003).

Second, it has been argued that Beck’s thesis overstates the novelty of risks in modern society and the extent to which these risks result in a general heightening of anxiety. Although many would agree that risk in modern society results in a new set of social pressures and tensions (Esping-Andersen 2002; Taylor-Gooby 2004; Bonoli 2006; Bonoli 2007) there are those who argue that little has changed in modernity (Dingwall
Countering the claim that risks in modernity foster a higher public awareness of risk (Zinn 2006: 7) it is argued that not all forms of risk are affected equally (Rose 1999). The remainder of this section outlines an alternative perspective on risk in modern society.

### 2.1.5 New Social Risks

New Social Risks (NSRs) are defined by Bonoli (2007) as:

> Situations in which individuals experience welfare losses that have arisen as a result of the socio-economic transformations that have taken place during the past three to four decades and that are generally subsumed under the heading of post-industrialisation (p. 498).

According to proponents, NSRs have emerged because of demographic, social and economic changes of the past four decades, and because of the incongruity between welfare risks and existing forms of social protection. These risks are purported to represent a qualitatively different challenge to those faced previously, affecting different strata of the population at different periods in the life course. The NSR literature highlights two transformations relating to (a) the labour market and (b) family arrangements.

#### Labour market transformations

Amidst growing international competition and where low wages are used to attract investment (Taylor-Gooby 2004: 4), the labour market requires employees to become ever more flexible while simultaneously demanding high-level skills and greater productivity (Esping-Andersen 1999: 173). The emphasis on tertiary education and the growth of low-skilled, low value-added jobs introduces significant risks for individuals lacking such high-level qualifications. As average levels of educational attainment increase, the disadvantage of low skills is compounded. Individuals who would previously have been employed in manual or semi-manual professions not only lack the necessary skills, but find their existing qualifications rapidly becoming obsolete. The NSR literature highlights two domains of labour market transformation as salient: (a) the growth of residual low-wage employment and (b) the consequences of competitive working practices.

Firstly, while post-industrial labour markets will favour high-level skills and high-wage employment, this will be paralleled by an expansion of low-wage, low-productivity service employment offering few opportunities
for progression (Esping-Andersen 2000: 15). Individuals lacking skills are increasingly vulnerable to low-wage employment (Taylor-Gooby 2004: 21) and the opportunities for skill increases are much more likely higher up the occupational ladder (Gallie 2002: 113). Of course, low-skilled workers have always faced disadvantage (Bonoli 2007: 499), but whereas low-skill workers in industrial society benefited from the productivity increases accrued from technological development, the low wage sectors of the post-industrial labour market (such as retail, cleaning or catering) offer few possibilities for equivalent advances (Pierson 1998: 551). Most low-skilled workers remain in precarious or low wage jobs, or are unemployed (ibid.). Moreover, whereas manufacturing workers in industrial society benefited from the mobilising capacity of trade unions, the wages of low-skilled employees today are largely determined by market mechanisms (Bonoli 2007: 499). One consequence of this ‘residualisation’ of unskilled employment is that labour markets will appear “more dualistic and possibly polarised by skills, education and earnings” (Esping-Andersen 2000: 15).

Secondly, the demand for flexible labour has led to new, increasingly hazardous, patterns of employment. As noted earlier, employment trajectories are no longer based upon a ‘job-for-life’, but rather, are curtailed by temporary or insecure work. Since most welfare systems have been inherited from the post-war era, and thus remain optimised for workers who spend their entire working life in full employment, this represents a substantial risk. Individuals who follow atypical career paths risk insufficient social security coverage and a loss of welfare (Bonoli 2007: 501). The demand for flexibility has also given rise to concerns over the deteriorating quality of work (Stehr 2002). If, as Esping-Andersen (2002) argues, “participation is seen as a primary social good”, then the quality of jobs becomes as important as the quantity (p. 9). Stressful, insecure employment involving long or unsocial hours or low-wages can have severe ‘spill-over effects’ on families and children (p. 10). Low-grade work that provides few opportunities for career progression tends also to become “low-skill traps in which people can easily experience an erosion of their learning abilities” (ibid.).

Changing family patterns

The NSR thesis also highlights the proliferation of new family patterns, relationship structures and gender roles (Esping-Andersen 2002: 27). New family arrangements, such as incomplete households, unofficial cohabitation and multiple marriages over the life course, introduce new
risks for welfare provision (Draxler 2006: 27). The ‘nuclear family’ or ‘male breadwinner model’, which formed the basis of post-war welfare policy, can be relied upon less and less to absorb welfare risks (Lewis 2001). Changing marital patterns (e.g. increasing divorce rates and more unstable partnerships) introduce new insecurities, with separation often resulting in entitlement losses for one or both partners (Bonoli 2007: 500). Rises in single parenthood are especially problematic and often associated with higher incidences of poverty, or if mothers work, less parental attention to children (Esping-Andersen 2002: 56). Employment is key to reducing poverty risks but can have a negative effect if jobs produce stress and fatigue (ibid.). Moreover, for mothers or fathers to engage in paid employment (and avoid the negative effects upon children’s cognitive development) assumes access to affordable, flexible and high quality childcare, which is often not the case.

Finally, associated with both the emergence of new family forms and labour market change, NSR proponents highlight the “enormous behavioural change” (Lewis 2001: 153) in the employment of women over the past four decades, with increasing numbers of women occupying part- or full-time positions. Of course, the increased tendency of women to enter the labour market does not, in itself, constitute a social risk (indeed, women’s employment is shown to improve family welfare; Esping-Andersen 2002: 65). Rather, the risk arises from the difficulties of combining motherhood and child-rearing with paid employment (p. 65). The pressures of balancing work and family are experienced most acutely for women engaged in low-skilled or low-wage employment, lone-parents or those caring for elderly relatives (Taylor-Gooby 2004: 2).

**Critiques of the NSR perspective**

The NSR approach is valuable insofar as it emphasises the interplay between labour market and family contexts. Most usefully, it relates to sweeping notions of ‘post-industrialism’ or ‘risk society’ to everyday practicalities of work and family life, thus linking the grand theories of Bell (1979), Beck (1992) and Castells (1996) with the practical concerns of individuals and families in 21st century Europe. Nonetheless, it is important to evaluate the concept critically, as the approach introduces several problematic assumptions, particularly regarding the role of women and historical narrative.

Naumann (2007) argues that the reconciliation of work and family life is “not a new structural problem, that is new in kind, but an unresolved old structural problem, as old as industrialisation” (p. 17). According to
Naumann, risks can be considered ‘new’ in three ways. First, risks may be new if they have never occurred before in history (e.g. HIV infection as a social risk that did not exist before WW2; p. 5). Second, risks may be new by degree, if an existing risk has grown to affect a larger population. Third, risks may be new ‘as a cognitive frame’, that is, risks may have only recently entered the public consciousness and social phenomena may have existed for some time before being classified as a risk (p. 5).

Naumann highlights that even a century ago, families were struggling to cope with the balance of work and care responsibilities, and that since the beginning of the 20th century this imbalance has grown alongside increased female integration into the labour market (p. 6). Even at the post-war height of the industrial male breadwinner welfare state, every third mother with a young child was in gainful employment. In short, conflicts between work and family life long predate any notion of post-industrial society.

The consideration of the historical narrative underlies a second critique of the NSR approach, namely, that there was never any ‘golden age’ of welfare state and family/work reconciliation as NSR proponents argue. Naumann takes issue with the image of a “coherent, internally consistent welfare state” where different parts of the system complement one another “to create a stable, well-functioning welfare arrangement” (2007: 7). As Naumann argues, for women in the ‘golden age’ with caring responsibilities the industrial welfare state was altogether more complex and messy than Bonoli (2007) and others suggest. Even then, women were engaged in precarious, atypical employment and were inadequately protected by welfare interventions. The NSR concept identifies the mismatch between contemporary social risks and inherited post-war social protection schemes, but this was as true in the 1960s as it is today.

A further weakness of the NSR concept is how it frames structural tensions between work and care as an individualised risk for women. Naumann highlights similarities between the NSR approach and the ‘Women’s Question’ that arose at the end of the 19th century. Specifically, concerns were raised about the consequences for children of poor health and squalor, but rather than being seen as a societal risk, these problems were perceived as pertaining solely to women.

Overall, while the NSR approach usefully conceptualises risk in terms of welfare outcomes, it introduces several normative assumptions, particularly relating to the role of women. Women’s employment and the work/care dilemma represents a ‘risk’ only insofar as one accepts a male breadwinner model. This highlights the need to avoid labelling certain
situations as risks based on normative judgements, and to examine the more fundamental structural tensions that underlie these circumstances.

2.1.6 Summary: The limitations of a ‘big picture’ approach

It is widely assumed, not just in the academic literature, that advanced economic nations have undergone a period of substantial social and economic transformation, focused around an increasingly globalised, networked, informational and knowledge-based economy. There are two problems with this position. First, despite countless articles, books, newspaper reports, policy statements or speeches by politicians, there is an astounding level of incoherence as to what this ‘new society’ actually comprises. Certainly, technological innovation plays a role, as does the increased inter-connectedness of global economic structures and processes. But beyond these basic assertions lies a considerable amount of conjecture, hype and rhetoric (or worse, determinism). If anything, the eminence of the post-industrial rhetoric is a demonstration of the power of ideas. Rarely are accounts of post-industrial change based on empirical evidence, and yet, through repetition become established as received knowledge. The second problem with the ‘big picture’ perspective is that it offers few insights into how such societal changes operate at the micro-level. Theorists who label society according to some new economic logic (e.g. information, creativity or networks) often carry the implicit assumption that these changes are felt throughout all of society. That this ‘new wave’ constitutes the remaking of society.

This is unlikely to be the case. Just as agricultural and industrial societies were characterised by inequality and insecurity and shaped by technological advances, so the changes heralded as ‘new’ in post-industrial society imply greater continuity than many theorists would suggest. Moreover, these changes will not affect everyone equally. Catch all terms such as ‘post-industrialisation’ or ‘globalisation’ are unhelpful insofar as they coalesce a disparate set of trends under a single, increasingly vague, umbrella. They overplay the significance of recent developments at the expense of long-standing continuities. Certainly, technology has come to play an increasing role in economic and social spheres. The proportion of people entering higher education (in Western nations) has increased considerably in recent years. Moreover, there has been marked shift in the employment profiles of OECD countries, from agriculture and industry towards services. However, whether these trends collectively fulfil the above forecasts is, for subsequent analyses, irrelevant. If workers
feel insecure, stressed or inadequately paid, it matters not whether the wider society can be described as informational, knowledge-based or networked. The failure of theorists to provide a coherent articulation of post-industrial society does not negate the impact of these changes. Heightened job insecurity or job stress will have important individual consequences whether or not the collective experience constitutes a broader societal shift.

2.2 The Small Picture: labour market change at the individual level

Economic and social relations in Europe have undoubtedly changed over the past 40 years, but, as evidenced above, theorists have struggled to explain these changes in terms of any unifying ‘grand theory’. Notions of ‘information’, ‘network’, or ‘risk’ society tell us everything and nothing: they define social change in terms of a new logic, but fail to attach this to everyday realities. They do little to explain how the purported socio-economic ‘transformation’ is experienced by individuals and their families. This thesis, in response, emphasises the social consequences of post-industrialisation at the individual level. If broader trends matter at all, then we should observe their impact at the micro-level. This is not to suggest that macro-level factors are irrelevant. Indeed, as later chapters demonstrate, individual experiences of social change are shaped and filtered by broader environmental factors. Nor is it theoretically unfounded: it is not a proposal to study changing working conditions without reference to wider societal changes. The starting point remains the post-industrial transformations identified by Bell and others, but to make sense of these changes, the analysis is located at the individual level.

This study posits that there have been changes in the social and economic organisation of advanced economic nations, and that these transformations have had (and will continue to have) important consequences at the individual level. Our understanding or conceptualisation of the bigger picture may be limited, but this fallibility does not negate the micro-level consequences. Subsequent chapters focus on two labour market trends: (a) the shift towards less secure employment arrangements and (b) the increasing demands placed on employees in terms of stress, overload, work intensity and long hours. The analyses investigate the consequences of these trends for individual well-being, and moreover, the extent to which outcomes are moderated by individual or contextual circumstances.
The focus is limited for several reasons. First, as detailed below, the prevalence and awareness of labour market insecurities and intensified working conditions have increased considerably in recent decades. Not only do more people report feeling insecure or overloaded at work, but the public, political and academic recognition of these problems has also escalated (see Figure 2.2). Second, these micro-level labour market experiences are endemic of broader post-industrial developments. Many macro-level theories (e.g. Beck’s Risk Society) emphasise increased insecurity and flexibility of working arrangements, but do not translate easily to micro-level analysis. Isolating observable trends at the micro-level provides one way to evaluate the consequences of societal transformation.

More simply, these trends are important because they are consistently associated with negative physical and mental health outcomes. Taking the starting point that social research should enhance well-being, this study hopes to disentangle the link between post-industrial employment and health, such that policy interventions can more effectively mitigate the harmful consequences. The remainder of this chapter focuses on job insecurity and work intensity, in turn. Consideration is given to the definition of each term, longitudinal and cross-national variation and the consequences for individual well-being.

### 2.2.1 Job insecurity

A focus on job insecurity concerns the shift towards more uncertain and unpredictable employment trajectories, the expansion of insecure employment and jobs with atypical contractual arrangements. Due to
globalisation, and as firms seek to keep pace with global competition by exercising greater control over working hours, there is increased demand for flexibility over the recruitment and dismissal of employees (Golsch 2002: 1). Through deregulation and flexibilisation of the labour market, national governments have “opened the way for employers to pass on economic risks to employees by means of atypical employment relationships” (ibid.). Heery and Abbot (2000) summarise this thesis most succinctly:

"Employment in the developed economies has become more insecure or unstable in the sense that both continued employment and the level of remuneration have become less predictable and contingent on factors that lie beyond the employee’s control (p. 2)"

The post-war model of stable employment has been substituted by insecure, atypical employment relationships. Moreover, these contractual arrangements are “spreading among all kinds of employees” (Golsch 2002: 1). As Heery and Abbot (2000) argue, “the incidence of both job instability and feelings of insecurity is changing and previously secure groups are now finding themselves in a precarious position” (p. 4). Post-industrialisation and globalisation have had a democratising effect on the distribution of risk, leaving few immune from market fluctuations (Cooper 2008: 1233). As Beck puts it, “you can run into anyone down at the unemployment office” (Beck 1998: 55). Individuals are increasingly expected to experience ‘patchwork careers’ comprised of short-term spells of work, fixed-term contracts or a reliance on casual work (Fevre 2007: 2).

The literature on job insecurity has expanded rapidly in recent years. While there is not space here to summarise this fully\(^1\), it would be useful to highlight some key terms.

**Defining job insecurity**

Various definitions of job insecurity have been proposed. Some emphasise worries about future employment, defining insecurity as “expectations about continuity in a job situation” (Davy et al. 1997: 323), “concerns about the future permanence of the job” (van Vuuren and Klandermans 1990: 133) or the “perception of a potential threat to the continuity

\(^1\)For a more thorough review, see Sverke et al. (2002), Burchell et al. (1999), Burchell (2005), Cheng and Chan (2008) or de Witte (2007).
in his or her current job” (Heaney et al. 1994: 1431). Other definitions highlight the involuntary nature of insecurity, focusing on the “subjectively perceived likelihood of involuntary job loss” (Isaksson et al. 2000b: 243) or as “powerlessness to maintain desired continuity in a threatened job situation” (Greenhalgh and Rosenblatt 1984: 438).

Most definitions view job insecurity as an inherently multidimensional construct, incorporating perceived threats to an employee’s position or job features, the relative importance of these threats and individuals capacities to counteract them. Anderson and Pontusson (2007), for example, consider three components: (a) the estimated probability of losing one’s current job; (b) the assessment of one’s ability to find a similar job elsewhere; and (c) the availability of income during unemployment (p. 228). Greenhalgh and Rosenblatt (1984) similarly identify three components of insecurity. The first is the perceived threat to various job features such as opportunities for promotion or control over work schedules. Recognising that employees are unlikely to value job features equally, the second component captures the relative importance of each. The overall ‘severity’ is thus the threat of the loss of each job feature multiplied by the importance this feature holds for the individual. The third component captures perceived threats to the individual’s job, such as being fired or laid-off (Ashford 1989: 805). The fourth component measures the importance of such an event for the individual. The final component is powerlessness, encompassing “an individual’s ability to counteract the threats identified in the first four components” (p. 805). Even if individuals perceive threats to their job or job features, and consider these important, the resulting level insecurity is dependent on their capacity to mitigate these threats.

When defining insecurity it is useful to identify several dichotomies, such as between ‘objective vs. subjective’ and ‘cognitive vs. affective’ forms (see Figure 2.3). Objective insecurity refers to positions that are inherently of limited duration, by the nature of the job (e.g. temporary or fixed-term positions; Pearce 1998; de Witte and Naswall 2003). Subjective insecurity, on the other hand, captures the individual’s own expectations about becoming unemployed, the loss of job features (such as autonomy or hours) and the consequences these changes may have. The conceptualisation of Greenhalgh and Rosenblatt (1984) is useful here. As illustrated in Figure 2.4, the subjective threat (i.e. the perceived level of insecurity) is derived from the objective threat “by means of the individual’s perceptual processes, which transform environmental data into information used in thought processes” (p. 440).
Workers have three sources from which to derive the subjective threat: official organisational announcements, unintended organisational messages and rumours. This latter category is particularly broad. Rumours may relate to the performance of the company (e.g. messages shared between co-workers) as well as broader economic prospects (e.g. information from local or national media outlets).

A further distinction is possible between ‘cognitive’ and ‘affective’ forms of insecurity (Ashford 1989). Cognitive insecurity is the individual’s estimate of the probability that they will lose their job in the near future, whereas affective insecurity refers to worries or anxieties about becoming unemployed. As Anderson and Pontusson (2007) put it, affective insecurity is the question of “what happens to me (and my family) if I lose my job?” (p. 4). Affective insecurity can be decomposed into two discrete
variables: (a) the prospects of finding another similar job and (b) access to non-work sources of income (Anderson and Pontusson 2007). This is consistent with the notion of ‘job dependency’, defined by Greenhalgh and Rosenblatt (1984) as a function of occupational mobility (the ability to find a similar job) and income insecurity (“the inability to meet living expenses without the income from the current job”; p. 445).

Finally, one can differentiate between job insecurity and employment insecurity, where the former is concerned with security in the current job and the latter with employability in the wider labour market (Chung and van Oorschot 2011: 7). This distinction is important. An individual may think that job loss is imminent, but if they feel confident of finding another position quickly, the consequences are likely to be moderate. By contrast, for those who think job loss is likely, and are pessimistic about finding another position (perhaps due to age, experience or skills), the consequences are likely to be more severe. The term ‘employment insecurity’ is often used interchangeably with the term ‘labour market insecurity’ (e.g. Anderson and Pontusson 2007). In this thesis, both terms are understood as the extent that an individual can maintain a continuous employment career, even if this includes changing employers or jobs (Dasgupta 2001; Pacelli et al. 2008). This is a function of both individual employability (e.g. qualifications, experience) as well as wider labour market conditions (e.g. unemployment or economic growth).

To date, most studies have considered cognitive insecurity, often referred to simply as ‘job insecurity’ (e.g. Heaney et al. 1994; Wichert 1999). This is perhaps because most large social surveys, if they address job insecurity at all, tend only to include questions on the ‘perceived likelihood of becoming unemployed in the near future’, or the extent to which an individual feels that ‘their job is secure’. This thesis employs a range of measures, reflecting variation in data availability and substantive focus. Most chapters adopt a cognitive measure of insecurity (e.g. 4 and 5), whereas others (e.g. 6) introduce affective components as well.

### 2.2.2 Job insecurity and subjective well-being

Past studies consistently show perceived job insecurity to be negatively associated with a range of subjective and objective outcomes, relating to physical or mental health, family circumstances and work attributes (e.g. performance, satisfaction and commitment). Given the space available, subsequent chapters consider self-reported psychological or physiological outcomes only. This omits all work-related outcomes such as job withdrawal, turnover intention, organisational commitment or job

The negative association between insecurity and health is well established in the literature. Numerous studies report a positive association between job insecurity and mental health complaints (Chirumbolo and Hellgren 2003) or impaired psychological well-being (Friesen and Sarros 1989; Kuhnert et al. 1989; Wilson et al. 1993; de Witte 1999), even after controlling for socio-demographic characteristics. Meltzer et al. (2009), for example, find strong associations between insecurity and depression, while Hartley (1991) finds workers with falling levels of perceived security to more likely to report psychosomatic symptoms and depression. Burchell (1994), in a study of 600 employees in the UK, finds reduced psychological well-being among individuals who feel insecure about their jobs. Roskies et al. (1993) show job insecurity to be associated with psychological distress, anxiety and depression, as does Orpen (1993) in his study of a manufacturing company in South Africa. Other studies supporting a link between insecure employment and depression include Folkman et al. (1979), Peterson et al. (1993), Dekker and Schaufeli (1995) and Landsbergis (1988).

Several studies support a link between job insecurity and physical health (e.g. Axelrod and Gavin 1980; Ashford 1989; Mattiasson et al. 1990; Heaney et al. 1994; Lim 1996; Isaksson et al. 2000a). Taber and Cooke (1979), for example, show feelings of job insecurity to increase somatic complaints and hypertension, while Mattiasson et al. (1990) highlight the consequences for cardiovascular risk factors. Other studies have shown job insecurity to be associated with a decrease in general well-being (e.g. Jick 1985; Hartley 1991; Barling and Kelloway 1996; Hellgren et al. 1999).

Several studies suggest an association between job insecurity and problems sleeping, although the evidence is less forthcoming. Greenhalgh and Rosenblatt (1984) conceptualised job insecurity as a source of stress and anxiety, which in turn are associated with somatic complaints such as a lack of sleep. At the country-level, Burchell (2009) shows increases in job insecurity to be associated with a corresponding decrease in the quality of sleep. In a longitudinal study of Finnish shipyard workers, Mattiasson et al. (1990) show workers faced with the ‘threat of unemployment’ are more likely to report sleep disturbances than those who did not feel their positions were threatened. Other studies provide evidence of sleep
disturbance before redundancy (e.g. Cobb and Kasl 1977; Arnetz et al. 1988; Withington 1989; Ferrie et al. 1998).

There is, in summary, strong and consistent evidence to support a positive relationship between perceived job insecurity and poor psychological or physiological health outcomes. What is less well established is the size of the effect and the underlying mechanism that produces it. Despite countless studies showing a significant association between insecurity and health, the strength of the relationship varies from moderate (Bussing 1999) to weak (Kinnunen and Nätti 1994) while others find no association at all (Barling and Macewen 1992; Lindstrom et al. 1997). The association is also dependent on the outcome measure in question (Clark 2005). This thesis takes the position that to understand the relationship between job insecurity and health, it is necessary to consider how outcomes differ among individuals. When faced with the threat of job loss, individual outcomes vary. What variables explain these disparities?

Cross-national differences in job insecurity

The extent of labour market deregulation varies considerably across Europe (Esping-Andersen and Regini 2000) and policies are strongly embedded within national economic, social and cultural contexts. It is reasonable to expect, therefore, that perceptions of job insecurity will also vary. This section considers the available evidence.

Several authors consider the macro-level context of temporary and flexible employment. Erlinghagen (2008), in a multilevel analysis of 17 European countries, finds evidence of significant cross-country differences in individual perceptions of job insecurity. This finding “is not only driven by social-structural or institutional differences, but also by nation-specific unobserved characteristics” (p. 183). Mertens et al. (2005) compare outcomes for fixed-term employees in Germany and Spain – two countries typically considered as examples of ‘rigid’ labour markets. While their findings go beyond the space available here, what is significant is the extent of variation between these two countries that share many structural similarities. While individuals on fixed-term contracts earn less than equivalent workers with permanent contracts in both countries, the paper cautions “against generalising findings from Spain to other ‘rigid’ European labour markets” (p. 3):

*In Spain the wage penalty is larger and it matters whether you have a fixed-term contract or not: in Germany it matters what kind of fixed-term contract you have (Mertens et al. 2005: 4).*
Guest and Clinton (2006) highlight that temporary workers are a heterogeneous group, likely to vary in skill levels and the extent to which they are employed on their contract of choice. This consideration of worker agency is also highlighted by Gash (2008), who considers whether women work part-time through “preference or constraint” (p. 655). That is, whether women prefer part-time positions because they are “less committed” to paid employment than their full-time colleagues (Fortin 2005), or whether women are structurally constrained in their jobs due to the “ongoing incompatibility of full-time employment and family life” (Gash 2008: 656). Guest et al. (2006) also compare the attitudes of workers in traditional employment contracts with those in flexible arrangements, considering whether workers are “free or precarious” (p. 107). They conclude that, for their sample of professional workers, “those on atypical employment contracts report experiences and attitudes that are at least as positive of those workers in traditional contracts” (ibid.).

To sum up, the literature reveals considerable variation in both the extent to which employment has become less secure and the ways in which this trend manifests. Two trends are worth reiterating. First, employment security is likely to vary significantly from one country, region, sector or workplace to the next. While the situation for temporary employees may be improving in some countries, it is unchanged or deteriorating in other (Green 2008). Second, even within particular sectors, outcomes vary markedly between different types of non-standard work (Bosch and Charest 2008). As Gebel and Giesecke (2008) argue, the category of ‘flexible employment relationships’ encompasses a range of arrangements (p. 112). As a first step, these authors highlight the distinction between ‘internal’ and ‘external’ flexibility:

Whereas the former means adjusting working times, training and firm-internal workplace reorganisation, the latter refers to the usage of temporary contract, outsourcing and subcontracting (p. 112).

It would be interesting, at this point, to consider the empirical evidence. Subsequent chapters use data from the 2006 European Social Survey. How do perceptions of job insecurity, on average, vary in this dataset? Figure 2.5 presents the weighted proportion of respondents who feel it is ‘likely’ or ‘very likely’ that they will lose their job in the coming year. The error bars show the 95% confidence intervals. The plot shows significant variation between the countries (i.e. the error bars do not overlap), with lower aggregate levels of job insecurity in Norway and the Netherlands, and higher levels in France and Portugal.
Critical views of job insecurity

Some have critiqued the notion of rising insecurity, pointing to evidence that shows divergent outcomes, even within particular employment sectors or occupational classes. Others have argued that globalisation does not inevitably lead to “an increasing erosion of male employment relationships” or the spread of ‘patchwork careers’ (Buchholz et al. 2009: 60). Rather, the employment careers of well-qualified and well-established men in the labour market have been broadly stable and protected from ‘flexibilisation’ by employers (ibid.). Flexible working practices are therefore inflicted upon less qualified and less experienced workers, such as recent graduates and young adults. Buchholz et al. (2009) describe this as a polarisation between ‘insiders’ and ‘outsiders’ (p. 60).

Even if the positions of ‘insiders’ are more protected than those of ‘outsiders’, there remain major differences within this subgroup (Mills and Blossfeld 2006). Numerous studies have shown the consequences of temporary or insecure employment to vary according to individual and institutional characteristics. Giesecke and Groß (2003), for example, identify three sets of factors affecting the probability of holding a fixed-term contract: (a) individual effects, (b) structural effects and (c) effects of
the type of job (p. 165). Individual factors include age, gender, education and occupational class. Mills and Blossfeld (2005) find younger employees to be considerably more likely to enter temporary employment, compared to their older colleagues. Anderson and Pontusson (2007) similarly find perceived job insecurity to decline with age (p. 223), while “estimates of one’s ability to find another job” tend to increase with age. Moreover, there is some evidence to suggest that age differentials have increased in recent decades (Gebel and Giesecke 2008). The role of education is more mixed. On the one hand, Anderson and Pontusson (2007) find education to be “strongly and consistently” associated with more positive assessments of alternative job prospects (p. 223). Conversely, individuals with tertiary-level qualifications are more likely to occupy temporary positions, while vocational qualifications are comparatively more protected (Giesecke and Groß 2003; Gebel and Giesecke 2008). Structural effects include employment sector and firm size (Keizer 2008). Giesecke and Groß (2003) show temporary positions to be more common in agricultural and public sectors and to increase with firm size. Finally, existing job characteristics can influence the future likelihood of entering temporary employment (Giesecke and Groß 2003). Individuals in more senior positions with greater responsibility are less likely to enter temporary employment, due to their higher bargaining power (p. 165).

The notion of precariousness as problematic

Several authors have critiqued the notion of ‘insecurity’ itself. Rather than living in an ‘age of insecurity’ (e.g. Beck 1992), it is argued, the proliferation of insecure employment exhibits “strong continuities with, and often a strengthening of, past trends” (Sengupta et al. 2009: 30). McGovern et al. (2007) argue that contemporary jobs have a great deal in common with past employment arrangements, and an “image of ordinariness” may be more appropriate, whereby the “ordinary character of potentially good or bad jobs” is emphasised (Sengupta et al. 2009: 27). The notion of ordinariness has previously been deployed by Savage et al. (2001), who introduced the concept as a more accurate way of characterising workers’ identities “than either clear-cut class consciousness or a pursuit of some postmodern identity” (p. 888).

The continuities with past employment relationships are also emphasised by Neilson and Rossiter (2005). The notion of job insecurity as a recent phenomenon, these authors argue, overlooks two important facts. First, the growth of insecure or precarious work in advanced economic countries “is only a small slice of capitalist history”, and if the historical
perspective is widened “precarity becomes the norm” (para. 11). Second, the authors emphasise the precariousness of capital that itself is prone to crises, risks and uncertainty. By emphasising the insecurity of employment rather than that of capital, the precarity thesis effectively frames global economic insecurities as an individual risks for employees.

Recognising that the experience of insecurity varies considerably even between similarly placed individuals, several theorists have questioned the notion of a single, identifiable class of precarious workers. Several studies question the notion of “the precariat” (Bodnar 2006; Obinger 2009), a term with combines the words precario and proletariat in a single class category. Neilson and Rossiter (2005) argue that it is not possible to reduce such a diverse array of employment relationships into a single composite category, nor equally, into a single logic of production (Hardt and Negri 2000). There is no one model of the ‘precarious worker’. Neilson argues that the very notion of precarity encompasses something more than a position in the labour market. Moreover, the notion of an alliance between distinct social groupings of precarious worker “implies a degree of co-ordination and organisation that rarely coalesces at an empirical level” (ibid.). Finally, it has been argued by Fevre (2007) that the ‘age of insecurity’ thesis is not supported by the available evidence. Or rather, data for the countries upon which proponents such as Beck (1992) and Giddens (1998) base their hypotheses do not support the claims. If the ‘age of insecurity’ is dawning anywhere, Fevre argues, it is in Spain, Mexico, Portugal, Turkey and Poland (2007: 517).

2.2.3 Work intensity

It is widely acknowledged that workplace tension and strain have increased in recent decades (e.g. Green and McIntosh 2001; Kelliher and Anderson 2010). Work has become more stressful and faster paced, long or unsocial hours are more common and work and non-work boundaries are increasingly blurred. These changes have important consequences for individuals, organisations and society (e.g. Van der Doef and Møes 1999; Haüsser et al. 2010). At the individual-level, job stress is associated with impaired physical and mental health, as well as reduced job satisfaction and commitment (Burchell et al. 2002; Westman 2008). Organisational costs include sickness absenteeism, reduced productivity and additional retirement costs (Houtman et al. 1999). Societal costs include healthcare, social assistance related to early retirement and the potential loss of productive workers (Hoel et al. 2001). Many further costs arising from
job stress are likely to be externalised and distributed among individuals in society (Levi and Lunde-Jensen 1995).

It is difficult to evaluate the economic impact of job stress (Hoel et al. 2001; Chandola 2010) but past research provides several estimates. In the UK, job stress in 1996 was estimated to be costing employers £381 million per year (HSE 1999). The National Institute for Occupational Safety and Health (NIOSH) estimated that work-related diseases in the USA cost employers $26 billion annually (Sauter et al. 1990). More recent research by the International Labour Organisation estimated the cost of job stress for employers in Europe and the United States to be more than $120 billion annually (cited in Olson 2000). For the Netherlands, Koningsveld et al. (2001) estimated that the costs of absenteeism and disability in 2001 amounted €12 billion (or 2.96% of GNP). Finally, work-related stress in the UK was estimated to result in 10.8 million lost working days in 2010/11 (HSE 2011). In short, job stress has profound consequences at every level of society. Policies that reduce the prevalence or consequences of job stress (and the research that enables such policies) are much needed.

This section summarises the existing literature on job stress and work intensity. It provides a general overview, before focusing in more depth on the job-demands-resources model (JD-R; Karasek 1979; Bakker and Demerouti 2007). There are five parts. It (a) defines some key terms, before (b) considering the association between job stress and subsequent health outcomes. The third section (c) outlines some established theoretical frameworks; the fourth (d) provides a detailed overview of the JD-R model. The existing literature on job stress is vast and goes far beyond the space available here. For a more thorough review, see Burchell et al. (2002), Perrewé et al. (2010) or Cooper (2013).

Definitions

Despite the abundance of past research, there is no single accepted definition of work intensity (Burchell et al. 2009). The term encompasses a range of work-related psychological and physical demands arising from, for example, working very hard, for long hours or to tight deadlines. It is often used interchangeably related concepts such as ‘burnout’, ‘work overload’ or ‘job stress’. Burnout is defined as “a prolonged response to chronic emotional and interpersonal stressors on the job” (Maslach et al. 2001: 397), as the endpoint of a three-dimensional continuum between exhaustion, cynicism, and inefficacy (Leiter and Maslach 2005: 544) and as “a special type of prolonged occupational stress that results particularly
from interpersonal demands at work” (Schaufeli and Enzmann 1998: 8). Work overload is “the degree to which employees, in the course of their job, have to deal with too high work demands, which force them to make use of reserve capacities” (Schabracq et al. 2003), or the state of “having too much to do, in too little time, at too high a pace, with too few resources” (Wichert 2002: 97). Past studies have differentiated between qualitative and quantitative workloads, the former referring to the content and complexity of tasks and the latter to the volume of work (ibid).

Concerning job stress, Cox et al. (2000) identify three overlapping definitions. The first conceptualises stress as a characteristic of the work environment (p. 10). The second defines stress in terms of the subsequent health outcomes, “as a particular physiological response to a threatening or damaging environment” (p. 11). A third approach synthesises these perspectives, viewing job stress as the interaction between an employee and their work environment.

**Job stress and individual well-being**

There are countless studies linking workplace stressors with reduced physiological and psychological well-being. Kuper et al. (2003) present data from the Whitehall II study showing civil servants reporting high job demands and low job control (i.e. job strain) to be at a greater risk of coronary heart disease (see also Schnall et al. 1994). Allesøe et al. (2010) use data from the Danish Nurse Cohort Study to show how work pressure is associated with increased risk of ischaemic heart disease. Cooper et al. (1994) show job stress among 500 senior British police officers to be significantly associated with poor physical health outcomes. Finally, Evans et al. (1999) cite a number of studies showing the stresses and demands placed upon urban bus drivers to be linked with increased cardiovascular, gastrointestinal and musculoskeletal risks.

The association between job stress and psychological outcomes is equally well-supported (Kahn and Byosiere 1992). Past studies show job stress to be associated with increased anxiety, depression and hysteria, and decreased life satisfaction (Wichert 2002). Macewen et al. (1992) show work overload to be associated with depression and anxiety which, subsequently, motivated anger and withdrawal within marital relationships. Stansfeld et al. (1999) employ Whitehall II data to show high job demands to be associated with an increased risk of psychiatric disorder. Work stress is also associated with work-family conflict (Burke 1986; Bacharach et al. 1991; Blair-Loy 2009) and reduced sleep duration (Chatzitheochari and Arber 2009).
If there is ample evidence to support the stress-strain relationship, an equal abundance of research shows how this relationship is contingent on other moderating variables. These include factors relating to the work environment (e.g. control or support), demographic variables (e.g. age or gender), personality (e.g. coping strategies, hardiness) and family arrangements (in the form of social support and job dependency). Such influences may be located at the individual, organisational or national level. Daniels and Guppy (1994), for example, show how work-based social support and control can buffer the association between job stress and psychological well-being. van Yperen and Hagedoorn (2003) similarly show how job control can reduce the fatigue associated with high job demands. Siu (2002) examines job stress and psychological well-being for a sample of Chinese workers, showing organisational commitment to buffer the stress-strain relationship.

Individual characteristics, such as age (Winefield and Anstey 1991), gender (Cieslak 2009), ethnicity (Miller and Travers 2005) and personality (Parkes 1994; Glazer et al. 2004) are also important. Stress reactions have been shown to depend on traits such as locus of control (Parkes 1991), Type A behaviour (Cooper et al. 1994), negative and positive effect (Billings et al. 2000), hardiness and emotional reactivity (Howard et al. 1986), coping mechanisms (Osipow and Davis 1988; Parkes 1990), self-esteem (Brockner 1988; Brockner et al. 1993; Judge and Bono 2001) and proactivity (Parker and Sprigg 1999).

Theories of job stress

As demonstrated above, the breadth of the job stress literature makes it easy to become lost. Over the past half-century, a plethora of studies has investigated just about every aspect of the work-health nexus. There is considerable overlap from one concept to the next and many inconsistencies in how these are operationalised. To provide some structure, therefore, this section outlines existing theoretical frameworks relating to job demands and strain. After summarising some of the more well-known perspectives, the discussion focuses on Karasek’s (1979) job-demands-control model (herein DCM). The focus on Karasek’s model is justified for three reasons. First, the DCM provides a map with which to navigate the existing literature. It serves as a filter, isolating a theoretical, disciplinary and empirical base for subsequent analyses. A second reason is popularity: the demand-control model has dominated the empirical research on stress and health over the past 20 years (Bakker and Demerouti 2007: 310). As Siegrist et al. (2004) note, the DCM is “the most influential
and widely tested approach towards assessing psychological stress at work” (p. 1494). Thirdly, insofar as the model highlights the buffering potential of job resources, it fits well within the broader theme of moderation. Whereas other theories emphasise imbalance – e.g. between a worker and their environment or between effort exerted and the subsequent rewards – the DCM is preferred since it emphasises moderating mechanisms.

**Person-environment (P-E) fit theory**

P-E fit theory states that the degree of fit between an individual and their work environment determines the stress and subsequent strain that is experienced (Ganster and Schaubroeck 1991: 241). Two types of fit typically considered: (a) fit between job outcomes and the needs, motives and preferences of the worker; and (b) fit between job demands and the worker’s abilities. While popularised by French and colleagues (French Jr and Kahn 1962; Caplan et al. 1975; French et al. 1982), P-E fit theory has since been critiqued on methodological and theoretical grounds. For example, tests of the theory are commonly based on the same small set of dimensions along which to measure fit, relying almost entirely on subjective assessments and often use either inappropriate measures of ‘person’ or ‘environment’ or inappropriate statistical models (see Edwards and Cooper 1990). Partly because of these criticisms, P-E fit theory, which was dominant in the 1970s, “was no longer the dominant influence in the work stress literature of the 1980s” (Ganster and Schaubroeck 1991: 241).

**Effort-reward imbalance model (ERI)**

Derived from social reward theory, the effort-reward imbalance model (ERI; Siegrist 1996) proposes that job strain is a result of an imbalance between the amount of effort invested by the worker and the rewards received (in the form of salary, security or opportunities for progression). The basic premise is that job strain arises when a high degree of effort is not reciprocated with adequate rewards (Calnan et al. 2004: 85).

**General adaption syndrome**

Selye (1950; 1951; 1976) draws on the work of earlier theorists (e.g. Cannon 1929) to describe stress responses in terms of three distinct phases: the alarm reaction, resistance stage, and exhaustion stage.
For each stage, Selye describes the biological responses to external threats.

The alarm stage is characterised by a ‘fight-or-flight’ reaction (Cannon 1967), where the body identifies the threat and releases stress hormones such as adrenaline, noradrenaline and cortisol. In the resistance stage the initial threat has diminished, but the body is weakened as it repairs muscle tissues and attempts to lower the production of stress hormones. The exhaustion stage occurs when the body cannot restore its normal levels of resistance (Rice 2012: 25). High levels of cortisol begin to have negative effects on the circulatory, digestive and immune systems, leading to permanent damage (i.e. burnout or overload).

**Lazarus’ transactional model of stress**

Lazarus (1966; 1984) proposed that stress exists due to a transaction between the individual and their environment. This transaction, Lazarus argues, is mediated by three types of appraisal: primary, secondary and reappraisal. Primary appraisal is the individual’s assessment of the threat or stressor. This, in turn, triggers the secondary appraisal, where the individual reviews the availability and efficacy of coping mechanisms and behaviours. Reappraisal is the process by which primary and secondary appraisals are continually updated as a situation evolves (Lyon 2012: 9). A key focus of Lazarus’ model is on coping, defined as “constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the demands of the person” (Lazarus and Folkman 1984: 141).

There are many other theories of job stress that go beyond the space available here (for a review, see Cooper 1998; Perrewé and Ganster 2010). For the sake of coherence, the remainder of this section focuses on a single theoretical framework: the demand-control model.
Karasek’s DCM model

First proposed by Karasek (1979), the demand-control model (DCM) states that it is not just high demands that produce job strain, but the combination of high demands and low control. The model defines two constructs relating to the work environment: ‘job demands’ and ‘job decision latitude’. The former refers to “work-related duties that are based on the roles and expectations of one’s job” (Joudrey and Wallace 2009: 200), or alternatively, as the “physical, social, or organisational aspects of the job that require sustained physical and/or mental effort” (Llorens et al. 2006: 379). Job decision latitude comprises both the worker’s authority to make decisions on the job (decision authority) and the variety of skills used by the worker (skill discretion).

Karasek argues that in high strain jobs (high demands, low control) the demand creates “arousal that cannot be transformed into action because employees lack control on the job” (Yperen and Hagedoorn 2003: 339). Instead, this arousal manifests in negative health outcomes, such as exhaustion or fatigue. As Karasek puts it, the individual’s decision latitude “is the constraint which modulates the release of ‘stress’ (potential energy) into the energy of action” (Karasek 1979: 287).

Figure 2.6: Karasek’s demand-control model

<table>
<thead>
<tr>
<th>Job demands</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>“Passive”</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>“Low strain”</td>
<td>“Active”</td>
</tr>
</tbody>
</table>

Summarised in Figure 2.6, the model predicts that: (a) increases in demands are associated with increases in strain, relative to decreasing job decision latitude; and (b) “incremental additions to competency are predicted to occur when the challenges of the situation are matched by the individual’s skill or control in dealing with a challenge” (Karasek 1979: 288). This defines four types of job. When demands and control are simultaneously high, the job is labelled as ‘active’. At the opposite diagonal, jobs with low demand and low control are labelled as ‘passive’. In ‘high strain’ jobs, individuals are unable to act on the demands placed upon them, which they instead turn inwards with negative health consequences.
Finally, jobs where demand is low and control is high are labelled ‘low strain’.

The most prevalent biological explanation of Karasek’s model suggests that exposure to stressful work causes blood pressure to rise through increases in adrenalin and cortisol (Schnall et al. 1994). Job control is beneficial, therefore, insofar as it reduces exposure to job demands, thus reducing fluctuations in adrenalin or cortisol levels (Elsass and Veiga 1997: 198).

**Evidence to support the DCM**

Overall, empirical support for the demand-control model has been mixed. Although some early studies found support for an interaction between demands and control (Karasek et al. 1981; Alfredsson et al. 1982; Theorell et al. 1984; Alfredsson 1985) more recent studies are less conclusive, with many finding little support for the hypothesised moderating relationship (Payne and Fletcher 1983; Spector 1987; Perrewé and Ganster 1989; Melamed et al. 1991). Studies often support a direct association between demands and control or demands and well-being, but find little evidence of any interaction between control and demand (e.g. Gangster and Fusilier 1989; Parkes 1991; Parkes et al. 1994; Landsbergis et al. 1995; Theorell and Karasek 1996; Wall et al. 1996; Schaubroeck and Merritt 1997; Dollard and Winefield 1998). Payne and Fletcher (1983), for example, report no significant interactions, while Perrewé and Ganster (1989) find perceived control to have no buffering effect on the link between job demands and physiological arousal. Bromet et al. (1988) and Spector (1987) both find limited support for an interactive relationship between demands and control. Overall, there is little empirical support for the interaction between job demands and control (Xie 1996: 1596). Some studies provide evidence of an interactive effect (Warr 1987; Martin and Wall 1989; Dwyer and Ganster 1991; Fox et al. 1993) but many do not.

In recent years, two comprehensive reviews of the DCM literature have been published. A systematic review by van der Doef and Mæs (1999) summarises 63 studies published between 1979 and 1997. They find moderate support for the additive effects of demands and control upon strain, but only weak support for an interactive relationship. A more recent review by Häusser et al. (2010) covers 83 studies published between 1988 and 2007. They present three major findings. First, as in the earlier review, support for the additive effects of demands and control and psychological well-being was ‘almost always found’ if sample sizes were sufficient. Second, longitudinal studies tended to find weaker ‘but
still significant' additive effects of demands and control. Finally, and most importantly, the evidence supporting a moderating effect was very weak overall.

Empirical weaknesses notwithstanding, the DCM has also been criticised for how loosely key concepts have been defined and operationalised. Ganster and Schaubroeck (1991) argue that ‘decision latitude’ conflates a number of theoretically distinct constructs. Wall et al. (1996) similarly explain weak support for the demand-control interaction by the lack of correspondence between the theoretical construct of control and the way this is typically measured. They find support for the interactive effect when adopting a more focused measure of job control, but not when the broader measure of ‘decision attitude’ is used. Elsas and Veiga (1997) also highlight the definition of job control as a key consideration.

Extensions

Since 1979 there have been several extensions to Karasek’s two-dimensional DCM. Most important has been the addition of a third dimension: social support. The demand-control-support model (DCSM) states that in addition to low control, low levels of social support may also moderate the association between demands and strain (Johnson and Hall 1988; Karasek and Theorell 1990). Social support is defined as “interpersonal coping resources where one person helps another to enhance and improve their well-being” (Joudrey and Wallace 2009: 202). The basic premise is that social support has a positive or healthy effect on the individual members of a social group (LaRocco et al. 1980; Cohen and Syme 1985; Thoits 1995). Emotional support is defined as “having contact and/or interaction with others who show concern, listen, display empathy or assist in self-esteem of the individuals’ sense of mastery” (House 1985: 87). The term ‘iso-strain’ was introduced by Johnson (1986) to refer to jobs with high demands, low control and low social support (‘isolated high-strain work’). Johnson showed that workers in high iso-strain jobs reported increased rates of heart disease and other health complaints.

Like the DCM, however, empirical support for the DCSM is mixed. In their review of 43 studies, van der Doef and Maes (1999) find just five that consider the buffering potential of social support, and of these, only two find evidence of a moderating relationship. Of 19 studies that test the association between iso-strain (high strain, low support) and psychological well-being, just nine were supportive of the relationship. In
few studies have considered social support and those that do tend to yield inconsistent results (van der Doef and Mæs 1999: 107).

The Job-Demands-Resources model

More recently, the job-demands-resources (JD-R) model has been proposed as an extension of the DCSM, recognising that job resources other than support may play moderating role. The starting point of the JD-R model is that psychosocial job characteristics can be categorised as either demands or resources (Demerouti et al. 2001; Schaufeli and Bakker 2004). The model states that demands are associated with negative health outcomes (such as burnout), whereas resources stimulate employee motivation and so promote positive outcomes such as organisational commitment and performance (Salanova et al. 2005).

Bakker and Demerouti (2007) describe the JD-R model as having “dual psychological processes” (p. 313) that influence job strain and motivation. In the first of these (the ‘health impairment’ process) excessive job demands “exhaust employees’ mental and physical resources” leading to the “depletion of energy (i.e. a state of exhaustion) and to health problems” (p. 313). A second process (the ‘motivation process’) assumes that job resources can motivate employees, leading to increased engagement and performance (ibid.). These dual processes are illustrated in Figure 2.7.

‘Job resources’ are defined by Bakker and Demerouti as the physical, psychological and organisational aspects of the job that (a) are functional in achieving work goals, (b) reduce job demands and the associated
health consequences, or (c) stimulate personal growth, learning and development (Bakker and Demerouti 2007: 312). These may be derived at the organisational level (e.g. pay, career opportunities, job security), from interpersonal and social relations (e.g. supervisor and co-worker support), in the organisation of work (e.g. role clarity, participation in decision-making) and at the task level (e.g. skill variety, task significance, autonomy; p. 312).

Several studies have tested the hypothesised interaction between demands and resources. A study of 1012 higher education employees by Bakker et al. (2005) shows job resources to buffer the association between job demands and burnout. The study tests the interaction between four job demands (work overload, emotional and physical demands and work-home interference) and four job resources (autonomy, social support, supervisor relations and feedback) for three outcome measures (exhaustion, cynicism and reduced professional efficacy). While no buffering effect was found professional efficacy, significant interactions are found for exhaustion and cynicism (for 18/32 possible two-way interactions between demands and resources). Similar findings are reported by Xanthopoulou et al. (2007), who consider the interaction between demands and resources for 714 Dutch employees of a homecare organisation. They find significant interactions for 21/32 possible two-way interactions. Autonomy is shown to have the strongest buffering effect, followed by social support and ‘opportunities for professional development’. A further example from outside the JD-R literature is provided by Billings et al. (2000), who show that men caring for AIDS patients and who received social support were able to maintain their positive emotional states under conditions of stress, and experienced fewer physical symptoms.

Cross-national variation in the JD-R

Many studies have shown working conditions, attitudes and outcomes to vary across Europe. Green and McIntosh (2001), for example, use data from the European Working Conditions Surveys (EWCS) to show that the increase in average work effort between 1991 and 1996 was greatest in the United Kingdom, Ireland and France, but little effort intensification was observed in Germany, Denmark and Greece. de Smet et al. (2005) examine average levels of reported demands and control for samples from three European regions (South, Middle and Sweden). They find demands and control to be higher in the Swedish centres compared to the southern and middle European centres. Kirkcaldy and Cooper (1992) report on data from the European Values System study group (Abrams et
al. 1985), showing British employees to be more likely to express pride and satisfaction in their work, and more likely to look forward to it, compared to employees in West Germany (p. 178). Harding et al. (1986) used the same data to produce an index of workers’ general orientation to work. High levels of work orientation are found among workers from Denmark, the UK, Ireland and Holland, whereas workers from West Germany and France tended to have lower levels of work orientation. Heiskanen (1985) examines job characteristics such as pay, security and working conditions for employees in the car and steel industry in Europe and the United States. Their results show that workers in the Soviet Union, Yugoslavia and Czechoslovakia, assess their work more positively than workers in the UK, France and Finland.

Kirkcaldy et al. (1992) examine differences in motivational and personality traits among West German and British undergraduates. They find British workers to exhibit higher scores than those in Germany for ‘achievement motivation’ (the need to achieve personal excellence in task performance), work ethic and competitiveness. But lower scores for ‘savings’ (valuing in financial security over possible risks; p. 178). Another study by Kirkcaldy and Cooper (1992) finds differences in work-related attitudes and pressures between managers in the UK and Germany. German managers reported feeling exposed to greater pressure than their UK counterparts, and were more likely to rely on coping strategies, such as time management and social support.

Drenth and Wilpert (1990) use data from the Industrial Democracy in Europe study of 1987 to compare participation in decision making in 12 countries. They find workers in Yugoslavia, Sweden, Norway and Denmark to have the strongest influence on decision making, while those in Japan, Israel, Belgium, Germany and Finland had the weakest influence.

Smulders et al. (1996) analyse 19 questions assessing the working conditions of 12,500 European employees. They use cluster analysis to identify four work-environment clusters: ‘Northern’ (Denmark, West Germany, former East Germany, the Netherlands and the UK), ‘Middle’ (Belgium and Luxembourg), ‘Southern’ (Spain, Portugal, France, Italy and Ireland) and an ‘isolated Southern’ cluster (Greece). The ‘overall quality of working life’ is found to be lower in Southern countries and Ireland, compared to the rest of Europe. The quality of work in Northern and Middle European countries was ‘above average’. Their results are summarised in Table 2.1.
Table 2.1: Mean Scores for Six Work Environment Factors in Four Country Clusters

<table>
<thead>
<tr>
<th></th>
<th>Physical working conditions</th>
<th>Psychosocial job demands</th>
<th>Job control</th>
<th>Social support</th>
<th>Length of work week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>5.96</td>
<td>4.66</td>
<td>1.65</td>
<td>1.88</td>
<td>7.18</td>
</tr>
<tr>
<td>Middle</td>
<td>6.08</td>
<td>5.47</td>
<td>1.63</td>
<td>1.88</td>
<td>7.17</td>
</tr>
<tr>
<td>Southern</td>
<td>5.81</td>
<td>5.22</td>
<td>1.64</td>
<td>1.84</td>
<td>6.36</td>
</tr>
<tr>
<td>Greece</td>
<td>5.19</td>
<td>4.44</td>
<td>1.57</td>
<td>1.81</td>
<td>5.54</td>
</tr>
<tr>
<td>F-values</td>
<td>15.00**</td>
<td>15.40**</td>
<td>0.50</td>
<td>0.80</td>
<td>9.00**</td>
</tr>
</tbody>
</table>

Source: Smulders et al. (1996)

* p < 0.05; ** p < 0.01

An earlier study by Sirota and Greenwood (1971) uses data on the importance of 14 work goals (such as autonomy, earnings and security) for 13,000 employees of a technology company with offices in 25 countries. They identify six country clusters: ‘Anglo’, ‘French’, ‘Northern European’, ‘Southern Latin America’, and ‘Northern Latin America’. Employees in the ‘Anglo’ cluster rate goals relating to individual achievement (e.g. career progression, earnings) more highly than other clusters, but rate the ‘desire for security’ as less important than employees in other clusters. Individuals in the ‘Northern European’ cluster were less concerned with individual achievement and more oriented towards job accomplishment.

Overall, there is good evidence to suggest that the experience of work vary significantly across Europe, even if it is hard to identify any consistent trends. Whereas many studies have considered the level of demands, resources or strain, far fewer have considered how the relationships between these variables differ. This section concludes by considering the handful of studies that explore cross-national variation in the associations between demands or resources and strain.

Based on a questionnaire of 200 senior executives in 10 European countries, Cooper (1984) highlights how the sources of job stress vary considerably across Europe (p. 403). In Sweden, work-home overlap is cited as a major pressure point for executives, whereas in Germany it is the perception of German industry as being efficient that was the principal motivating influence. In the UK ‘keeping up with new technology’ was often raised as a source of stress, as well as ‘the amount of travel required by my work’ and ‘the possibility of job loss’ (p. 404).

Using data from the 2003 Quality of Life Survey, Drobnic et al. (2010) consider the association between working conditions (such as autonomy, time pressure, opportunities for advancement and job security) and life
satisfaction for 9 European countries. Overall, the association between working conditions and life satisfaction is stronger in Southern and Eastern European countries, with the issue of economic security (security of employment and pay) shown to be a key determinant of life satisfaction.

Llorens et al. (2006) use multigroup structural equation modelling to test the consistency of the JD-R model for a Spanish (N = 654) and Dutch (N = 477) sample. The basic structure of the JD-R is maintained across these samples, but the strength of the relationships differ (for example, the association between job demands and organisational commitment is significant only in the Dutch sample). Finally, Lu et al. (2006) show the association between job demands and work-family conflict to be stronger in the UK than in Taiwan.

Some authors have argued that the relationships between job demands, job control and job strain are not comparable across different countries and cultures. Verhoeven et al. (2003) cite research by Kawakami et al. (1992) who find no relationship between the DCSM and depressive symptoms among 468 Japanese factory workers. A study of 98 women in Poland (1995) similarly finds no relationship between the DCM and psychological well-being. Finally, for an Israeli sample of 798 industrial workers Kushnir and Melamed (1991) fail to find any association between job demands and somatic symptoms. While Karasek’s demand-control model may have found initial support in a Western European context, it is not inevitable that these relationships will hold cross-culturally.

Verhoeven et al. (2003) consequently suggest that the DCSM suffers from a Western bias. In their study of 2796 secondary school teachers across 13 European countries, the model explains most variation in outcomes in Western Europe (25% to 46%), followed by Southern Europe (21% to 38%) and least in Eastern Europe (13% to 34%). Job control is an important determinant of job satisfaction in Eastern Europe, but less so in Western and Southern European countries. Social support buffers the association between job demands and job satisfaction in Western Europe, but no association is observed in Southern and Eastern countries.

Daniels (2004) similarly shows socio-cultural factors to influence perceived job demands, suggesting that job stress is, “at least to some degree, socially constructed” (p. 468). Using EWCS data, Daniels shows that perceived working conditions and job dissatisfaction cannot fully explain cross-national variation in occupational stress.

While many studies suggest variation in the associations between job demands and job strain, organising these differences into a cohesive framework is difficult. Smulders et al. (1996) suggest a North-South divide
in Europe with regard to working conditions and attitudes. They also show that: (a) the Netherlands resembles Scandinavian countries with respect to work values and the UK with respect to the work environment; (b) Greece deviates from other Southern European countries; (c) Ireland clusters with the UK on work values but with Southern European countries with respect to the work environment; and (d) the UK rarely clusters with Scandinavian or Southern European countries.

Other studies suggest that the JD-R model is sensitive to differing cultural interpretations. Narayanan et al. (1999) compare reactions to job stress among female clerical employees from India (N = 130) and the United States (N = 133). Consistent with Cooper (1984), they find substantial differences in the sources of stress in each country. In United States, lack of control was the major source of stress, whereas in India it was the lack of structure, and “not one respondent reported having too little control” (p. 207). The authors also find variation in the types of support mentioned by workers. The Indian sample was more likely to cite family support, whereas those in the United States emphasised workplace support from supervisors or co-workers.

Taipale et al. (2011) study the determinants of work engagement using survey conducted in eight European countries in 2007. They find work engagement to be highest in the Netherlands, Sweden and Finland, and lowest in the UK. They also show that, across these eight countries, levels of demands and control tend to go hand-in-hand. With few exceptions, in countries where workers report high levels of demands, they tend to also report high levels of control. The study shows slight variation in the association between job demands and work engagement, with a small lowering effect (of work engagement) observed for Finland, Sweden and Germany, but no association observed in other countries. The positive association between job control and work engagement is greatest in Portugal and the UK, while the positive association between support and engagement is greatest for Germany and Sweden.

Hasselhorn et al. (2008) study the impact of demands and control on turnover intentions for nurses in eight European countries, again showing significant variation across Europe. Nurses who experienced an increase in job strain over the 12-month period were, on average, 2.7 times more likely to say they intended to leave the profession, but the size of this effect varies considerably cross-nationally. A stronger link between job strain and turnover intentions is observed in Slovakia, Poland and Italy, whereas no association is seen in France, the Netherlands and Belgium.
Most recently, Brough et al. (2013) have tested the JD-R model using a longitudinal sample of Australian and Chinese employees (N = 1609). A self-completion questionnaire was administered to Chinese and Australian workers on two occasions, 12 months apart. While the researchers found positive associations between job resources and job strain, the link between job demands and job strain “was not clearly evident” from their research (p. 1325). Additionally, they find no evidence to support the interactive (i.e. buffering) relationships between demands and resources (just 1 out of 16 interaction terms demonstrated significant. Most interestingly, the results were “generally found not to be dependent on the country of the sample” (p. 1325), suggesting the JD-R model is applicable across contrasting cultural samples.

Overall, the studies reviewed above provide some evidence of cross-national variation in the JD-R model, but it is difficult to identify many overarching trends, not least because most existing studies compare only a handful of countries.

### 2.2.4 Trends in job insecurity and work intensity

Later chapters take the starting point that jobs have become less secure and work is more demanding than in previous decades. The analyses are cross-sectional, evaluating the consequences of work demands for individual well-being, at a single point in time. This approach is taken for the sake of simplicity and due to data limitations. It would be complex to simultaneously consider geographic and temporal variation in working conditions, even before addressing the role of moderating factors. This study prioritises moderation and cross-national comparison because (a) this is where the existing literature is weakest, and (b) there are few sources of longitudinal data on perceived job insecurity or job stress that cover multiple European countries (see chapter 3). This approach is summarised in Figure 2.8, below.

It is important to justify this assumption. If the thesis is predicated on increases in job insecurity and work intensity, what is the evidence for these trends? This section summarises the available evidence on trends in perceived job insecurity and work intensity. Very simply: has the prevalence of insecure and stressful employment increased across Europe in recent years?

**Job insecurity**

One way of estimating concerns about job security is through the media. Reports of economic or labour market uncertainty can both reflect but also
foster the general perception that job security is declining. In November 1993 *Time* magazine ran a story charting the decline of the ‘Great American Job’ (see Figure 2.9), pessimistically asserting that, “thirty months into recovery, Americans are realising that the Great American Job is gone” (Church et al. 1993: 32). The same article reports a survey finding that “two-thirds believed that job security has deteriorated over the past two years” (p. 32). Such stories are commonplace. Figure 2.10

**Figure 2.9: Time, 22nd November, 1993**

shows the front page of *The Guardian* from January 27th 1982, with the headline “Three million jobless — and worse to come”.

There are few good sources of information on media reportage, and such questions are arguably better suited to qualitative methods that capture the content and cultural nuances of news reports. Given the space available, however, this section relies on quantitative assessments of reporting practices. Firstly, Figure 2.11 presents data from the ‘Google Ngrams’ database – an English language corpus containing the text of
about 4% of all books ever printed (Michel et al. 2011)\(^2\). The graph plots usage of the term “job insecurity” between 1975 and 2007, showing a rapid raise in the late 1980s and a decline after the millennium. This is, of course, an approximate measure (books may discuss economic uncertainty without using the phrase “job insecurity”). An alternative source is the NewsBank Access World News website, a database of newspaper articles published from 1980 onwards. Figure 2.12 presents the number of articles published per year in North America and the UK that mention “job insecurity”, as well as the two periods for which both regions were in recession (90/92 and 07/09). Both regions see an increase in the mid-1990s and late 2000s, particularly in the USA.

In recent years, several academic studies have tackled the question of rising job insecurity. An OECD report from 1997 described “a widespread and, in some countries, very sharp increase in the number of individuals perceiving employment insecurity” between the 1980s and 1990s (OECD 1997: 129). Drawing on data from the International Social Survey Programme (ISSP) and the Eurobarometer series, the report finds the early to mid-1990s characterised by widespread and increasing concerns among workers over job security, even in countries where the unemployment rate is low (Japan) or has been falling (the UK and USA) (p. 130).

\(^2\)Specifically, the English corpus (googlebooks-eng-all-20090715) is used, which limits the sample to books written in English and dated between 1500 to 2008. This analysis is based on books published between 1975 and 2007.
An earlier OECD report (OECD 1993) consider trends in job tenure across Europe. Illustrated in Figure 2.13, the average length of tenure is shown to increase between 1980 and 1995. While longer tenure is no substitute for greater security, this data would suggest the situation *improved* between the late 1980s and 1990s.

The separation rate, a measure of short-term job instability, is also provided. This measures short-term turnover rates, defined as the number of employees with three or fewer months tenure relative to those with 3-6 months tenure (Gregg and Wadsworth 1995). Figure 2.14 plots the separation rate for four countries between 1980 and 1995, showing little variation for any country except Spain, where the rate increases dramatically from the late 1980s.

Farber (1998) uses data from the *Current Population Survey* in the United States to examine variation in the duration of jobs between 1973 and 1993. Overall, he finds no systematic change in job duration (p. 192). However, Farber highlights two trends masked by the overall picture. First, individuals with little education, and particularly men, are less
Figure 2.13: Trends in job tenure across Europe

Average tenure (years)

Tenure < 1 year (%)

Source: OECD (1997)

Figure 2.14: Turnover trends across Europe

Separation rate from 1 year to 2 years (%)

Source: OECD (1997)
likely to be in jobs of long duration in 1993 than they were in 1973. Second, women are with at least high school education are substantially more likely to be in long-term jobs in 1993 than 1973 (p. 159).

**Figure 2.15:** Duration of current employment, Australia (1975-1998)

Job duration is also considered by Borland (2000), using data from the *Australian Labour Mobility Study*. Consistent with Farber (1998), Borland shows the overall distribution of job duration to be relatively stable between 1975 and 1998, as illustrated in Figure 2.16. Borland also collates data from the Morgan Gallup polls for Australia, which (between 1975 and 1998) asked respondents: “Do you think your current job is safe, or do you think there’s a chance you will become unemployed?” Plotted in Figure 2.16, the data suggest little variation in perceived job insecurity since 1975, despite large fluctuations in the unemployment rate.

**Figure 2.16:** Perceived job insecurity in Australia (1975-1998)

Fullerton and Wallace (2007) use data from the *General Social Survey* (GSS) in the United States to investigate trends in perceived job security. After controlling for unemployment, “a statistically significant trend
emerges in which workers express less optimism about their job security than in more recent years” (p. 217). Valetta (1999) finds similar trends using data from the Panel Survey of Income Dynamics (PSID). Significant declines in job security are observed for all men and for skilled white-collar women in the period 1976 to 1993. Borland concludes by stating the evidence “does not reveal permanent changes to job stability or job security between the 1980s and 1990s” (p. 21), although he does identify a broadening of how individuals define and perceive ‘job security’ – going beyond the fear of job loss to include beliefs about the predictability of future job content (e.g. the tasks to be performed or the hours of work). One possibility, therefore, is that data showing little change in the perceived risks of job loss are overlooking important variations in other types of insecurity.

Finally, Green (2003) presents data from the German Socio-economic Panel (GSOEP) showing the proportion of workers who feel job loss in the coming two years is ‘certain’ or ‘probable’ (see Figure 2.17). After an increase in perceived insecurity in the early 1990s, the trend levels off in the second half of the decade. Green (2003) considers similar data for the UK from the Social Change and Economic Life Initiative (1986) and the Skills Surveys (1997, 2001). Presented in Table 2.2, the data suggest modest declines in perceived insecurity since 1986.

**Figure 2.17:** Perceived risk of job loss in Germany

![Figure 2.17: Perceived risk of job loss in Germany](image)

Having reviewed the academic literature, this final section considers the available longitudinal data. There are, it should be noted, very few sources of longitudinal information on perceived job insecurity. In the United States, the General Social Survey (Smith et al. 2008) includes the question: “Thinking about the next 12 months, how likely do you think it is that you will lose your job or be laid off?” (‘very likely’, ‘fairly likely’, ‘not too likely’ or ‘not at all likely’). Figure 2.18 plots the proportion of
Table 2.2: Perceived risk of job loss in the UK (1986 to 2011)

<table>
<thead>
<tr>
<th></th>
<th>1986</th>
<th>1997</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td>8.7</td>
<td>6.7</td>
<td>6.4</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td>8.3</td>
<td>7.5</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Unemployment rate</strong></td>
<td>11.2</td>
<td>5.8</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Source: Green (2003)

workers who think job loss in the coming year is “very likely”, as well as the unemployment rate and periods of recession. The plot shows aggregate levels of insecurity to fluctuate in line with economic variation. When unemployment is higher, during economic recession, a greater proportion of respondents think job loss is imminent. Overall, however, the trend is relatively flat, and tends to fluctuate with business cycles, rather than demonstrate any long-term trend.

Figure 2.18: Perceived job security in the GSS (1977-2008)

Recognising that aggregate trends might hide considerable heterogeneity, Figure 2.19 presents a breakdown by gender, ethnicity, education, occupation and industry. Overall, the trends are remarkably consistent. Disparities present in 1977 remain in 1996, and trends for each subgroup closely resembles the overall trend, with peaks around the 80/81 and 90/91 recessions.
The *British Household Panel Survey* (BHPS) includes a question on satisfaction with job security, with responses given on a 7-point scale from 1 (‘completely dissatisfied’) to 7 (‘completely satisfied’). Figure 2.20 plots the proportion of respondents in each year who express negative satisfaction with job security (values 1 to 4). In line with falling unemployment, the proportion of respondents reporting dissatisfaction with their job security decreases rapidly following the peak in 1991/2.

**Figure 2.19:** Trends in perceived job insecurity from the GSS

**Figure 2.20:** Dissatisfaction with job security in the British Household Panel Survey (1991-2001)
The notion that work has become more flexible, temporary and insecure is perpetuated throughout the academic literature and popular press. However, such claims are rarely upheld empirically. As Green (2003) concludes:

*It is not accurate to describe work in modern labour markets as especially insecure, beyond the fact that this has been an era of high unemployment which in some but not all countries has persisted throughout the recent decade till the present* (p. 36).

An earlier study by Schmidt and Svorny (1998) similarly concludes that “there has not been a dramatic change in job security over the last two decades” (p. 661).

One possibility is that definitions of what ‘job insecurity’ entails have changed. By focusing on the perceived ‘risk of job loss’, the above evidence might overlook significant variation in other forms of insecurity (e.g. control over hours or working conditions). Finally, given that almost all past evidence shows a strong link between perceived insecurity and unemployment rates, it will be interesting to update these graphs as more recent survey data, covering the 2007/9 recession, becomes available. A recent Gallup poll for the USA (Jones and Saad L 2011), illustrated in Figure 2.21 shows a substantial rise in the proportion of respondents worrying about ‘being laid off’ and reduced hours or wages, immediately following the 2007/8 recession.

**Figure 2.21:** Worries about employment security in the United States

![Worries about employment security in the United States](image)

Source: Gallup Poll, Worries About Job Cutbacks, Jones and Saad (2011)

**Work intensity**

There are even fewer sources of longitudinal data on working conditions. This section considers past studies, before presenting trends from the
European Working Conditions Survey (EWCS). Drawing on evidence from the Current Population Survey (CPS), Schor (1991) argues that Americans are increasingly overworked. Between 1967 and 1987 annual work time increased by 98 hours among men and 305 hours among women. More recent analysis of this data, however, suggests that while average weekly hours have been mostly stable over time, the workforce is increasingly bifurcated’ (Jacobs and Gerson 2004). An increasing proportion of the labour force was working very long hours while another segment, also increasing over time, was underemployed, working less than 30 hours per week. The ‘overworked’ group consisted of highly educated professional and managerial workers, whereas the ‘underemployed’ tended to be less educated and work in low-skilled jobs.

Some authors a tribute declining job satisfaction during the 1990s to the increased pace of work (Green and Tsitsianis 2005) or stress and hard work (Clark 2005). Maume and Purcell (2007) present data from two surveys of American employees\(^3\) which suggest increases in average weekly hours and job complexity between 1977 and 1997. Green and McIntosh (2001) use data from the 1991 and 1995 European Working Conditions Survey (EWCS) to show a significant rise in work effort\(^4\) in most Western European countries. Burchell et al. (2002) similarly use EWCS data to show a significant increase in work effort in the early 1990s. A recent summary by Chandola (2010) notes that work-related stress has been increasing in Britain since 1992, particularly for women (p. 20). A more recent study by Green (2004) uses data from the Employment in Britain Survey (1992) and the Skills Survey (1997 and 2001) which highlight an increase in work effort during the 1990s (see Table 2.3).

Most data on trends in work intensity comes from the EWCS, so it would be useful to summarise this evidence here. There have been four waves to date (1991, 1995, 2000 and 2005; data from the 2010 wave was unavailable at time of writing). Figure 2.22 presents trends in four variables measuring how often an employees’ job involves (a) complex tasks, (b) working with computers, (c) working at very high speed or (d) working to tight deadlines. The graphs show the weighted percentage

\(^3\)The 1977 Quality of Employment Survey (QES) and the 1997 National Study of the Changing Workforce (NSCW).

\(^4\)Their measure of ‘work effort’ is the average score on two items that ask respondents how often their job requires them to work “at very high speed” or “to tight deadlines”.
Table 2.3: Trends in work effort in Britain (1992 to 2001)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent who strongly agree that “my job requires me to work very hard”</td>
<td>Private</td>
<td>31.5</td>
<td>38.2</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>31.9</td>
<td>44.3</td>
</tr>
<tr>
<td>Percent whose job involves working at high speed ‘all’ or ‘almost all’ of the time</td>
<td>Private</td>
<td>19.1</td>
<td>25.2</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>13.8</td>
<td>26.3</td>
</tr>
<tr>
<td>Percent who strongly agree that “I work under a great deal of tension”</td>
<td>Private</td>
<td>13.5</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>18.4</td>
<td>24.5</td>
</tr>
</tbody>
</table>


of employees who responded ‘all’ or ‘almost all’ of the time, aggregated across 15 Western European countries. The first row gives the overall trend (for all respondents) and the subsequent rows break the trend down by gender, age and income.

Figure 2.22 presents a mixed picture. For most measures, the trend in recent years has been flat or declining. The plot for ‘working at high speed’ or ‘to tight deadlines’ shows a rapid rise between 1991 and 1995, but has remained steady or declined since. The sole exception is the proportion of employees working with computers, which shows a steady increase from 1991 to 2005, particularly since 2000. Differentiating by gender, age and income does not change the overall picture. The proportion of older workers (aged 50+) working ‘to tight deadlines’ declined between 1995 and 2005, in contrast to the trend for younger workers, but otherwise these breakdowns offer few additional insights.

Finally, Figure 2.23 plots the average weekly working hours for full-time employees from 17 Western European countries. With few exceptions, the plot shows a decline in average working hours between 1983 and 2010, for men as well as women. It is important to note, however, that this plot may hide variations between individuals, such as by income, sector.

---

5 This includes Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the UK.

6 ‘High’ and ‘low’ income here are relative measures, based on monthly earnings and adjusted to take inflation, national income tax and social contributions into account. The EWCS derives a 4-category ordinal scale of relative income (see Macías 2006) ranging from ‘very high’, ‘high’, ‘low’ to ‘very low’. In this graph, a simplified scale is used, splitting between ‘high’ or ‘very high’ and ‘low’ or ‘very low’.
Figure 2.22: Trends in work intensity from the EWCS (1991-2005)

Does your work involve...

<table>
<thead>
<tr>
<th></th>
<th>Complex tasks?</th>
<th>Working with computers?</th>
<th>Working at very high speed?</th>
<th>Working to tight deadlines?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-29</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


(Percent responding ‘all’ or ‘almost all of the time’)

Source: European Working Conditions Survey; All estimates weighted.
or occupational class. Based on the idea of bifurcation (Jacobs and Gerson 2004), it may be that certain segments of the labour force are indeed working longer hours, but this is offset by shorter hours for other groups. However, Figure 2.24, which compares the average weekly hours for full-time employees by industry, provides little evidence of bifurcation. Workers in manufacturing and agriculture work, on average, long hours than those in the service sector, but overall, both sectors have seen a decline in hours since 1987.

Overall, there is surprisingly little empirical evidence to suggest that perceptions of job insecurity have increased in recent decades. Despite growing attention in popular and academic literatures, fears about job loss have tended to mirror economic cycles rather than exhibiting any upward or downward trend. There is some evidence to suggest an increase in work effort or intensity in the early 1990s, but the trend since has been remained relatively flat.

**Figure 2.23:** Average weekly working hours for full-time employees, Western European countries (1983-2010)

![Graph showing average weekly working hours for full-time employees, Western European countries (1983-2010)](image)

Source: OECD (2011)

### 2.3 Summary

This chapter has described the post-industrialisation of employment from two contrasting perspectives. At the macro-level, the economic emphasis has shifted from the production of tangibles to the processing of knowledge and the delivery of services. This period has also been characterised by increasing global interconnectedness (both social and
Figure 2.24: Average weekly working hours by sector (full-time employees)

[Graph showing average weekly working hours for Industry and Services from 1987 to 2007]

Source: Eurostat (2012)

economic) facilitated by technological advances (not least, the Internet). These changes have motivated, and coincide with, new labour market and demographic arrangements. Whilst employment relations have always been in flux, the particular confluence of global competition, tertiarisation (Peneder et al. 2003) and technological and demographic change (van de Kaa 1987) has ushered in a period of considerable destandardisation. This is apparent at both the macro- and micro-levels. Not only are traditional stratifiers (such as class or occupation) less representative, but individual trajectories are increasingly insecure and uncertain. The stability of a job-for-life has been replaced by a patchwork of temporary alternatives. The work-home interface is progressively blurred, and the downward trend in working hours belies a growth in unsocial or non-standard hours (e.g. Fagan 1996).

Across a range of theoretical approaches, job insecurity and job stress are consistently linked with poor physical and psychological health. The focus in subsequent chapters, therefore, is upon moderation. The consequences of work-based stress have been shown to vary across individuals and countries. Later analyses seek to disentangle the stress-strain relationship, and explain differential reactions to stressful or insecure employment.
3 Methods

This chapter describes how methods have been chosen and implemented in this thesis. There are two parts. The first provides an autobiographical account of the methodological background to the study. It tracks the development of the thesis proposal, from a background in social policy to more recent experience in social statistics. This discussion highlights how methodological choices are shaped by past experiences and are inherently personal. Researchers aim to choose the ‘most appropriate’ method for a particular research problem, but choices will be constrained by experience (i.e. expertise or ability) and availability (i.e. discipline area or department). Whether a given method is ‘appropriate’ is a subjective assessment, guided by the ontological and epistemological frameworks in which a researcher operates. This discussion, therefore, gives an account of how I came to be in a position (at the start of the Ph.D.) where I favoured the chosen methods over the plurality of alternatives.

The second part is more practical. It describes the chosen methods and outlines some key decisions that shaped the content and direction of the thesis (e.g. cross-sectional vs. longitudinal; Western vs. Eastern Europe; Bayesian vs. frequentist). Further implementation details are provided in Appendix 1, which addresses issues such as survey weighting, the choice of Bayesian priors and statistical software. Overall, this chapter aims to provide a reflective account of the constrained and path dependent processes from which methodologies emerge.

3.1 Muddling through

One is rarely afforded the space or time to discuss methodological decisions at length. Researchers typically summarise the chosen method, briefly review some alternatives, before making the case for why this particular method is suitable, given the research objectives. What this approach hides is a considerable period spent ‘muddling through’, the phase between identifying the research topic and presenting the results. Simply put, to specify some research questions and summarise the chosen method tells
very little about the research process. The models that won’t converge, the data that wasn’t available, and myriad deviations and dead-ends. Researchers are encouraged to present polished, concise pieces of work, where such meanders are rarely mentioned.

For students, the gulf between the clean lines and polish of a journal article and the messy, confused reality of doing social research can be disconcerting. It is reassuring, therefore, when academics such as Andrew Gelman are willing to shed some light on the process:

So, you throw model after model at the problem, method after method, alternating between quick-and-dirty methods that get me nowhere, and elaborate models that give uninterruptable, nonsensical results. Until finally you get close. Actually, what happens is that you suddenly solve the problem! Unexpectedly, you’re done! And boy is the result exciting. And you do some checking, fit to a different dataset maybe, or make some graphs showing raw data and model estimates together, or look carefully at some of the numbers, and you realize you have a problem. And you stare at your code for a long, long time and finally bite the bullet, suck it up and do some active debugging, fake-data simulation, and all the rest (Gelman 2009).

A similar point is raised by Becker in the excellent Writing For Social Scientists (2007):

The separation of scholarly work from teaching in almost all schools hides the process from students. Students don’t know, never seen their teacher, let alone textbook authors, at work, that all these people do things more than once, rather than treating the professional work as quasi-test. Students don’t know that the journal editors routinely sent papers back for
revision, the publishers hire editors to improve the prose of books to published (p. 45).

The points made by Gelman and Becker about the modelling and writing process are true of every aspect of social research. There is often doubt, confusion, changes in direction and the abandonment of ideas or methods. This inevitable process of ‘muddling through’ is rarely discussed openly. In this chapter I take the opportunity to discuss ‘the process’ in detail.

3.2 Why a quantitative methodological perspective?

This section provides an autobiographical account of my research interests over the past 10 years, to set the methodological context of the thesis. As Figure 3.2 illustrates, my substantive interests – and the way in which I conceptualise and analyse them – have been shaped by my educational experiences over the past decade.

3.2.1 Origins in Social Policy

My interest in post-industrial processes, and their consequences for individuals and society, can be traced back to a seminar presentation I gave in November 2005 on Manuel Castells’ ‘Materials for an exploratory theory of the network society’ (Castells 2000). This led to an exploration of theorists who described a shift away from industrial society, including Bell (1974), Castells (1996) and Giddens (2008). I had long been interested in the role of technology in society. Prior to studying social policy, I had completed the first year of a MEng in computer science, leaving because I drew greater interest in the wider social context of technological developments than the technical minutiae of their implementation. My undergraduate thesis, titled The Information Society and the Welfare State: Towards a Typology of Info-Welfare Regimes, sought to combine the two themes that dominated my undergraduate education: the notion of post-industrial society (specifically the ‘information society’ and ‘knowledge economy’) and the framework of welfare regimes popularised by Esping-Andersen’s Three Worlds of Welfare Capitalism (1990). It was inconceivable, I thought, that this ‘third wave’ of development would sweep away everything that came before it, bringing about the ‘transformation’ of society as some theorists were heralding. The more I read about how post-industrialisation was ushering in a new era – a qualitatively different form of society – the more critical I became. I was particularly sceptical
of accounts that prioritised economic or technological determinants at the expense of existing social structures, institutions or divisions. Especially the deterministic arguments for the ‘natural’ or ‘inevitable’ progress of technology (e.g. Negroponte 1996). This scepticism remains the starting point for much of my research. I believe that the collection of processes and trends that gather under the ‘post-industrial’ rubric are important, and deserve considerable research attention, but they do not inevitably take priority over existing social divisions and structures. Rather than accepting the “naive and taken-for-granted position” (Webster 1995: 215) that Western nations have ‘entered the information age’ or are ‘operating in the knowledge economy’, I want to understand how these changes interact with existing structures and institutions. Inequalities present in industrial society will persist in post-industrial society. Old social risks, such as the risk of unemployment or ill health, have retained their significance despite the proliferation of so-called ‘new’ social risks (Aust and Bonker 2004; Bonoli 2007).
Figure 3.2: Development of the thesis

MEng Computer Science

BA in Social Policy

Welfare regime theory; Esping-Andersen

A module in ‘State, Technology and Society’

A seminar paper on Manuel Castells

The ‘network’ or ‘information’ society

BA thesis: A comparative analysis of ‘informational development’ and welfare regimes

PhD proposal: The interplay of post-industrial society and the welfare state

The MSc

Introduction to quantitative methods

The individual consequences of post-industrial society

New Social Risks

MSc thesis: “New social risks and subjective well-being”

The PhD

The interplay of family and working arrangements in post-industrial society

Mediation and moderation

Simplify

Structural equation modelling

Simplify

Work arrangements in post-industrial society

Job insecurity and work intensity

Moderation
My undergraduate thesis developed this argument by highlighting the role of state welfare as a key influence shaping the propagation of the ‘information society’. Just as welfare institutions tend to be highly path dependent, the development of the information society is likely to be influenced by social, political and economic contexts. The thesis considered how levels of ‘informational development’ were associated with the configuration of welfare policy in a set of Western European nations, contrasting a typology of informational development with Esping-Anderson’s ‘three worlds’ model. Most importantly, the unit of analysis was the nation state: I was interested in what post-industrialisation meant for macro-level structures and institutions. No consideration was given to individual circumstances or outcomes.

Around this time (in early 2007), I wrote my Ph.D. proposal, along similar lines. The intention was to use Ragin’s qualitative comparative analysis (QCA; Ragin 2000) to study the interplay of post-industrialisation and the welfare state. Again, this was located at the macro-level, focusing on countries rather than individuals.

3.2.2 Introduction to Quantitative Methods

Following the BA, I completed an MSc in Social Research Methods and Statistics at the University of Manchester. This course introduced me, for the first time, to a range of quantitative methods where the unit of analysis was the individual. This shift from the macro- to the micro-level had a profound influence on the development of the thesis, and more generally, on the way in which I thought about and conceptualise social phenomena. I remained interested in macro-level social changes (such as post-industrialisation), but the lens through which I sought to analyse these trends shifted. A macro-level social policy perspective – focusing on variation between countries – gave way to a more quantitative approach, based on survey data and regression-based techniques. The target of the research was unchanged, but the level of analysis narrowed.

It is hard to overstate the influence this ontological shift had on the development of this thesis. Whereas I had previously been concerned with measuring the emergence of information- or knowledge-based society, I quickly became more interested in the consequences of these trends for individuals and families. Tying in with the critical stance put forward earlier, I adopted the position that societal transformation was only ‘real’ insofar as it was experienced by individuals on an everyday basis. To herald the arrival of a ‘new age’ or a ‘third wave’ based around a new
economic logic means nothing if these changes are not perceptible at the micro-level.

This shift was further motivated through my introduction to critical realism (Bhaskar 1978), during the MSc at Manchester. Critical realism states that (a) progress is possible because there exist enduring structures and processes (“the intransient dimensions of reality”) against which theories can be tested, but also, (b) it is impossible to fully apprehend this reality (McEvoy and Richards 2006: 69).

Our knowledge of the world is always mediated by the discourses available to us, but we can get empirical feedback from those aspects of the world that are accessible (p. 69).

Critical realism proposes three ontological domains: (a) the empirical (aspects of reality that can be experienced directly); (b) the actual (phenomena that occur but are not necessarily experienced); and (c) the real (the underlying processes and structures that generate phenomena)\(^1\). Indirectly, this framework influenced my thinking about post-industrial society and the conceptualisation of social change. I had become frustrated by macro-level theories that failed to relate to what was happening at the individual level. Borrowing from critical realism, I equated post-industrial society to the ‘real’ ontological dimension. Post-industrial society alluded to the underlying processes and structures that influenced events at the ‘actual’ level. I equated labour market changes, such as increasing job insecurity and job stress, to the ‘actual’ dimension (i.e. phenomena that do occur but are not necessarily experienced). Finally, I equated the everyday experience of work to the ‘empirical’ dimensional, i.e. phenomena that are experienced. This includes the perception of job insecurity, work overload or job strain.

This perspective implies that, in order to productively study the ‘actual’ or ‘empirical’, we needn’t understand or measure the ‘real’ (i.e. post-industrialisation). This realisation was incredibly freeing. Rather than getting bogged down with the definition and measurement of post-industrial society, I could begin the more fruitful analysis of individual outcomes – the observable phenomena that are generated by unobservable (or at least, un-measurable) macro-level changes.

---

\(^1\)For an introduction to critical realism, see Bhaskar (1978), Sayer (1992; 2000; 2010), and Blaikie (2007).
This epistemological shift, to focus upon the *consequences* of social change (rather than social change itself), introduced new difficulties. How should one measure the individual consequences of post-industrialisation? What types of outcome are we interested in? For which groups of individuals? I settled on two connected post-industrial trends: (a) changes to working conditions and (b) developments in family arrangement and composition. Written in 2008, the MSc thesis centred on the concept of ‘New Social Risks’ (Taylor-Gooby 2004), defined as:

*Situations in which individuals experience welfare losses that have arisen as a result of the socio-economic transformation that has taken place during the past 3 to 4 decades and are generally subsumed under the heading of post-industrialisation (Bonoli 2007: 498).*

Following Bonoli and others, the study considered the link between ‘new social risks’ and subjective well-being for a set of Western European nations. This approach is summarised below. We assume that post-industrial society has introduced a new set of social risks, and test empirically the consequences of these risks for individual well-being.

This thesis adopts a similar approach. The starting point is that working arrangements have changed in post-industrial society (specifically, jobs have become less secure and working conditions have intensified).
The consequences of these changes for individual well-being are then tested empirically.

3.2.3 The PhD: a focus on moderation

Following the MSc, I began to reframe the Ph.D. proposal to take this new methodological and ontological perspective into account. I remained interested in post-industrial developments, but in individual rather than societal outcomes. I became particularly interested in mediating and moderating effects. The former is where the relationship between two variables, X and Y, is explained by the presence of a third variable, Z (see MacKinnon 2008). Moderation is where the presence of Z changes strength direction of the association between X and Y. These techniques, it seemed, offered one way of answering the question: if post-industrial employment arrangements had consequences for individual well-being, for whom are these consequences most severe and why? Rather than simply testing the direct association between working conditions and well-being, I wanted to understand this relationship. What other factors will play a role? Why are some individuals more strongly affected by job insecurity than others? Which variables have a protective, buffering effect?

Given the focus on moderating the mediating relationships, I began to investigate structural equation modelling (SEM) as a suitable methodological framework. SEM can be defined as “a class of methodologies that seek to represent hypotheses about summary statistics derived from empirical measurements in terms of a smaller number of ‘structural parameters’ defined by a hypothesised underlying model” (Kaplan 2008: 1). It incorporates a range of methods – including confirmatory factor analysis (CFA), latent class analysis (LCA) and path analysis.

SEM has grown in popularity in recent years (Hershberger 2003), and often comes recommended to students. After studying SEM techniques for nearly 18 months, I came to realise that SEM is not a method in the traditional sense, but rather, provides a ‘tool kit’ of techniques that one can bolt together in any number of combinations. In contrast to more
prescriptive techniques, such as multiple regression, the flexibility afforded by SEM is disarming. Moreover, as I came to realise, flexibility isn’t always helpful, especially in the absence of strong driving theories that prescribe exactly which variables should be entered into the model, where and when. In the early stages of the PhD I was interested in (a) new work and family arrangements and their association with individual well-being, and also, (b) how these relationships were influenced by various mediators and moderators. Beyond this initial motivation, however, there was little in the way of a ‘strong driving theory’.

I spent many months drawing and estimating SEM models, where the dependent variables were subjective well-being and explanatory variables were work and family arrangements associated with post-industrial society. These models became increasingly complex (as shown in Figure 3.4), the point where it was easy to get lost in the model, and forget the original motivations and theoretical basis of what I was doing. With the near-infinite flexibility that SEM affords, one must be very clear about the underlying theories that justify each path, and each variable.

**Figure 3.4:** Early SEM models

With hindsight, the confusion I experienced feels symptomatic of a more fundamental schism between macro- and micro-level theory. Put simply, the theories that motivated me to study post-industrial processes in the first place operate solely at the macro-level, and cannot inform about individual mechanisms, processes and outcomes. Theories, such as the ‘information’ or ‘network’ society, translate poorly to the micro-level. They offer no ‘strong driving theory’ that describes the everyday reality of these changes. Figure 3.5 illustrates this divide.
I was thus faced with identifying a set of meso- and micro-level theories that would provide the strong theoretical basis that SEM requires. With regards to job stress and employee well-being, for example, I referred to Karasek’s job-demands-resources model (Karasek 1979). For models involving job insecurity, I highlighted the notion of ‘job dependency’ discussed by Greenhalgh and Rosenblatt (1984).

### 3.2.4 Simplify

During latter stages of the PhD I began to investigate simpler models, guided by micro-level theory. In contrast to the complex models attempted earlier – which featured multiple dependent and explanatory variables, and numerous mediating and moderating relationships – I sought more parsimonious models that mapped closely to existing individual-level theories. This inevitably meant limiting the scope of the study. I decided to focus upon changes to working conditions only (rather than family arrangements), and within this, identified job insecurity and work intensity as two key trends to investigate. I also began to focus upon moderating, rather than mediating, relationships. Figure 3.6 illustrates this process of simplification. By reducing the scope of the thesis, simplifying the methodological approach, and guided by strong micro-level theories I was finally in a position to begin the analysis, nearly 18 months after I began.

In many ways, the work presented in this thesis represents just the tip of the iceberg. It took almost two years of ‘muddling through’ to arrive at a position where (a) I knew what I wanted to study and, (b) more importantly, how I would go about this. While interested in socio-economic changes related to post-industrialisation, I believe the best way to understand these changes is by examining outcomes at the micro-level. At the same time, cultural, political and economic contexts remain
Figure 3.6: Simplifying the thesis

important. This thesis, therefore, adopts a cross-disciplinary approach, merging the ideas of social policy (macro) and social statistics (micro) to focus on individual outcomes while taking contextual influences into account.

### 3.3 Methodological choices

The remainder of this chapter describes the methods used in this thesis and discusses some of the tensions, compromises and decisions encountered along the way. The ontological perspective developed above necessitated a particular methodological approach (i.e. quantitative, cross-national, multilevel), but within these constraints there remain a plethora of options. This discussion is in four parts. The first two summarise the methods and data used in each chapter, respectively. The third and fourth parts discuss issues relating to the application of these methods, focusing on ‘general principles’ and ‘implementation details’, in turn. The former addresses more fundamental methodological decisions, such as ‘longitudinal vs. cross-sectional’ or ‘Bayesian vs. frequentist’. These topics do not fit into any single chapter, but are important in explaining the overall shape and direction of the analysis. ‘Implementation details’ refers to methodological decisions that warrant explanation but are shared across one or more chapters (e.g. the handling of survey weights or the choice of prior distributions for Bayesian estimation). To begin, Table 3.1 summarises the data and methods used in each chapter. Given the space
available, the reader is referred to established texts from the existing literature.

Given the focus on micro- vs. macro-level influences, contextual effects and the hierarchical clustering of data, multilevel techniques were an obvious choice. Three chapters adopt a multilevel approach: either in standard regression (chapters 5 and 9) or SEM (chapter 6) frameworks. There are many excellent texts on multilevel analysis, most notably, Snijders and Bosker (2011), Gelman and Hill (2006) and Hox (2010). Three chapters adopt a SEM framework, all implemented in Mplus 6.1. Chapter 4 uses multigroup confirmatory factor analysis (MGCFA) with the 2006 ESS, chapter 6 uses multilevel path analysis with the 2010 ESS and chapter 8 uses latent class analysis (LCA) and mixture regression analysis with the 2004 WERS. A good introduction to SEM techniques is given by Kaplan (2008), Kline (2011) and Hoyle (1995; 2012). Lee (2007) and Asparouhov and Muthén (2010) discuss Bayesian approaches to SEM while Rabe-Hesketh et al. (2012) and Heck (2001) introduce SEM from a multilevel perspective.

3.4 Data

Just as the choice of methods is guided by the substantive focus of the thesis, the chosen data sources must similarly reflect the overarching aims and motivations. It must, for example, include questions on job insecurity, work intensity and subjective well-being. It must provide a cross-sectional (rather than longitudinal) sample of European countries. And it must adhere to a suitable sampling strategy with adequate response rates and sample sizes. While European researchers enjoy an abundance of (often under-analysed) survey data, relatively few sources meet these criteria.

Table 3.4 summarises the datasets considered for use in the thesis. As this highlights, timing was an important issue. Survey data represents a moving target, and many sources (e.g. the 2010/2012 ESS or the 2010 EWCS) were unavailable at the start of the PhD. Moreover, the questions included in successive waves of a single survey can often vary, meaning it is not only necessary to decide which survey to use, but also which year. Some surveys feature a core set of questions but then rotate thematic modules in each round (e.g. the ESS). Often, the wording for key questions will change from one year to the next. In 2004, the ESS asked respondents the extent to which they agreed with the statement “my job is secure”, whereas in 2006 it asked “how likely would you say it is that you will become unemployed in the next 12 months?”
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Job insecurity and family context</th>
<th>Method</th>
<th>Data</th>
<th>Software</th>
<th>Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Job insecurity and economic climate</td>
<td>Multigroup SEM</td>
<td>ESS 2006</td>
<td>Mplus 6.1</td>
<td>Robust ML</td>
</tr>
<tr>
<td>5.</td>
<td>Job insecurity and labour market policies</td>
<td>Multilevel regression</td>
<td>ESS 2010</td>
<td>Mplus 6.1</td>
<td>MCMC</td>
</tr>
<tr>
<td>7.</td>
<td>A mixture regression approach to the JD-R model</td>
<td>Latent class and mixture regression analysis</td>
<td>WERS 2004</td>
<td>Mplus 6.1</td>
<td>MCMC</td>
</tr>
<tr>
<td>8.</td>
<td>Job demands, job resources and perceived occupational stress: A cross-European analysis</td>
<td>Multilevel regression</td>
<td>EWCS 2005</td>
<td>R (MCMCglmm)</td>
<td>MCMC</td>
</tr>
</tbody>
</table>

ESS = European Social Survey  
WERS = Workplace Employee Relations Survey  
EWCS = European Working Conditions Survey  
ML = Maximum likelihood  
MCMC = Markov Chain Monte Carlo  
SEM = Structural equation modelling
The most important criteria when evaluating a survey was the coverage of key substantive topics, namely, job insecurity and work intensity. Several studies were removed from consideration at this point because they failed to include questions measuring perceived job insecurity. The EU-SILC, for example, was one of the most promising surveys initially, providing longitudinal and cross-national data with large sample sizes and excellent coverage of topics such as employment history and household income. However, it includes no information on job-based stressors such as employment insecurity, work intensity or unsocial working hours. It also provides no adequate measure of subjective well-being. The European Values Survey (EVS) and the European Quality of Life Study (EQLS) are ruled out for similar reasons.

Several studies were excluded because, although promising in other respects, they focused on only a single country. The GSOEP, BHPS and GSS all provide longitudinal data on job security and individual well-being, but are confined to Germany, the UK and the United States, respectively. While it is popular to compare Germany and the UK using the GSOEP and BHPS (e.g. Clasen et al. 2006; Frijters and Beatton

---

**Table 3.2: Data considered for the thesis**

<table>
<thead>
<tr>
<th>Survey</th>
<th>Years available</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Values Survey (EVS)</td>
<td>1981, 1990, 1999, 2008*</td>
</tr>
<tr>
<td>European Quality of Life Study (EQLS)</td>
<td>2003, 2007, 2011*</td>
</tr>
<tr>
<td>European Union Survey of Income and Living Conditions (EU-SILC)</td>
<td>2006 to 2011*</td>
</tr>
<tr>
<td>Eurobarometer surveys</td>
<td>1974 to 2013*</td>
</tr>
<tr>
<td>BHPS (and Understanding Society)</td>
<td>1991 to 2011*</td>
</tr>
<tr>
<td>German Socio Economic Panel (GSOEP)</td>
<td>1984 to 2012*</td>
</tr>
<tr>
<td>General Social Survey</td>
<td>1972 to 2012*</td>
</tr>
<tr>
<td>Establishment Survey on Working</td>
<td>2004</td>
</tr>
<tr>
<td>Time/Life Balance</td>
<td></td>
</tr>
</tbody>
</table>

* Data unavailable at start of PhD
2012), the core aim of this thesis is to compare variation across Europe. It is difficult to assess contextual effects (other than time) using just two countries.

Having excluded surveys that cannot adequately capture core substantive topics or which fail to provide cross-European comparisons, few options remain. After an exhaustive evaluative period, I settled on three data sources: (1) the European Social Survey (ESS), (2) the European Working Conditions Survey (EWCS) and (3) the Workplace Employee Relations Survey for England and Wales (WERS). Table 3.3 summarises the sample countries, sizes and response rates for the two European surveys. For the 2004 WERS, which focuses upon the United Kingdom, the total sample size was 22,451 with an overall response rate of 53.5%. The thesis also makes use of numerous sources of contextual information (e.g. from the OCED or Eurostat), which are described in the respective chapters. Remainder of this section describes the ESS, EWCS and WERS in turn.

3.4.1 The European Social Survey

The ESS is an academically led biennial study of social attitudes and values in Europe, with six rounds conducted to date (2002 to 2012). The survey is coordinated by a team led by Prof. Rory Fitzgerald (City University) and financed by the European Commission and the European Science Foundation (ESF). The study has five core objectives: (a) to measure change in socio-political structures and attitudes across Europe; (b) to promote higher standards of rigour in cross-national research; (c) to introduce indicators of national progress based on citizens’ perceptions of their societies; (d) to facilitate the training of European social researchers in comparative quantitative analysis; (e) to improve the visibility of ESS data among policymakers and the wider public (ESS 2013).

The survey population includes all persons aged 15 and over (with no upper age limit) resident within private households in each country. The unit of analysis is the individual. Rather than adopting a single sampling strategy for all 27 countries, the ESS aims to achieve a ‘workable and equivalent’ sample design in each country. Each country must adhere to a common set of sampling principles, including (a) random probability samples, (b) full coverage of the population, (c) high response rates (target minimum of 70%), (d) the minimisation of non-response and (e) the same minimum effective sample sizes (a minimum of 1,500 or 800 where the population is smaller than 2 million inhabitants). The particulars of each national sample design are then ‘signed off’ by a panel of experts.
Table 3.3: Sample sizes (N) and response rates (RR) for surveys used in the thesis

<table>
<thead>
<tr>
<th></th>
<th>ESS 2006</th>
<th>ESS 2010</th>
<th>EWCS 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>RR</td>
<td>N</td>
</tr>
<tr>
<td>Austria</td>
<td>2,405</td>
<td>64.0</td>
<td>1,009</td>
</tr>
<tr>
<td>Belgium</td>
<td>1,798</td>
<td>61.0</td>
<td>1,043</td>
</tr>
<tr>
<td>Cyprus</td>
<td>995</td>
<td>67.3</td>
<td>1,083</td>
</tr>
<tr>
<td>Denmark</td>
<td>1,505</td>
<td>50.8</td>
<td>1,576</td>
</tr>
<tr>
<td>Finland</td>
<td>1,896</td>
<td>64.4</td>
<td>1,876</td>
</tr>
<tr>
<td>France</td>
<td>1,986</td>
<td>46.0</td>
<td>1,728</td>
</tr>
<tr>
<td>Germany</td>
<td>2,916</td>
<td>54.5</td>
<td>3,031</td>
</tr>
<tr>
<td>Greece</td>
<td>2,715</td>
<td>54.2</td>
<td>2,775</td>
</tr>
<tr>
<td>Ireland</td>
<td>1,800</td>
<td>56.8</td>
<td>2,576</td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td></td>
<td>1,005</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1,889</td>
<td>59.8</td>
<td>1,829</td>
</tr>
<tr>
<td>Norway</td>
<td>1,750</td>
<td>65.5</td>
<td>1,548</td>
</tr>
<tr>
<td>Portugal</td>
<td>2,222</td>
<td>72.8</td>
<td>2,150</td>
</tr>
<tr>
<td>Spain</td>
<td>1,876</td>
<td>65.9</td>
<td>1,885</td>
</tr>
<tr>
<td>Sweden</td>
<td>1,927</td>
<td>65.9</td>
<td>1,497</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1,804</td>
<td>51.5</td>
<td>2,386</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2,394</td>
<td>54.6</td>
<td>2,422</td>
</tr>
<tr>
<td>Total/average</td>
<td>29,163</td>
<td>60.1</td>
<td>30,006</td>
</tr>
</tbody>
</table>

Although permitting the inclusion of countries that a more rigid sample specification might exclude, this flexible approach means the design effects (DEFFs) will vary from one country to the next. To correct for this, two weights are provided in the dataset. The ‘design weight’ accounts for over- or under-representation of individuals occupying certain types of address, such as those in larger households. It corrects for difference in the probability of selection, thereby producing a sample that is more representative of the target population. The ‘population weight’ ensures that in the weighted sample each country is represented in proportion to its population size. These two weights have been multiplied to produce a single weight (cweight). Notably, the weights currently provided by the ESS do not adjust for non-response in the sample. The survey is conducted using face-to-face interviews lasting approximately one hour. Each round of the survey includes a core set of 120 questions as well as one
or more rotating modules on a particular theme. For further information on the ESS sample, see Jowell and Eva (2008).

While the ESS was one of few cross-national surveys that met the requirements of the thesis (i.e. cross-national, good coverage of key topics), the choice of which round of the survey to use was altogether less straightforward. Despite sharing a core set of questions, differences in question wording and rotating thematic modules meant the variables available for analysis differed substantially. Three rounds were available at the start of the PhD: 2002, 2004 and 2006. The rotating modules for 2004 were “work, family and well-being”, “health care needs” and “economic morality”. For 2006, they were “personal and social well-being” and “the timing of life”. As a result, the two surveys differ markedly in their coverage and measurement of job insecurity, work intensity and subjective well-being. Job insecurity was measured in 2004 by asking respondents how true the statements “my job is secure” is for them (from ‘not at all true’ to ‘very true’). In 2006, by contrast, respondents were asked to assess their likelihood of becoming unemployed in the next 12 months (from ‘very likely’ to ‘not at all likely’).

The 2006 module on “personal and social well-being” provides a more thorough assessment of subjective well-being, compared to 2004. While both rounds include questions on life satisfaction, general happiness and ‘feelings over the past week’ (e.g. ‘cheerful and in good spirits”, ‘calm and relaxed’, ‘fresh and rested’, etc.), the 2006 survey included an additional barrage of questions measuring depressive symptoms and positive attitudes (see Table 3.4).

To complicate things further, the 2004 survey provides much better coverage of ‘work intensity’ and ‘job strain’ due to the rotating module on ‘family, work and well-being and work-life balance’. This includes, for example, questions on unsocial working hours (e.g. nights or weekends, overtime at short notice), work-family overlap and job quality (e.g. job control, support from supervisors, effort).

To summarise, the 2006 survey provides better measures of job insecurity and subjective well-being, but less information on work intensity and job strain, compared to 2004. The solution, after much deliberation, has been to use the 2006 ESS for chapters addressing job insecurity, and the 2005 EWCS (see below) for chapters on work intensity.

3.4.2 European Working Conditions Survey

The EWCS has been chosen because it represents the best source of cross-European data on working conditions and work intensity. The 2005
Table 3.4: Measures of subjective well-being available in the 2006 ESS

<table>
<thead>
<tr>
<th>How much of the time during the past week have you...</th>
<th>...felt depressed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>...felt that everything you did was an effort?</td>
<td>...were happy?</td>
</tr>
<tr>
<td>...felt lonely?</td>
<td>...enjoyed life?</td>
</tr>
<tr>
<td>...felt sad?</td>
<td>...could not get going?</td>
</tr>
<tr>
<td>...had a lot of energy?</td>
<td>...felt anxious?</td>
</tr>
<tr>
<td>...felt anxious?</td>
<td>...felt tired?</td>
</tr>
<tr>
<td>...felt sad?</td>
<td>...felt calm and peaceful?</td>
</tr>
<tr>
<td>...felt really rested on waking in the morning?</td>
<td>...felt bored?</td>
</tr>
<tr>
<td>...felt free to decide how to live their life.</td>
<td>...felt bored?</td>
</tr>
</tbody>
</table>

Positive attitudes and activities

<table>
<thead>
<tr>
<th>I seldom have time to do the things I really enjoy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I get very little chance to show how capable I am.</td>
</tr>
<tr>
<td>I love learning new things.</td>
</tr>
<tr>
<td>Most days I feel a sense of accomplishment from what I do.</td>
</tr>
<tr>
<td>I like planning and preparing for the future.</td>
</tr>
<tr>
<td>If things go wrong, it takes a long time to get back to normal.</td>
</tr>
<tr>
<td>My life involves a lot of physical activity.</td>
</tr>
</tbody>
</table>

The survey was the fourth in the series (with previous rounds in 1990, 1995, 2000 and 2005) and covered the EU27 plus Norway, Croatia, Turkey and Switzerland. The survey population is all persons in employment (employees and self-employed) during the fieldwork period of each country. A multi-stage, stratified and clustered sample design was implemented in

---

2Initial findings from the 2010 EWCS were released in October 2012 (Parent-Thirion et al. 2012), but the data did not become available during the PhD.

3The EU27 include Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden and the United Kingdom.

4This is based on the Eurostat definition, which defines employed persons as “persons aged 15 and over, who during the reference week performed work, even for just one hour per week, for pay, profit or family gain will all were not at work but had a job or business from which there were temporarily absent because of, e.g., illness, holidays, industrial dispute and education or training” (Labour Force Survey 2005)
each country. A ‘random walk’ procedure was used to select respondents in the last stage. This sampling design had four stages. First, primary sampling units (PSUs) in each country were stratified based on region and level of urbanisation. Secondly, a starting address for the ‘random walk’ procedure was selected from each stratum and PSU. Thirdly, starting from the assigned address, an interviewer would follow a pre-defined procedure ‘random walk’ to select the households to contact for interviewing. Finally, within each household, an interviewer would identify a number of employed persons, and then (in households where more than one person worked) select the person whose birthday was latest. In each country, 1000 face-to-face interviews were sought. The fieldwork period ran from 17 September to 30 November 2005. Interviewers visited 70,300 households and carried out 29,766 interviews. The overall response rate, for countries considered in this thesis, is 50% (see Table 3.3). The survey provides three types of weighting to control for (a) selection probability, (b) non-response and (c) population size. These have been applied to all analyses where possible, but see comments in Appendix 1 regarding weighting procedures for multilevel models.

3.4.3 The 2004 Workplace Employee Relations Survey (WERS)

The WERS is used in chapter 8, which applies latent class and mixture regression analysis to the well-established job-demand-resources model. As the emphasis was methodological rather than substantive, a simpler data source was selected. Latent class analysis and mixture regression analysis both seek to identify subgroups (i.e. classes) within a sample based on a set of variables (in the case of LCA) or the relationships between these variables (in the case of mixture regression analysis). While multilevel mixture models are technically feasible (e.g. Vermunt 2008; Asparouhov and Muthén 2008; Henry and Muthén 2010) the additional complexity of a hierarchical sample was considered unhelpful (as a rule, one should innovate on data or methods, but not both at the same time). Moreover, since the analysis seeks to identify subgroups within a sample, the sample sizes provided by cross-national surveys (typically less than 2000) are likely to be insufficient. The 2004 WERS was chosen, therefore, because

---

5 Except Cyprus, Estonia, Luxembourg, Malta and Slovenia, where the target was 600.
(a) it provides good coverage of topics such as job demands, job resources and job strain, and (b) it provides a large (N = 23,000) representative sample for a single country (the UK).

The 2004 survey is the fifth WERS, with previous surveys taking place in 1980, 1984, 1990 and 1998. The survey aims to provide “a nationally representative account of the state of employment relations and working life inside British workplaces” (Kersley et al. 2005: 1). The WERS includes both a cross-sectional and panel element; the focus here is on the former. Fieldwork for the 2004 WERS was conducted between February 2004 and April 2005 by the National Centre for Social Research (NatCen). The survey uses two modes of data collection: (1) face-to-face interviews with around 3200 managers and 1000 worker representatives; (2) a short (eight sides of A4) self-completion questionnaires from over 20,000 employees (the ‘Survey of Employees’).

The survey uses a stratified random sample of businesses taken from the Inter-Departmental Business Register (IDBR). The sampling unit is the IDBR ‘local unit’. The sample is restricted to establishments with a minimum of five employees and with a Standard Industrial Classification 2003 within Sections D to O inclusive\(^6\). Within each workplace\(^7\) self-completion questionnaires were distributed to a random selection of (up to) 25 employees. Face-to-face interviews were conducted with a union and non-union representative. The total sample comprised 3998 local units.

The ‘Survey of Employees’ questionnaires were distributed at 85.6% of workplaces from which a management interview was obtained. The response rate from these questionnaires can be calculated in two ways: (a) based on the total number of questionnaires distributed by interviewers (54.3%); or (b) based on the total number of questionnaires distributed in workplaces from which at least one productive questionnaire was returned (60.7%). The total productive sample for the ‘Survey of Employees’ questionnaire is 22,451 employees from 2295 workplaces.

Since the WERS samples are not based on equal probability designs (the probability of selection differs by establishment size and industry

---

\(^6\)This excludes establishments in sections A to C (Agriculture, hunting and forestry; Fishing; and Mining and Quarrying), P (Private households with employed persons) and Q (Extra territorial bodies). Local units located in Northern Ireland were also excluded.

\(^7\)A workplace was defined as comprising “the activities of a single employer at a single set of premises” (Kersley et al. 2005: 13).
sectors) the data must be weighted in order to provide unbiased estimates. For chapter 8, all models are weighted using the ‘revised weight’ variable \texttt{seqwtnr2} (see Chaplin et al. 2005 for details of how this is calculated).

Despite widespread praise (e.g. Whitfield and Huxley 2007), the WERS has received criticism (Addison and Belfield 2001; Forth and McNabb 2008), most notably, focusing on questionnaire design and item validity (Timming 2009). Timming highlights the vagueness of response categories, double-barrelled questions, the needless use of ordinal measurements (i.e. where continuous measures would be preferable) and variable-category confusion (where what should be response categories are treated as variables). Despite these limitations, however, the WERS 2004 remains “an outstanding resource” (p. 560) that is well suited to the requirements of chapter 8. As Timming puts it, “no other nationally constituted survey on work and employment can match its breadth and depth” (p. 562).

### 3.5 General principles

This section describes some of the methodological tensions that arose during the PhD. For the most part, these tensions are the result of simplification. The finite scope of a PhD thesis means one must be selective in terms of the topic and methods considered.

1: Cross-sectional rather than longitudinal

This thesis adopts a cross-sectional (rather than longitudinal) approach for both substantive and practical reasons. First, given a background in comparative social policy, I was more interested in how post-industrial employment arrangements varied across European nations than over
time. Drawing on the ‘welfare regime’ literature (e.g. Esping-Andersen 1990; Castles and Mitchell 1992; Esping-Andersen 1999; Scruggs 2006), I wanted to test whether the macro-level clusters of countries (e.g. liberal, social democratic, etc.) could be found in the micro-level data. Moreover, given the focus on moderation and the role of contextual variables, the cross-sectional approach seemed appropriate.

More practically, the focus on geographic rather than temporal variation was influenced by the availability of suitable data. Very few surveys provide both cross-sectional and longitudinal information on working conditions and well-being. The EU-SILC (Eurostat 2005) and the Cross National Equivalent File (CNEF; Burkhauser et al. 2000) appear to be the sole exceptions, but neither of these provide consistent information on work-based stressors, such as perceived insecurity or job stress. Even when one drops the cross-national requirement, and focuses solely on change over time within a single country, there remain few sources of panel data on job insecurity and job stress. The British Household Panel Survey (BHPS) measures job insecurity in just two waves (1996 and 1997), but this question has not been repeated since. The BHPS does include a question on ‘satisfaction with job security’, but this is a poor proxy for insecurity. It is also possible to devise a measure of ‘job loss in the next year’ from the BHPS (i.e. respondents who are employed in round n and unemployed in round n + 1), but this again is far from ideal. The more recent Understanding Society panel (Buck and McFall 2011) asks respondents to assess their chances of becoming unemployed in the next 12 months, but this question is only available for the most recent wave.

The National Child Development Study (NCDS) follows a group of individuals living in the UK who are born in a single week in 1958. There have been five waves since 1981, the most recent of which (2000 and 2009) include two items on perceived job insecurity. The first asks respondents to rate their job from ‘very secure’ to ‘not very secure’. The second asks respondents whether they expect, in the coming year, to be ‘working for the same employer as now’, ‘working for a different employer’ or ‘not working at all’. These questions are also included in the 1999/2000 and 2004/2005 waves of the 1970 British Cohort Study (Elliott and Shepherd 2006).

---

8 Respondents were asked to assess their likelihood of becoming unemployed, on a five-point scale from “very likely” to “not at all likely”.
Many major panel studies provide surprisingly little (or no) information on perceptions of job security and job stress. These include the Whitehall II study (which asks respondents about ‘financial security in the future’, but not employment security; Marmot et al. 1991), the Americans’ Changing Lives Survey (1986-2002; Lantz et al. 2005), the National Survey of Midlife Development in the United States (MIDUS; Brim et al. 2004), the Wisconsin longitudinal study (Sewell et al. 2003), the Current Population Survey (CPS; King et al. 2010) and the Panel Survey of Income Dynamics (PSID 2013). Several studies provide repeated cross-sectional information on working conditions – e.g. the British Social Attitudes Survey (Park et al. 2012) and the General Social Survey in the United States (Smith et al. 2008) – but the options for longitudinal analysis with these samples are limited.

2: Subjective vs. objective well-being

Recent years have seen a growing acceptance and application of subjective data among social scientists. This thesis relies on subjective measures of well-being, and in many chapters, on single-item indicators, such as life satisfaction. Recognising that debates surrounding ‘subjective vs. objective’ well-being go far beyond the space available here (for a review, see Kahneman et al. 1999; Easterlin 2006), the view is taken that, despite their limitations, subjective indicators provide a useful and reliable measure of individual well-being and how this is influenced by work-based stressors such as insecurity or stress. This position is nicely illustrated by Di Tella and MacCulloch (2007):

Doctors sometimes ask their patients questions such as, “does it hurt?” Upon hearing these words, reasonable patients do not throw a fit, accuse the doctor of unscientific reliance on interpersonal comparisons of pain and leave the hospital in disappointment. Presumably, they think these questions help doctors do their job (p. 1).

Like any data, subjective assessments are prone to error and bias, but this does not negate their usefulness in analysing social problems. Reports of life satisfaction or happiness have been shown to be influenced by subtle changes in the immediate context, such as mood, the time of day, weather or the order of questions on a survey (Layard 2003; Coombs 2006; Krueger and Schkade 2008). Responses can also depend on comparisons with immediate neighbours, other countries or past experiences (Kahneman et al. 2004: 430). Moreover, single-item measures, such as life satisfaction,
overlook the multi-dimensional nature of individual well-being (e.g. Ryff and Keyes 1995; van de Walle 1998; Bérenger and Verdier-Chouchane 2007). Dolan et al. (2011) raise further issues of salience, scaling and selection.

These limitations notwithstanding, subjective data have been shown to be adequately reliable for present purposes (e.g. Wallace and Wheeler 2002). Krueger and Schkade (2008) report that reliability figures for subjective measures of well-being (which include life satisfaction) are “sufficiently high to yield informative estimates” (p. 1843). Individuals in similar circumstances tend to give similar responses (Van Praag 2007) and subjective indicators correlate well with one another (Smith 2004) and with objective characteristics such as unemployment, risk of heart disease or blood-pressure responses to stress (Di Tella and MacCulloch 2007). There is also evidence from neuroscience linking subjective feelings to biological processes, such as brain activity (e.g. Davidson 2000). Cross-national reliability would also appear to be acceptable. Despite evidence suggesting that the determinants of life satisfaction might vary cross-culturally (e.g. Oishi et al. 1999; Gundelach and Kreiner 2004; Böhnke 2008), research shows good cross-national reliability in reports of life satisfaction. As Bolle and Kemp (2008) argue, “the international differences in life satisfaction seem more likely to be real than to arise from differences in the way that different nationalities assign numbers or labels to their experiences” (p. 408).

The suitability of subjective data depends also on the intended application. Frey and Stutzer (2005) argue that if the main concern is to identify the determinants of happiness, rather than the absolute level, “it is neither necessary to assume that reported subjective well-being is cardinally measurable, nor that it is interpersonally comparable” (p. 208). Throughout this thesis, we are not interested in the levels of subjective well-being, but rather, in changes in well-being due to job stressors.

Data availability and precedence are also an issue. Few national (and even few cross-national) surveys provide objective data on well-being (the biomarkers provided in recent waves of Understanding Society are a notable exception) and past research on job insecurity and job stress have focused almost exclusively on self-reported measures. The reliance on subjective data in this thesis is therefore a pragmatic compromise. Better measures of well-being are undoubtedly possible, but are neither available in the aforementioned surveys nor required to productively study individual experiences of work.
3: Bayesian vs. Frequentist estimation

“A Bayesian revolution is under way in social science methods”
— Zyphur and Oswald (2013)

Interest in Bayesian methods among applied social science researchers has exploded over the past decade, alongside advances in computer speed and storage capabilities. I first became aware of Bayesian inference (and MCMC estimation) in the first year of PhD program (2008), when fitting multilevel logistic regression models in MLwiN. MCMC estimation was introduced as a more stable and accurate alternative to approximate, quasi-likelihood estimation methods (e.g. MQL or PQL). Since then, MCMC methods have only grown in popularity. Whereas five years ago there were limited options with regards to software (MLwiN and WinBUGS being the notable exceptions), researchers now enjoy an abundance of options. Mplus (Muthén and Muthén 2013) gained Bayesian estimation capabilities in 2010. A range of packages for the statistical software R (R Core Team 2013) has become available, including MCMCglmm (Hadfield 2010) and MCMCpack (Martin et al. 2011). Other notable packages for Bayesian inference include JAGS (Plummer 2010), the Python package pyMC (Patil et al. 2010) and most recently, Stan (Stan Development Team 2013).

There are many good introductory texts on Bayesian inference and analysis (e.g. Gelman 2004; Lynch 2007; Jackman 2009; Kruschke 2010), so to avoid repetition, the reader is referred to these works for more detailed coverage. The key distinction is that whereas frequentist methods view parameters as fixed constants, Bayesian analysis views them as variables. Parameters are drawn from the posterior distribution, formed by combining prior expectations (in the form of a probability distribution) with observed data. Priors can be non-informative or informative (i.e. when they represent our previously held beliefs or expectations).

MCMC estimation is used throughout this thesis as a drop-in replacement for maximum likelihood (ML) or weighted least squares (MLS) methods. It is used for problems where traditional methods are either inaccurate or computationally expensive (i.e. slow or unfeasible). Muthén (2010) highlights three motivations for Bayesian analysis: (1) it

---

9The term ‘non-informative’ is a misnomer, since any prior distribution will contain some information. These are also referred to as ‘diffuse’ or ‘flat’ priors.
provides more information about parameter estimates and model fit; (2) analyses can be made less computationally demanding; and (3) new types of models can be analysed (p. 4). Point 2 is of particular interest here. As Muthén argues:

Many models are computationally cumbersome or impossible using ML, such as with categorical outcomes and many latent variables resulting in many dimensions of numerical integration. Such an analyst may view the Bayesian analysis simply as a computational tool for getting estimates that are analogous to what would have been obtained by ML had it been feasible (Muthén 2010: 5).

Bayesian methods, therefore, are employed as ‘a computational tool’ to increase the accuracy of estimates in situations where non-Bayesian (i.e. frequentist) methods are known to be problematic. With non-informative priors Bayesian methods have been shown to give results close to the maximum likelihood estimates in large samples (Browne and Draper 2006: 505).

While many studies have demonstrated the computational advantages of Bayesian methods (e.g. Chung et al. 2013), three topics are of particular relevance to this PhD. First, MCMC estimation has been shown to provide more accurate parameter estimates when estimating multilevel logistic models, compared to quasi-likelihood methods (Browne, 1998; Leckie and Charlton 2011). Second, Bayesian estimation has been shown to perform better than frequentist alternatives (i.e. maximum likelihood) in multilevel models with few level-2 units (Muthén 2010; see below). Finally, Bayesian estimation is useful in many situations where frequentist approaches are too slow or complex (e.g. models that require many dimensions of numerical integration), as is often the case with categorical or latent variables in SEM framework (Zyphur and Oswald 2013). Muthén (2010) demonstrates the considerable speed gains of Bayesian estimation for multilevel logistic regression with random slopes, “particularly if a random slope has a very small variance” (p. 25). Not only is it faster, but Bayesian estimation can also be much more accurate. For multilevel models with categorical variables, Asparouhov and Muthén (2010) show that while weighted least squares (WLSMV) gives biased estimates, MCMC estimation does not.
4: Western rather than Eastern Europe

Most chapters in this thesis focus upon Western (rather than Eastern) Europe, for the same reasons that it adopts a quantitative, cross-sectional design: the geographical tendencies of the existing literature, the availability of comparable survey data and personal experience. The welfare state is a decidedly European enterprise (Flora 1986) and the comparative literature has historically centred on Western Europe. My formative research (detailed above) has addressed issues of comparative welfare policy from micro- and macro-level perspectives, but invariably, from a Western European perspective. Data availability is another important consideration. The riches of European survey data, in terms of coverage and consistency, make Western Europe an ideal target analysis.

A further justification for the focus on Western Europe (or rather, the exclusion of Eastern Europe) relates to the measurement of subjective well-being. Past research has shown national characteristics, such as GDP or social expenditure, to explain a considerable proportion of the variation in subjective measures of well-being (Böhnke 2007), particularly in less developed Eastern European nations (Hayo and Seifert 2003). While subjective well-being is not wholly determined by material resources or living conditions (p. 331) individuals nonetheless tend to compare their situation to that of others. Self-assessments are always filtered by cultural context, but the systematic differences (most notably, economic) between Eastern and Western Europe make consistent comparisons difficult. Eastern Europeans report among the lowest levels of subjective well-being in the world (Deaton 2008), a trend that has been linked to high rates of economic growth (Deaton 2008), the legacy of communist rule (Inglehart and Klingemann 2000) or high levels of corruption (Tavits 2008).

3.6 Conclusion

Researchers rarely choose methods based solely on their ability to answer a particular research question. Instead, they rely on informal criteria (Gelman 2013) such as expertise (i.e. past experience), cost (i.e. time, resources) and disciplinary or departmental norms. Recognising that most forms of dissemination tend to hide such informalities, this chapter has provided a more detailed commentary on the methodological meanders that led to this thesis. In general, my epistemological and methodological inclinations have tended to reflect the prevailing academic environment.
This thesis thus represents the confluence of training in social policy (i.e. York) and social statistics (i.e. Manchester).
4 Job insecurity and family context: job dependency or social support?

This chapter considers how the association between job insecurity and subjective well-being is moderated by family context. Based on data for five Western European countries it uses multigroup structural equation modelling (MGSEM) to test two theoretical perspectives: job dependency and social support. The former posits that the association between insecurity and well-being will be amplified by family-related dependencies, such as having children or being the sole breadwinner. Social support, in contrast, is expected to act as a buffer, reducing the negative consequences associated with anticipated job loss. Overall, the results fail to support either perspective. A significant positive association is observed between perceived job insecurity and depression, but there is no evidence to suggest that family context plays an intermediary role.

4.1 Introduction

Despite the breadth of the existing job insecurity literature, few studies have considered family arrangements. If they are included at all, family circumstances tend to be framed as outcome measures, such as marital functioning and parent-child relationships (Burchell 2005: 90). Larson et al. (1994), for example, highlight the link between job insecurity and marital and family dysfunction, while Richter et al. (2010) consider how insecurity relates to work-family conflict. Using data from 943 interviews with British employees during 1986, Lampard (1994) found the insecure employment at the time of marriage significantly increased the risk of marital dissolution later on. A commonly used concept in this literature is spillover – “the way in which women’s and men’s emotional experience at work influences the dynamics of family life” (Nolan et al. 2000: 196) or vice versa. Typically, research focuses on the spillover of negative
work experiences into family life (Barling 1990). In contrast to much of the existing literature, this chapter frames family arrangements as a moderating influence rather than an outcome.

A handful of studies have studied interaction of job insecurity and family context. Lim (1996) considers the extent to which social support provided by family and friends buffers the consequences of perceived insecurity. Conversely, Hughes and Galinsky (1994) test whether family stressors, such as the presence of children, amplify work-based stressors, such as job insecurity. Research carried out in the United States during the 1930s suggests that family characteristics such as “adaptability, cohesion, and willingness to take on non-traditional family roles” (Burchell 2005: 92) can buffer families during periods of labour market uncertainty. Liker and Elder (1983) suggest that families who are more rigid in the division of household tasks are more likely to experience marital dissolution when the husband’s job is insecure. Similarly, Hughes and Galinsky (1994) have shown that job insecurity is more likely to result in marital tension if there is little spouse support in the performance of household tasks.

A more recent study by Weckström (2012) investigates how family situation and gender moderate the experience of unemployment for 881 Finnish workers. Weckström finds that while women assess the consequences of unemployment less negatively than men, overall, family situation has little impact. With the exception of lone mothers, the influence of marital status or children in the household was non-significant. The report concludes that “family situation is not decisive when it comes to coping with unemployment” (p. 381).

4.1.1 Defining family

It is important to be clear about what is meant by ‘family’. At the beginning of the 21st century, the 1950s model “of a white, middle-class bread-winning husband, his home-maker wife and their two children”, seems out-dated (Burchell 2005: 89). There have been huge changes in family composition and formation over the past half-century (e.g. van de Kaa 1987). Increases in cohabitation, sole occupancy and multiple marriages over the life course (Draxler 2006: 27) mean the nuclear family or male breadwinner model, which formed the basis of post-war welfare policy, can be relied upon less and less to absorb welfare risks (Lewis 2001). Changing marital patterns, rising divorce rates and less stable partnerships introduce new insecurities, with separation often resulting in entitlement losses for one or both partners (Bonoli 2007: 500).
Despite these changes, it is important to avoid exaggerating the extent of demographic change. As Burchell notes, “attitudes to traditional sexual divisions of labour remain steadfast” (2005: 89) and while men’s involvement in domestic tasks has risen, they have not become as engaged in “the practicalities of family life to the same degree that women have become engaged with the demands of paid work” (ibid.). As illustrated in Figure 4.1, traditional family forms remain predominant, despite the proliferation of alternative forms.

**Figure 4.1:** Family arrangements in the 2006 European Social Survey

This chapter considers two mechanisms by which family arrangements are thought to moderate job insecurity: (a) job dependency and (b) social support. Job dependency is loosely defined as the importance an individual’s job (and the sustainment of that position) holds for them. It is hypothesised to amplify the negative consequences of job insecurity, such that workers who are more dependent on their current position react more strongly to the threat of job loss. Social support, conversely, is hypothesised to act as a buffer. Informal support provided by family and friends is thought to reduce the negative consequences of insecurity. These mechanisms are thought to be associated with family context.

The chapter is split into five sections. The first outlines the theoretical model, explaining how family situation is thought to moderate the experience of job insecurity. The second section describes the data and methods, while the third describes how the key concepts have been operationalised. The fourth section presents the findings and the fifth concludes.
4.2 Dependency and support as moderators of job insecurity

4.2.1 Job dependency

Job dependency refers to a set of conditions that determine how important an individual’s current job, and the sustainment of that position, is to them. Dependency is thought to moderate the experience of insecurity such that individuals who are more dependent on their current position will be more strongly affected by the threat of job loss. Building on Greenhalgh and Rosenblatt’s (1984) conceptualisation, job dependency is defined as a function of occupational mobility and economic insecurity. Dependency thus arises when an individual (a) possesses skills that are in low demand, (b) is responsible for a high proportion of household income, (c) faces high fixed obligations and (d) supplementary income sources are unavailable or uncertain (p. 445).

Occupational mobility refers to the difficulties faced when seeking alternative employment and is closely related to the notion of employability. Highly mobile workers (i.e. those with better skills, experience or connections) are thought to be less concerned with the security of their current position, since finding alternative employment would be relatively easy. Research has shown that employees who perceive themselves as more skilled, adaptable and confident consequently evaluated the prospect of job loss as less harmful, or even, as an opportunity for advancement (Fugate, Kinicki and Ashforth, 2004; cited in Sora et al. 2010).

Economic insecurity concerns an individual’s fixed financial obligations and the alternative sources of non-work income that are available. With regard to household context, economic insecurity is motivated by breadwinner status (the proportion of household income an individual contributes), fixed obligations (i.e. provision for children or elderly relatives) and the availability of alternative sources of income. Past research has shown workers with young children to be more vulnerable to the stresses associated with job insecurity (Hughes and Galinsky 1994; Larson et al. 1994; Ertel et al. 2008). This is to be expected. Employees worry not only about the likelihood of job loss (i.e. cognitive insecurity), but also about the anticipated consequences of such an event (i.e. affective insecurity; Burchell 2005). Where employees provide for dependent family members (e.g. children or elderly relatives), the consequences of job loss will be felt more widely, compared to workers with fewer financial responsibilities (e.g. those who live alone).
Hypothesis 1: Job insecurity is negatively associated with subjective well-being.

Hypothesis 2: Family-based job dependencies will amplify the association between job insecurity and subjective well-being.

4.2.2 Social support

Although the term social support is understood intuitively in everyday language, there is no generally accepted definition of what it means (Nolan et al. 2000). Social support has been defined as “a flow of emotional concern, instrumental aid, information and/or appraisal between people” (House 1981: 86) or as “the function performed for the individual by significant others such as family members, friends and co-workers” (Thoits 1995: 64). Common to all definitions is the assumption that social support has a positive effect on health and well-being in the event of stressful situations. Lim (1996) identifies three ways in which social support is thought to influence health and well-being outcomes. Firstly, as a main effect on the outcomes, such that individuals who receive higher levels of support are expected to experience better health and less dissatisfaction. Secondly, as a direct effect on perceived stress, such that when social support is present the level of perceived stress is reduced. Finally, as a moderating or buffering factor, whereby social support can alter the association between stress and the associated outcomes. House (1981) similarly identifies three mechanisms by which social support may alleviate the consequences of work-related stress: (1) By reducing the importance of the perception that a situation is stressful; (2) by tranquillising the neuroendocrine system such that people are less reactive to the perceived stress; and (3) by facilitating healthy behaviours, such as physical exercise or rest.

Overall, there is good empirical evidence to suggest that social support can buffer the negative consequences of stressful situations (e.g. Beehr 1976; LaRocco et al. 1980; Blau 1981; Seers et al. 1983). Näswall et al. (2005) find non-work based social support to moderate the negative association between job insecurity and mental health. Lim (1996) shows that support from co-workers and supervisors “can contribute significantly in buffering individuals against dissatisfaction, proactive job search and non-compliant job behaviours” when job insecurity is at stake (p. 190).

Beyond this general consensus, however, evidence suggests that the moderating influence of social support can depend on (a) the type of
support available (e.g. work-based or non-work based), (b) the choice of dependent variables (e.g. work-related or non-work outcomes; Lim 1996: 172) as well as (c) employee characteristics, such as tenure or gender. Generally, work-based support is more important (as a buffer) than non-work support where the source of stress is specific to the work environment (p. 172). Büsning (1999a) finds that while social support moderates the consequences of stress associated with job insecurity, the effect depends on the outcome under investigation. Clark (2005), meanwhile, shows family-based social support to alleviate the consequences of insecurity, but only for permanent employees.

Other studies find no support for the buffering hypothesis. An analysis by Dekker and Schaufeli (1995) of 105 Australian transport workers finds no buffering effect, while a study of 102 female nurses in the United States found support from colleagues to have a buffering influence, but in the opposite direction to that hypothesised above (Kaufmann and Beehr 1986). Overall, the interaction between social support and job insecurity appears somewhat inconsistent. The choice of outcome measures, the type of support available and the presence of other moderating factors can all play a role. The distinction between work- and non-work-based sources of support appears particularly pertinent.

**Hypothesis 3:** Social support provided by household members will act as a buffer, whereby the association between job insecurity and well-being is a weaker for individuals receiving higher levels of support.

### 4.3 Analytic approach

This study uses data from the 2006 *European Social Survey* (ESS; see chapter 3). The survey includes 43,000 individuals across 27 countries, of which just five are considered here: Germany, Sweden, Ireland, Portugal and the United Kingdom. Table 4.1 presents the response rates and sample designs for each.

This chapter focuses on just five countries for reasons of simplicity and coherence. To interpret a MGSEM analysis involving multiple moderators becomes increasingly complex as the number of groups increases. The focus on Western Europe, as argued in chapter 3, is also justified insofar as it reduces heterogeneity in national characteristics that have been shown to influence subjective assessments of well-being. Finally, these countries
have been chosen to represent the ideal types of European welfare regime, based on Esping-Andersen’s *Three Worlds of Welfare* typology (1990).  

This chapter is principally concerned with moderation: is the link between perceived insecurity and depression buffered or amplified by family context? The above hypotheses are tested using multigroup SEM, where the dependent variable (a latent measure of depression) is predicted by perceived job insecurity and a set of control variables. Moderation effects are then tested using interaction terms (job insecurity × the moderator), as specified below (for individual i in group g, where g represents country):

\[
\text{Depression}_{ij} = \beta_0 + \beta_1 (\text{job insecurity})_{ig} + \beta_2 (\text{moderator})_{ig} + \\
\beta_3 (\text{job insecurity} \times \text{moderator})_{ig} + \\
\beta_4 (\text{control variables})_{ig} + e_{0ig}
\]

The latent measure of depression requires a two-step approach. A measurement model is first specified using multigroup confirmatory factor analysis (MGCFA). Second, multigroup SEM is used to test structural relationships between this latent variable and the explanatory variables. All models are estimated in *Mplus 6.1* using robust weighted least squares estimation (WLSMV), weighted by the combined ESS weight (cweight). Using LISREL notation, with group index \( g = 1, \ldots, G \), the multigroup model can be denoted as

\[
I_j = f \left( \beta_{0j}^{(g)} + \beta_{1j}^{(g)} W \right)
\]

\footnote{Specifically, Germany, Sweden and Portugal represent the conservative, social democratic and Mediterranean ideal types, respectively. Ireland and the UK are representative of the liberal ideal type.}
Where $I_j$ represents the observed indicator, $f$ represents the link function, $\beta_{0j}^{(g)}$ is the intercept term, $\beta_{1j}^{(g)}$ represents the slope parameter and $W$ represents the latent trait. The multigroup structural equation model is specified as:

$$X_j^{(g)} = \tau_j^{(g)} + \lambda_j^{(g)} \xi^{(g)} + \delta_j^{(g)}$$

Where $X_j^{(g)}$ is the observed score for indicator $j$ in group $g$, $\tau_j^{(g)}$ the intercept term of indicator $j$ in group $g$, $\xi^{(g)}$ is the value of the latent variable; and $\delta_j^{(g)}$ is the error term (see Bou and Satorra 2010). Model fit is assessed using the normal SEM fit indices, which include the $\chi^2$ test of model fit, the comparative fit index (CFI) and the root-mean-square error of approximation (RMSEA). Despite contention surrounding the use of cut-off points for fit indices (Mulaik 2007; Barrett 2007; Steiger 2007; Nye and Drasgow 2010), the rules-of-thumb provided by Schermelleh-Engel et al. (2003) will be adopted here. CFI values of above 0.95 and RMSEA values of below 0.06 are considered acceptable. Significant tests of individual parameters are calculated by comparing nested models with a corrected $\chi^2$ difference test (the DIFFTEST function in Mplus).

Moderation effects are tested using interaction terms (i.e. the product job insecurity and each moderator, described below). Since both variables are dichotomous, the interaction term is a binary indicator of individuals who experience both high job insecurity and the moderator.

### 4.4 Measurements

#### 4.4.1 Subjective well-being

Subjective well-being is operationalised using a continuous latent measure of ‘depression’, based on eight observed indicators (see Figure 4.2). An important consideration when specifying cross-national latent constructs is measurement invariance (Cheung and Rensvold 2002; Harkness et al. 2003). This is the property where, “under different conditions of observing and studying phenomena, measurement operations yield measures the same attribute” (Horn and McArdle 1992: 117). Testing for invariance is therefore an essential precursor to comparative latent variable modelling. As Horn and McArdle argue, “without evidence of measurement invariance, the conclusions of a study must be weak” (p. 119).

Three levels of invariance of increasing strictness are typically considered. The lowest level is configural invariance, which requires that the items of a measurement instrument exhibit the same configuration of loadings in each country (that is, instrument should be defined by the
Figure 4.2: Measurement model for depression

How much of the time during the past week...

- ...you felt depressed?
- ...you felt calm and peaceful?*
- ...you felt anxious?
- ...you felt that everything you did was an effort?
- ...your sleep was restless?
- ...you enjoyed life?*

Depression

* = reverse coded.

Covariances between factor loadings not shown.

same indicators in each country). Configural invariance is supported if the CFA model is well fitting when estimated for each country separately, and the item loadings are substantial and significant (Davidov et al. 2008: 429). Metric invariance requires the factor loadings to be invariant across countries, while scalar invariance requires that the item intercepts are also invariant. Each type of invariance is tested by applying the relevant constraints and then examining the overall model fit. To the extent that the constrained model fits the data well, the assumption of invariance is upheld.

The minimum level of invariance required for an analysis depends on the research objectives. To compare the means of latent variables cross-nationally requires scalar invariance; to examine structural relationships between constructs cross-nationally requires only metric invariance (Baumgartner 2004). The instrument in this chapter must therefore achieve metric invariance.

Three sets of models are estimated. First, configural invariance is tested by specifying the models each country separately, which produces good model fit in all countries (CFI > 0.98 and RMSEA < 0.06), suggesting the assumption of configural invariance is upheld. Second, metric invariance is tested by estimating the CFA model in all across all five countries simultaneously, with factor loadings held equal across countries, categorical item thresholds freely estimated in all countries except the first (Germany) and scale factors fixed at one in all groups for identification purposes. Model fit for this model is also good ($\chi^2$ of
suggesting the assumption of metric invariance is met.

To test for scalar invariance the factor loadings and categorical item thresholds are held equal across groups. Scale factors are fixed at one in the first country and freely estimated in the others. Fit statistics for this model worsened considerably ($\chi^2$ of 1502.93 on 89 degrees of freedom, CFI of 0.93 and RMSEA of 0.097), implying the assumption of scalar invariance is not supported. An alternative to strict scalar invariance is partial measurement invariance (Byrne et al. 1989), where only some of the item intercepts are required to be invariant. Partial measurement invariance is sufficient for cross-national comparisons of constructed associations (i.e. relationships between latent variables), as considered here (Steenkamp and Baumgartner 1998). Based on the modification indices the following item thresholds have been freely estimated (the constraint of cross-group equality is relaxed):

- Thresholds for the variables ‘felt anxious’ and ‘everything you did was an effort’ in Germany and Portugal;
- Thresholds for the variables ‘your sleep was restless’ and ‘felt depressed’ in Portugal.

For identification purposes, the scale factors these variables are fixed at one in these groups. Having released these constraints, the overall model fit improves considerably, giving a CFI of 0.97 and RMSEA of 0.06 ($\chi^2 = 881.66$ for 60 degrees of freedom). This model satisfies the conditions of partial threshold invariance. The factor loadings for the final model are given in Table 4.2, below.

### 4.4.2 Job insecurity

Perceived job insecurity is operationalised using a binary measure of anticipated job loss. Respondents were asked: “How likely would you say it is that you will become unemployed in the next 12 months?” The possible responses included ‘very likely’, ‘likely’, ‘not likely’ and ‘not at all likely’. This ordinal measure has been dichotomised such that 1 represents ‘likely’ or ‘very likely’ and 0 represents ‘not likely’ or ‘not at all likely’. Of 28,150 respondents in the sample, 15,447 responded to
Table 4.2: Factor loadings and model fit statistics for the DEPRESSION measurement model (partial threshold invariance)

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>S.E.</th>
<th>Est/S.E.</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEPRESSION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>depress</td>
<td>1.000a</td>
<td>0.000</td>
<td>999.000</td>
<td>1.000</td>
</tr>
<tr>
<td>calm</td>
<td>0.783</td>
<td>0.056</td>
<td>14.103</td>
<td>0.000</td>
</tr>
<tr>
<td>anxious</td>
<td>0.719</td>
<td>0.057</td>
<td>12.711</td>
<td>0.000</td>
</tr>
<tr>
<td>effort</td>
<td>0.676</td>
<td>0.046</td>
<td>14.674</td>
<td>0.000</td>
</tr>
<tr>
<td>sleep</td>
<td>0.767</td>
<td>0.054</td>
<td>14.130</td>
<td>0.000</td>
</tr>
<tr>
<td>notenjoy</td>
<td>0.693</td>
<td>0.047</td>
<td>14.782</td>
<td>0.000</td>
</tr>
</tbody>
</table>

χ² (60 df) = 881.656, p < 0.05  
RMSEA = 0.055 (90% CI = 0.051, 0.061); CFI = 0.972

a Fixed at 1 to set the metric of the factor

this question (out of 15,990 who were eligible to respond\(^2\)), with 10.7% reporting high job insecurity (‘likely’ or ‘very likely’) and 89.3% reporting low job insecurity (‘not likely’ or ‘not at all likely’). The reasons for dichotomising this measure are twofold. Firstly, a binary measure is simpler to interpret (splitting between positive and negative statements about perceived job security), and allows for simple two-way interactions. More importantly, the ordinal variable gives cell counts that in some countries were unacceptably low. In Portugal, for example, just 23 respondents feel it is ‘very likely’ that they will become unemployed in the next 12 months. Collapsing the categories into a binary indicator avoids this problem.

### 4.4.3 Social support and job dependency

Social support and job dependency are measured using 12 indicators from the 2006 ESS, summarised in Table 4.3. All but two are dichotomous (income and household size). The final measure of job dependency, capturing ‘the proportion of working hours the respondent is responsible for’, requires explanation. The 2006 ESS provides no information on a respondent’s relative contribution towards household income. As a proxy

\(^2\)Of 20,168 individuals in the sample, 15,447 responded to the question on perceived job insecurity. Non-response is comprised of 446 ‘don’t knows’, 69 who give no answer, 20 who refuse to answer and 12,178 respondents who are ‘not applicable’. The latter is comprised of individuals were not in paid work at the time of the survey.
Table 4.3: Measures of social support and job dependency

| Social support | There are people in my life who care about me<sup>a</sup> |
|               | I have someone to discuss intimate and personal matters |
|               | Meet socially with friends/relatives<sup>b</sup> |
|               | Lives with partner/spouse |
|               | Lives alone |

| Job dependency | Respondent’s partner is in paid work? |
|               | Children (aged ≤ 16) currently living in the household? |
|               | Young children (aged ≤ 6) living in the household? |
|               | Annual household income is less than €12,000? |
|               | Borrow money to make ends meet?<sup>c</sup> |
|               | How many people normally live in the household? |
|               | Proportion of total working hours responsible for |

Response represented by ‘1’:
<sup>a</sup> ‘Agree strongly’
<sup>b</sup> ‘Weekly’ or more often
<sup>c</sup> ‘Quite’ or ‘very difficult’

A measure of ‘breadwinner status’, therefore, a measure of ‘the proportion of household working hours responsible for’ has been derived. This is calculated as the percentage difference in the weekly working hours between a respondent and their partner. If an individual lives alone, or is a single parent, they are considered responsible for 100% of the household income. If the respondent is not in employment, but their partner is, they are considered responsible for 0% of the household income. This produces a continuous, normally distributed variable ranging from 0 to 1, with a mean of 0.49 and a standard deviation of 0.14.

Figure 4.3: Histogram for ‘proportion of hours responsible for’
This derivation has several clear limitations. Most problematically, hourly pay may differ between partners, so hours worked might have little bearing on the income accrued. Secondly, only hours worked by the respondent and their partner are considered, overlooking contributions from other household members. Third, this measure only considers the respondent’s main job. Fourth, the measure does not take alternative sources of income into account (e.g. benefits or savings). For these reasons, this variable should be interpreted with caution.

While these indicators represent the best that are available from the 2006 ESS, they suffer several limitations. Most seriously, they conflate the concepts of household and family. There may be multiple families living within a single household, or household members may not self-identify as ‘a family’. They are also likely capture social support from outside the family (e.g. friends at work, extended family members). The absence of data on breadwinner status, described above, is also unfortunate.

4.4.4 Control variables

The analyses consider 14 control variables, summarised in Table 4.4. With the exception of age, all variables are categorical (ordinal or binary). Household income is an ordinal variable that is treated as continuous in the subsequent models. The weighted average for age is 47.55 (with lower and upper 95% confidence intervals of 47.07 and 48.02, respectively).

4.5 Findings

This section presents a multigroup SEM that tests the association between job insecurity and a latent measure of depression (herein \textit{DEPRESSION}). Two sets of models are presented. An initial ‘base’ model considers the direct association between perceived insecurity and depression, controlling for background variables. A second set of models consider the influence of each moderator in turn.

As shown in Figure 4.4, the latent variable \textit{DEPRESSION} is predicted by job insecurity (a binary variable) and eight control variables. Overall model fit is acceptable (CFI = 0.953; RMSEA = 0.038; $\chi^2 = 683.523$ on 319 degrees of freedom$^3$). Table 4.5 presents the unstandardised

---

$^3$A significant $\chi^2$ statistic would suggest poor model fit – that there are significant differences between the population covariance matrix $\Sigma$ and the model-implied

131
**Table 4.4:** Descriptive statistics for the control variables (weighted)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2660</td>
<td>48.06</td>
</tr>
<tr>
<td>Female</td>
<td>2431</td>
<td>47.75</td>
</tr>
<tr>
<td><strong>Cohabitation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lives with partner/spouse</td>
<td>3571</td>
<td>70.15</td>
</tr>
<tr>
<td>Does not live with partner/spouse</td>
<td>1520</td>
<td>29.85</td>
</tr>
<tr>
<td><strong>Children living in household</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2611</td>
<td>51.29</td>
</tr>
<tr>
<td>Yes</td>
<td>2480</td>
<td>48.71</td>
</tr>
<tr>
<td><strong>Job tenure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlimited contract</td>
<td>4460</td>
<td>87.60</td>
</tr>
<tr>
<td>No contract or limited contract</td>
<td>623</td>
<td>12.40</td>
</tr>
<tr>
<td><strong>Highest education level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary, or secondary (or less)</td>
<td>3218</td>
<td>63.21</td>
</tr>
<tr>
<td>Tertiary</td>
<td>1873</td>
<td>36.79</td>
</tr>
</tbody>
</table>

**Figure 4.4:** Model specification for the base model for DEPRESSION
coefficients from the base model. A significant positive association between perceived job insecurity and depression is observed in all five countries, with coefficients ranging from 0.37 in Sweden to 0.99 in Ireland. These cross-national differences are significant at the 5% level\(^4\). The coefficients for the control variables are more varied. Age is negatively associated with depression in Sweden and the UK, but positively associated in Portugal (with non-significant associations in Germany and Ireland). A significant positive coefficient for gender in all countries indicates that women, on average, report higher levels of depression than men. Household income is negatively associated with depression in three countries (Germany, Sweden and Portugal) but the association is non-significant in Ireland and the UK. Cohabitation status, the presence of children in the household, employment contract and education level all have little influence on levels of depression. Consistent with past studies (e.g. Virtanen et al. 2011; Tomioka et al. 2011), working hours are positively associated with depression, although this association is non-significant in Sweden and the UK.

### 4.5.1 Moderation effects

The 12 moderating variables are tested separately in turn. The significance of each interaction is tested by examining the change in model fit between two nested models: the \(H_0\) model, where the interaction term is freely estimated in all groups; and the \(H_1\) comparison model, where the interaction term is fixed at zero. A significant difference between these models (tested using the DIFFTEST function in Mplus; Muthén and Asparouhov 2010) indicates that removing the interaction term (i.e. fixing it at zero) significantly worsens the overall model fit, implying a significant moderation effect. Table 4.6 presents the DIFFTEST results for the 12 moderating variables.

As shown in Table 4.6, not one of the 12 measures of ‘support’ or ‘dependency’ produces a significant moderating effect. Constraining each covariance matrix \(\Sigma(\theta)\). However, numerous studies have shown this measure to be highly susceptible to sample size (e.g. Bollen 1989; Jöreskog and Sörbom 1993; Schermelleh-Engel et al. 2003). For this reason, this section relies on other fit statistics, such as the CFI and RMSEA.

\(^4\)This is tested by comparing two models in Mplus using the DIFFTEST function: (a) a model the coefficient for job insecurity is freely estimated in all countries and (b) a model where this coefficient is constrained to be equal across countries.
Table 4.5: Unstandardised regression coefficients for the base model for DEPRESSION

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>Ireland</th>
<th>Portugal</th>
<th>Sweden</th>
<th>UK</th>
<th>N</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely to become unemployed, next 12 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not likely or not at all likely (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely or very likely</td>
<td>0</td>
<td>0.005</td>
<td>0.007</td>
<td>0.006</td>
<td></td>
<td>935</td>
<td>0.122</td>
</tr>
<tr>
<td>Age</td>
<td>0.001</td>
<td>0.019</td>
<td>0.012</td>
<td>0.013</td>
<td></td>
<td>1067</td>
<td>0.070</td>
</tr>
<tr>
<td>Gender (female)</td>
<td>0.055</td>
<td>0.055</td>
<td>0.055</td>
<td>0.055</td>
<td></td>
<td>520</td>
<td>0.134</td>
</tr>
<tr>
<td>Household income</td>
<td>-0.094</td>
<td>-0.063</td>
<td>-0.036</td>
<td>-0.036</td>
<td></td>
<td>408</td>
<td>0.253</td>
</tr>
<tr>
<td>Lives with partner</td>
<td>0.183</td>
<td>0.183</td>
<td>0.183</td>
<td>0.183</td>
<td></td>
<td>929</td>
<td>0.091</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>-0.049</td>
<td>-0.055</td>
<td>-0.140</td>
<td>-0.123</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary contract</td>
<td>-0.061</td>
<td>-0.052</td>
<td>-0.005</td>
<td>-0.070</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usual weekly working hours</td>
<td>-0.134</td>
<td>-0.066</td>
<td>-0.021</td>
<td>-0.070</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance levels: *p<0.05; **p<0.01; ***p<0.001.
Table 4.6: Wald tests for interaction terms

<table>
<thead>
<tr>
<th>Interaction Term</th>
<th>DFs</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are people who care about me</td>
<td>5</td>
<td>0.655</td>
</tr>
<tr>
<td>Has someone to discuss intimate matters</td>
<td>5</td>
<td>0.194</td>
</tr>
<tr>
<td>Takes part in social activities</td>
<td>5</td>
<td>0.653</td>
</tr>
<tr>
<td>Meets socially with friends or colleagues</td>
<td>5</td>
<td>0.504</td>
</tr>
<tr>
<td>Lives with partner</td>
<td>5</td>
<td>0.253</td>
</tr>
<tr>
<td>Lives alone</td>
<td>5</td>
<td>0.460</td>
</tr>
<tr>
<td>Partner is in paid work</td>
<td>5</td>
<td>0.262</td>
</tr>
<tr>
<td>Proportion of hours responsible for household occupants</td>
<td>5</td>
<td>0.855</td>
</tr>
<tr>
<td>Household occupants</td>
<td>5</td>
<td>0.468</td>
</tr>
<tr>
<td>Children in the household</td>
<td>5</td>
<td>0.555</td>
</tr>
<tr>
<td>Children aged ≤ 6</td>
<td>5</td>
<td>0.600</td>
</tr>
<tr>
<td>Low household income</td>
<td>5</td>
<td>0.261</td>
</tr>
<tr>
<td>Would be difficult to borrow money</td>
<td>5</td>
<td>0.961</td>
</tr>
</tbody>
</table>

interaction term to zero, in other words, does not significantly worsen overall model fit. In some ways, this is a surprising result. As set out above, there are good theoretical reasons to expect family-based support and dependency to buffer or amplify the consequences of perceived job insecurity. At the same time, however, past evidence on the role of family-based moderators has been mixed. With regard to social support, for example, some studies support the buffering hypothesis (Lim 1996) but others show no effect (Dekker and Schaufeli 1995). Others even find social support to act as a stressor (e.g. Kaufmann and Beehr 1986). Most studies emphasise work-based social support, rather than family influences, as the more important moderating factor (e.g. Lim 1996). The choice of dependent variable is also important (Büssing 1999). Family arrangements might be more influential when other measures of subjective well-being are considered, besides depression. With regards to the literature on job dependency, past studies have again tended to emphasise non-family influences, such as employability or labour market conditions. Nonetheless, the lack of significance in these findings is noteworthy. For this dataset and these variables, neither ‘job dependency’ nor ‘social support’ perspectives appear compelling. Further research is undoubtedly required.
4.6 Conclusions

This chapter has sought to understand the link between job insecurity and subjective well-being by emphasising the role of family context. Despite the abundance of past research on insecurity and health, little is known about moderating role of family arrangements. The analysis considered two opposing hypotheses. The 'job dependency' perspective states that family obligations, such as caring for children or elderly relatives, will amplify the relationship between anticipated unemployment and the subsequent health outcomes. The 'social support' perspective suggests that the support provided by family members can form a protective buffer and reduce the impact of perceived insecurity.

Overall, perceived job insecurity was found to be positively associated with depression scores in all five countries (significant at the 5% level), in line with existing studies. However, no such support was found for the moderating role of family context. Out of 12 measures of 'job dependency' and 'social support', there were no significant interaction effects. While past research has been inconclusive, this finding is nonetheless surprising.

This study suffers several limitations. Most seriously, the operationalisation of several key concepts is overly simplistic. Job insecurity is a multi-dimensional concept, but has been measured here using a binary indicator of anticipated job loss. The measurement of family context is also limited. The variables chosen to represent family-based social support could, in fact, be capturing other forms of work and non-work based support (e.g. from colleagues or friends). These indicators also make assumptions about the quality of relationships – not all spouses or partners will be equally supportive. The proxy measure of breadwinner status (‘the proportion of hours an individual is responsible for’) is, for reasons discussed above, hugely problematic. While these indicators represent the best available in the 2006 ESS, it is plausible that the lack of significant moderating effects is, at least in part, explained by the limited way in which ‘family context’ has been captured.

A second limitation is the size of the sample. While a total sample of around 5000 for five countries is acceptable, relatively few respondents report ‘high’ job insecurity (11%) and so interaction effects hinge on a relatively small group of respondents. For example, just 10% of respondents have young children (aged six or below), and so the interaction between ‘young children’ and ‘high job insecurity’ represents just 81 respondents, or 1.5% of the sample. Finally, the chapter relies on cross-sectional data, capturing individuals at a single point in time and precluding any causal inferences. In addition to larger samples,
future research would benefit from a longitudinal approach: do trends in perceived insecurity and subjective well-being vary based on family arrangements?

This chapter finds no evidence to suggest that family arrangements moderate the association between perceived insecurity and depression. Given the theoretical basis for such effects, these results appear questionable. As the stresses associated with impending unemployment spillover into home life, family-based coping mechanisms (or the lack of them) are likely to be influential in determining outcomes, whether or not this influence can be measured. This chapter relies on a crude set of measurement instruments, providing a limited representation of ‘family context’ at a fixed point in time. Future research should combine longitudinal evidence with more qualitative interpretations of ‘family’ and ‘insecurity’.
5 Job insecurity and the national economic climate across Europe

Continuing the theme of moderation, this chapter uses data from the 2006 European Social Survey (ESS) to test whether national economic conditions moderate the association between job insecurity and life satisfaction. The negative association between job insecurity and subjective well-being is widely reported (de Witte 1999). There is also evidence to suggest that local unemployment rates are negatively associated with individual well-being (Clark et al. 2010). Much less is known about the interaction of these variables. Adopting a multilevel approach, this chapter tests a single hypothesis: that the negative association between insecurity and life satisfaction is amplified when regional and national economic conditions are worse (i.e. higher unemployment, lower economic growth).

Past research has shown the consequences of job insecurity to depend on a range of individual factors, such as social support (Lim 1997; Näswall et al. 2005) or job control (Bussing 1999). From a policy perspective, unpicking these moderation effects should be a priority. Understanding why some individuals are more resilient to the consequences of insecure employment than others is a prerequisite to effective policy. Moving beyond the individual-level, this study considers the impact of a single contextual factor: the national economic climate. As discussed below, much of the stress and anxiety associated with insecure work is attributable to the anticipated difficulties of finding alternative employment. For example, more mobile workers (e.g. with better qualifications or experience) are expected to be less affected by the prospect of job loss, since finding a new job will be relatively easy. Of course, the perceived barriers to alternative employment are not solely a function of individual attributes. Wider circumstances, such as national economic conditions, will also play a role. Where unemployment is high
and jobs are scarce, finding new employment is likely to be harder than when unemployment is lower. In this way, the perception of labour market conditions (and the extent to which they are conducive of re-employment) are hypothesised to buffer the experience of job insecurity.

**Hypothesis:** The negative association between perceived job insecurity and life satisfaction will be moderated by the national economic context, such that when economic conditions are less favourable (higher unemployment, lower growth) the association will be stronger.

The chapter is in four sections. The first reviews the existing literature on ‘economic climate’ and job insecurity. The second describes the data, methods and analytical approach. The third section presents the findings and the final section concludes.

## 5.1 Economic climate as a moderator

The negative association between job insecurity and individual well-being is well established in the literature (for a review, see Cheng and Chan 2008). Numerous studies show job insecurity to be positively associated with mental health complaints (Hellgren et al. 1999; Chirumbolo and Hellgren 2003) and impaired psychological well-being (Wilson et al. 1993; Orpen 1993; Roskies et al. 1993; Burchell 1994; de Witte 1999; Ferrie et al. 2002). By contrast, there has been surprisingly little research into how this association is contingent on the wider economic context (Reynolds 1997). Most studies focus on the individual as the main unit of analysis; contextual factors are typically ignored or measured at the individual-level only. As Sora et al. (2009) put it, despite a growing body of literature on job insecurity, “no research to date has empirically tested job insecurity from a contextual perspective” (p. 130).

### 5.1.1 Economic climate

The concept of economic ‘climate’ or ‘culture’ is discussed in the organisational literature, where culture is defined as the “normative beliefs and shared behavioural expectations in an organisational unit” (Glisson and James 2002), and climate as “the shared perceptions of organisational policies, practices and procedures” (Reichers and Schneider 1990). The effects of shared perceptions of group members have also been considered in relation to work stress (Sinclair et al. 2010) and the
‘safety climate’ (Zohar et al. 2003). As Sinclair et al. (2010) note, when organisations experience performance downturns, members of a business unit who share a common fate “seem likely to form similar employment and income-related stress perceptions” (p. 14). They consequently define economic climate as “employees’ shared concerns about their personal economic situation” (ibid). Sora et al. (2009) define the ‘job insecurity climate’ as a set of “shared perceptions of powerlessness to maintain the continuity of threatened jobs in an organization” (p. 130). They report that, for a Spanish sample of 550 employees, job insecurity climate influenced employees’ job satisfaction and organisational commitment beyond the employees’ perceptions of their own perceived job insecurity. Similar work by Peiró (2001) has emphasised the role of the ‘stress climate’, which considers the stress as collective phenomenon. Using a qualitative approach, Lansisalmi et al. (2000) also highlight the collective properties of stress within organisations.

A further insight is provided by the literature on emotional contagion, where it is suggested that concerns about job insecurity are likely to spread through an organisation via groups and informal networks (Hatfield et al. 1993). This ‘contagion effect’ has been investigated at both family (Mauno and Kinnunen 2002) and industry levels (Goins and Gruca 2008). Goins and Gruca, for example, show how the announcement of lay-offs at a single company can spillover and heighten industry-wide perceptions of insecurity.

5.1.2 Economic climate and well-being

These findings are important because economic climate (defined as the collective, group-level perception of economic insecurity) has itself been shown to determine individual outcomes (Kopelman et al. 1990; Hofmann and Stetzer 1998; Lindell and Brandt 2000). Two associations are considered below: (a) the direct association between economic climate and well-being; and (b) the moderating effect of economic climate on the association between job insecurity and well-being. Numerous studies have found economic conditions to be associated with individual well-being. In a multilevel study of Denmark, Osler et al. (2003) show local levels of unemployment to be directly associated with mortality rates, even after accounting for individual employment status. Clark et al. (2010) show high regional unemployment to be negatively correlated with life satisfaction for men (although no association was observed for women). Di Tella et al. (2001) similarly find national unemployment rates to be negatively associated with life satisfaction, even after controlling
for personal unemployment. Other studies (Brenner 1973; Catalano and Dooley 1977) have shown that unfavourable economic conditions are associated with indicators of psychological distress. Economic climate may also operate indirectly, mediated by changes in employment conditions (Dooley et al. 1994). Periods of recession often produce changes in job status, conditions or structures, and it may be these changes that are associated with psychological well-being (Fenwick and Tausig 1994). Finally, Anderson and Gascon (2008) report that competition from foreign labour (and the collective sense of insecurity this is associated with) resulted in US workers having increased demands for social insurance. Similar findings have been produced for the UK (Scheve and Slaughter 2004).

In summary, there exists good evidence to suggest that both personal insecurity and unfavourable economic environments are negatively associated with individual well-being. This study seeks to further this literature by considering the interaction of these relationships.

### 5.2 Analytical approach

This analysis combines survey data from the 2006 European Social Survey (ESS) with contextual indicators of ‘national economic climate’ from the Eurostat database (Eurostat 2012). Of 27 countries included in the 2006 ESS, subsequent analyses focus upon the 16 from Western Europe, excluding 11 from Eastern Europe. The total sample size is 28,150. All models have been estimated in MLwiN 2.26 (Rasbash et al. 2009) using MCMC estimation (Browne 2009) via the runmlwin package for Stata (Leckie and Charlton 2011). Parameters obtained via the IGLS (Iterative Generalised Least Squares) algorithm are used as starting values, and the default MLwiN priors have been used (see Appendix 1 for details).

To test whether national economic conditions moderate the association between job insecurity and well-being a two-level moderated regression model is used. A multilevel approach is required since ordinary least squares (OLS) regression is unable to differentiate between variables at different levels of analysis. OLS treats both individual and country-level statistics as if they are measured at the same levels, and as such, overlooks the clustering of individuals within countries. Using OLS regression to

---

1Bulgaria, Estonia, Hungary, Romania, Latvia, Russia, Slovakia, Slovenia and Ukraine.
analyse contextual effects might therefore lead to conclusions based on deflated standard errors. This is particularly relevant when considering contextual variables measured at higher levels, such as national GDP or unemployment.

The moderating influence of economic climate is tested by estimating a cross-level interaction term between perceived job insecurity and five measures of ‘economic climate’. Level-1 is the individual and level-2 is the country. The dependent variable is an 11-category ordinal measure of reported life satisfaction, treated here as continuous, ranging from 0 to 10 with a mean of 7.06 and a standard deviation of 2.11 (N = 28,032). Respondents were asked, “all things considered, how satisfied are you with your life as a whole nowadays?” Responses were chosen from a card, where 0 represented ‘extremely dissatisfied’ and 10 represented ‘extremely satisfied’. The distribution of life satisfaction by country is illustrated in Figure 5.1, below.

**Figure 5.1: How satisfied with life as a whole?**

![Bar chart showing life satisfaction by country](image)

Source: European Social Survey (2006)

The main explanatory variable is a binary measure of perceived job insecurity. Respondents were asked “how likely would you say it is that you will become unemployed in the next 12 months? Responses were given on a 4-point scale from ‘very likely’, ‘likely’, ‘not very likely’ to ‘not at all likely’. This has been dichotomised so that 0 represents ‘not
likely’ or ‘not at all likely’ and 1 represents ‘likely’ or ‘very likely’

Of the 28,168 individuals in the survey just 15,455 responded to this question. Non-response was attributable to (a) individuals not being in paid work (i.e. who were not asked questions about job security; 12,178), (b) those who gave a ‘don’t know’ response (446) or (c) refused to answer (89).

Five measures of national economic climate are considered:

1. Aggregate ‘satisfaction with the state of the economy’ (2006)
2. Unemployment rate (2006)

The first item is derived using a weighted national average of the variable in the ESS dataset, where individuals were asked: “On the whole how satisfied are you with the present state of the economy in [the respondent’s country]?” Response categories ranged from 0 (‘extremely dissatisfied’) to 10 (‘extremely satisfied’). Items 2 to 5 were taken from the Eurostat database. The unemployment rate (%) and GDP (purchasing power parities per inhabitant) are measured for 2006, to coincide with the ESS fieldwork period. Recognising that individual perceptions will be influenced not only by current economic conditions but also by trends in recent years, trends in GDP and unemployment included, measured as the average annual rate-of-change between 2001 and 2006. For each year, the percentage change on the previous year is

---

2The decision use the dichotomised measure of perceived insecurity, rather than the ordinal version, was based on two considerations. The binary recode, which splits between positive and negative assessments of the ‘likelihood of becoming unemployed’, is more straightforward to interpret than the 4-categories of the ordinal version. This is particular true for interaction terms – a binary indicator produces a single interaction term, whereas the ordinal version requires three interaction terms. The more pressing issue is that, within each country, there are too few cases in the final category of the original variable (‘very likely’). For example, just 7, 17 and 19 respondents assess job loss as ‘very likely’ in Portugal, Sweden and Germany, respectively. Burchell (2009) adopts this dichotomised measure for similar reasons.

3To calculate the national aggregate the individual-level scores for each country were weighted (to control for the country-specific sample design used in their country and population weight) and an average calculated for each country.

calculated. The trend is thus the average of this figure for the five-year period (2001-2006).

5.3 Null and base models

Before considering the moderating influence of national economic conditions, a simpler model is estimated to assess the extent of variation in life satisfaction at the individual and country levels, prior to the addition of explanatory variables. This ‘null’ model is an empty model where the outcome is life satisfaction ($\text{satlife}$) which is estimated for 11,101 individuals in 14 countries. The variance of $\text{satlife}$ is partitioned into a within-country variance and a between-country variance ($\sigma^2_{u0}$). The results are given in Table 5.1. The intra-class correlation (ICC) is 0.151, indicating that, prior to the addition of explanatory variables to the model, 15.1% of the variation in life satisfaction is attributable to country differences.

<table>
<thead>
<tr>
<th>Table 5.1: Coefficients for the ‘null’ model</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_{ij}$</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>$\sigma^2_{u0}$</td>
</tr>
<tr>
<td>$\sigma^2_{e0}$</td>
</tr>
<tr>
<td>ICC</td>
</tr>
<tr>
<td>DIC</td>
</tr>
<tr>
<td>pD</td>
</tr>
<tr>
<td>$N_{\text{country}}$</td>
</tr>
<tr>
<td>$N_{\text{individual}}$</td>
</tr>
</tbody>
</table>

Structured MCMC estimation (5000 iterations)

Subsequently, a ‘base’ model is specified that introduces job insecurity and all relevant control variables$^5$. These include demographic variables (age, gender, income) as well as other predictors of life satisfaction such

$^5$Model specification is achieved using ‘backwards elimination’. This involves specifying an initial model with all theoretical variables and relevant controls, and testing the removal of each explanatory variable in turn (by comparing the change in the DIC statistic).
as social support, perceived economic vulnerability, cohabitation status and whether there are children living in the household. To help control for differences in personality, a variable measuring “optimism about the future” is also included. The contribution of each variable was tested by examining the reduction in DIC. All continuous explanatory variables have been grand-mean centred. As before, this is a random intercept model: the intercept is allowed to vary across countries but the coefficients for the explanatory variables are held equal. The coefficients for this model are presented in Table 5.2.

Overall, the mean level of life satisfaction (having controlled for country differences and the other variables in the model) is 6.53. Having introduced the explanatory variables, the between-country share of the variation (in life satisfaction) is reduced from 15.1% to 11.1%. On average, high job insecurity (individuals for whom job loss is ‘likely’ or ‘very likely’) is associated with a 0.536 unit decrease in life satisfaction, controlling for other variables in the model. The control variables behave much as expected, with social interaction and ‘living with a partner’ show to be significantly associated with increased life satisfaction. Low levels of ‘optimism about the future’ are associated with reduced life satisfaction, as are negative feelings about current household income.

### 5.4 Random effects

Before considering the direct association between economic climate and life satisfaction, it is worth examining (a) the random intercept for life satisfaction and (b) the random coefficient for the association between insecurity and satisfaction. These are illustrated in Figure 5.2 and Figure 5.3, respectively. Figure 5.2 shows the intercept for life satisfaction to vary significantly across Europe, controlling for other variables in the model (a reduction in DIC of 807.81). Figure 5.3 plots variation in the association between job insecurity and life satisfaction, again showing significant variation across Europe (reduction in DIC of 39.00). The ‘level-2 residual’ is the amount by which the change in life satisfaction associated with ‘high’ insecurity, in a given country, differs from the average (i.e. the fixed effect; -0.54). Job insecurity is associated with

---

6. ‘Social interaction’ is captured by two variables measuring (a) how often the respondent takes part in social activities (compared to others their age) and (b) how often they meet with family and friends. See Table 5.2 for details.
Table 5.2: Coefficients from the ‘base’ model

<table>
<thead>
<tr>
<th></th>
<th>$\beta_{ij}$</th>
<th>95% C.I.</th>
<th>ESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Upper</td>
<td>Lower</td>
</tr>
<tr>
<td>Constant</td>
<td>6.527†</td>
<td>6.863</td>
<td>6.185</td>
</tr>
<tr>
<td>Household income$^{gm}$</td>
<td>0.012</td>
<td>0.029</td>
<td>−0.005</td>
</tr>
<tr>
<td>Age$^{gm}$</td>
<td>−0.005†</td>
<td>−0.002</td>
<td>−0.007</td>
</tr>
<tr>
<td>Female</td>
<td>0.143†</td>
<td>0.202</td>
<td>0.085</td>
</tr>
<tr>
<td>Reported general health$^a$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad/Very Bad</td>
<td>−1.487†</td>
<td>−1.282</td>
<td>−1.693</td>
</tr>
<tr>
<td>Fair</td>
<td>−0.668†</td>
<td>−0.574</td>
<td>−0.760</td>
</tr>
<tr>
<td>Good</td>
<td>−0.311†</td>
<td>−0.242</td>
<td>−0.377</td>
</tr>
<tr>
<td>Takes part in social activities$^b$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘More’ or ‘much more’ than most</td>
<td>0.164†</td>
<td>0.236</td>
<td>0.091</td>
</tr>
<tr>
<td>Meets with friends or relatives$^c$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once a week or more</td>
<td>0.167†</td>
<td>0.235</td>
<td>0.099</td>
</tr>
<tr>
<td>Someone to discuss intimate matters</td>
<td>0.362†</td>
<td>0.496</td>
<td>0.226</td>
</tr>
<tr>
<td>Feelings about household income$^d$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping</td>
<td>−0.440†</td>
<td>−0.372</td>
<td>−0.507</td>
</tr>
<tr>
<td>Difficult</td>
<td>−1.320†</td>
<td>−1.212</td>
<td>−1.429</td>
</tr>
<tr>
<td>Lives with partner/spouse</td>
<td>0.363†</td>
<td>0.436</td>
<td>0.290</td>
</tr>
<tr>
<td>Children in the household</td>
<td>0.014</td>
<td>0.077</td>
<td>−0.050</td>
</tr>
<tr>
<td>Always optimistic about the future$^e$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree or disagree strongly</td>
<td>0.377†</td>
<td>0.491</td>
<td>0.260</td>
</tr>
<tr>
<td>Neither agree nor disagree</td>
<td>0.991†</td>
<td>1.093</td>
<td>0.890</td>
</tr>
<tr>
<td>Job tenure$^f$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited contract</td>
<td>0.039</td>
<td>0.129</td>
<td>−0.053</td>
</tr>
<tr>
<td>Become unemployed, next 12 months$^g$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Likely’ or ‘very likely’</td>
<td>−0.536†</td>
<td>−0.439</td>
<td>−0.635</td>
</tr>
</tbody>
</table>

| $\sigma^2_{u0}$       | 0.300        | 0.678          | 0.133  | 4312 |
| $\sigma^2_{e0}$       | 2.403        | 2.467          | 2.340  | 4835 |
| ICC                    |             | 0.111          |       |
| DIC                    |             | 41267.859      |       |
| pD                     |             | 31.863         |       |
| $N_{\text{country}}$  |             | 14             |       |
| $N_{\text{individual}}$ |             | 11,101        |       |

Structured MCMC estimation (5000 iterations)
† Significant based on 95% credible intervals
$^{gm}$ Grand-mean centred

Reference categories
$^a$ ‘Very good’
$^b$ ‘About the same’, ‘less than’ or ‘much less than most’
$^c$ ‘Less often than ‘once a week’
$^d$ ‘Living comfortably’
$^e$ ‘Agree strongly’ or ‘agree’
$^f$ ‘No contract’ or ‘unlimited contract’
$^g$ ‘Not likely’ or ‘not at all likely’
a larger reduction in life satisfaction in Portugal, France and Germany, whereas smaller reductions are seen in Switzerland, Finland and Denmark.

**Figure 5.2:** Level-2 residuals (and 95% CIs) for life satisfaction

![Figure 5.2](image)


**Figure 5.3:** Level-2 residuals (and 95% CIs) for job insecurity

![Figure 5.3](image)


### 5.5 Direct effects

To consider whether national economic conditions are *directly* associated with life satisfaction the five contextual measures were entered into the
model as level-2 explanatory variables. These were tested one at a time: each moderator was removed from the model before testing the next. The basic model is given as:

\[
\text{satlife}_{ij} \sim N(XB, \Omega)
\]

\[
\text{satlife}_{ij} = \beta_{0ij} (\text{constant}) + \beta_1 (\text{job insecurity})_{ij} + \beta_2 (\text{contextual effect})_j + \sum_{l=3}^p \beta_l (\text{control variables})_{ij}
\]

\[
\beta_{0ij} = \beta_0 + u_{0j} + e_{0ij}
\]

Where ‘contextual effect’ refers to the country-level moderator. The results are presented in Table 5.3. These indicate that, on average and conditional on the other variables in the model, a unit increase in country aggregate score for ‘satisfaction with the present state of the economy’ is associated with a 0.351 unit increase in individual life satisfaction. A unit increase in the national unemployment rate is shown to be significantly associated with a 0.079 unit reduction in life satisfaction. The average rate-of-change in unemployment (2001-2006) is also significantly associated with life satisfaction. A unit increase in the unemployment rate-of-change is associated with a 0.055 reduction in life satisfaction, controlling for other variables in the model. GDP appears to have no significant association with life satisfaction, whether measured for 2006 or for the five-year period.

Broadly, these results are consistent with the existing literature. Living in a country where collective assessments of the ‘state of the economy’ are more positive and unemployment is lower are both significantly associated with higher levels of reported life satisfaction.

5.6 Moderation effects

Finally, we can assess whether the combined effect of job insecurity and economic climate has an additional effect on life satisfaction, over and above their separate effects. To test this we include a cross-level interaction term: the product of the binary ‘job insecurity’ variable and the country-level contextual variable. The basic model is given as:
<table>
<thead>
<tr>
<th>β_{ij}</th>
<th>β_{ij}</th>
<th>β_{ij}</th>
<th>β_{ij}</th>
<th>β_{ij}</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.01</td>
<td>1.01</td>
<td>1.01</td>
<td>1.01</td>
<td>1.01</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>3.43</td>
<td>3.43</td>
<td>3.43</td>
<td>3.43</td>
<td>3.43</td>
</tr>
<tr>
<td>4.18</td>
<td>4.18</td>
<td>4.18</td>
<td>4.18</td>
<td>4.18</td>
</tr>
<tr>
<td>1.14</td>
<td>1.14</td>
<td>1.14</td>
<td>1.14</td>
<td>1.14</td>
</tr>
<tr>
<td>3.08</td>
<td>3.08</td>
<td>3.08</td>
<td>3.08</td>
<td>3.08</td>
</tr>
<tr>
<td>3.38</td>
<td>3.38</td>
<td>3.38</td>
<td>3.38</td>
<td>3.38</td>
</tr>
<tr>
<td>3.44</td>
<td>3.44</td>
<td>3.44</td>
<td>3.44</td>
<td>3.44</td>
</tr>
<tr>
<td>2.26</td>
<td>2.26</td>
<td>2.26</td>
<td>2.26</td>
<td>2.26</td>
</tr>
<tr>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>0.14</td>
<td>0.14</td>
<td>0.14</td>
<td>0.14</td>
<td>0.14</td>
</tr>
<tr>
<td>0.16</td>
<td>0.16</td>
<td>0.16</td>
<td>0.16</td>
<td>0.16</td>
</tr>
<tr>
<td>0.18</td>
<td>0.18</td>
<td>0.18</td>
<td>0.18</td>
<td>0.18</td>
</tr>
<tr>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>0.22</td>
<td>0.22</td>
<td>0.22</td>
<td>0.22</td>
<td>0.22</td>
</tr>
<tr>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>0.26</td>
<td>0.26</td>
<td>0.26</td>
<td>0.26</td>
<td>0.26</td>
</tr>
<tr>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
</tr>
<tr>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>0.32</td>
<td>0.32</td>
<td>0.32</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td>0.34</td>
<td>0.34</td>
<td>0.34</td>
<td>0.34</td>
<td>0.34</td>
</tr>
<tr>
<td>0.36</td>
<td>0.36</td>
<td>0.36</td>
<td>0.36</td>
<td>0.36</td>
</tr>
<tr>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>0.42</td>
<td>0.42</td>
<td>0.42</td>
<td>0.42</td>
<td>0.42</td>
</tr>
<tr>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>0.46</td>
<td>0.46</td>
<td>0.46</td>
<td>0.46</td>
<td>0.46</td>
</tr>
<tr>
<td>0.48</td>
<td>0.48</td>
<td>0.48</td>
<td>0.48</td>
<td>0.48</td>
</tr>
<tr>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>0.52</td>
<td>0.52</td>
<td>0.52</td>
<td>0.52</td>
<td>0.52</td>
</tr>
<tr>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>0.56</td>
<td>0.56</td>
<td>0.56</td>
<td>0.56</td>
<td>0.56</td>
</tr>
<tr>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
</tr>
<tr>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>0.62</td>
<td>0.62</td>
<td>0.62</td>
<td>0.62</td>
<td>0.62</td>
</tr>
<tr>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
</tr>
<tr>
<td>0.66</td>
<td>0.66</td>
<td>0.66</td>
<td>0.66</td>
<td>0.66</td>
</tr>
<tr>
<td>0.68</td>
<td>0.68</td>
<td>0.68</td>
<td>0.68</td>
<td>0.68</td>
</tr>
<tr>
<td>0.70</td>
<td>0.70</td>
<td>0.70</td>
<td>0.70</td>
<td>0.70</td>
</tr>
<tr>
<td>0.72</td>
<td>0.72</td>
<td>0.72</td>
<td>0.72</td>
<td>0.72</td>
</tr>
<tr>
<td>0.74</td>
<td>0.74</td>
<td>0.74</td>
<td>0.74</td>
<td>0.74</td>
</tr>
<tr>
<td>0.76</td>
<td>0.76</td>
<td>0.76</td>
<td>0.76</td>
<td>0.76</td>
</tr>
<tr>
<td>0.78</td>
<td>0.78</td>
<td>0.78</td>
<td>0.78</td>
<td>0.78</td>
</tr>
<tr>
<td>0.80</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80</td>
</tr>
<tr>
<td>0.82</td>
<td>0.82</td>
<td>0.82</td>
<td>0.82</td>
<td>0.82</td>
</tr>
<tr>
<td>0.84</td>
<td>0.84</td>
<td>0.84</td>
<td>0.84</td>
<td>0.84</td>
</tr>
<tr>
<td>0.86</td>
<td>0.86</td>
<td>0.86</td>
<td>0.86</td>
<td>0.86</td>
</tr>
<tr>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
</tr>
<tr>
<td>0.90</td>
<td>0.90</td>
<td>0.90</td>
<td>0.90</td>
<td>0.90</td>
</tr>
<tr>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
</tr>
<tr>
<td>0.94</td>
<td>0.94</td>
<td>0.94</td>
<td>0.94</td>
<td>0.94</td>
</tr>
<tr>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>0.98</td>
<td>0.98</td>
<td>0.98</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Table 5.3:** Direct associations between economic climate and life satisfaction

*Structured MCMC estimation (5000 iterations)*

Source: European Social Survey, 2006; Eurostat, 2010.

Significant based on 95% credible intervals and change-in-DIC statistic.

Control variables for these models are consistent with those in the base model: Household income, age, gender, reported general health, social interaction and support, subjective economic vulnerability, presence of children, household income, age, gender.

† Significant based on 95% credible intervals and change-in-DIC statistic.

structured variables omitted from table.*

Source: European Social Survey, 2006; Eurostat, 2010.
\[ \text{satlife}_{ij} \sim N(XB, \Omega) \]

\[ \text{satlife}_{ij} = \beta_{0ij} (\text{constant}) + \beta_1 (\text{job insecurity})_{ij} + \beta_2 (\text{contextual effect})_j + \beta_3 (\text{contextual effect} \times \text{job insecurity})_{ij} + \sum_{l=4}^{p} \beta_l (\text{control variables})_{ij} \]

\[ \beta_{0ij} = \beta_0 + u_{0j} + e_{0ij} \]

\[ u_{0j} \sim N(0, \sigma^2_{u0}) \]

\[ e_{0ij} \sim N(0, \sigma^2_{e0}) \]

The results are presented in Table 5.4. Four of the five contextual variables are shown to significantly moderate the association between job insecurity and life satisfaction (at the 5% level). For individuals reporting high job insecurity, a unit increase in the ‘aggregate satisfaction with the economy’ is associated with a 0.212 unit increase in life satisfaction, controlling for other variables in the model. The reverse is found for national unemployment: individuals with high job insecurity experience a 0.068 unit reduction in life satisfaction for each unit increase in national unemployment. For individuals with high job insecurity a unit increase in GDP is associated with a 0.007 unit reduction in life satisfaction, while the effect for the trend in GDP is non-significant (at the 5% level).

Table 5.5 presents the reduction in DIC associated with each moderation effect. The table shows significant interactions (a reduction in DIC of \( \geq 4 \)) for all measures except ‘average rate of change of GDP’.

To illustrate these moderation effects we can plot the association between the moderator and the outcome for different levels of job insecurity, as shown in Figures 5.4 and 5.5. The y-axis in each plot is the predicted level of life satisfaction; the x-axis is the moderator (the country-level contextual variable). Figure 5.4 plots the interaction of job insecurity and the ‘aggregate level of satisfaction with the economy’. Both lines have a positive gradient indicating that, regardless of the level of job insecurity, increases in the country aggregate for ‘satisfaction with the state of the economy’ are associated with increases in life satisfaction. However, this increase is largest for individuals reporting higher job insecurity (as evidenced by the steeper gradient for these individuals). An increase in job insecurity, therefore, is associated with a reduction in predicted life satisfaction for all individuals but the association is strongest in countries where, on average, people are least satisfied with the state of the economy.
Table 5.4: Moderation effects

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6.574</td>
<td>6.394</td>
<td>6.214</td>
<td>6.617</td>
<td>0.448</td>
</tr>
<tr>
<td>3</td>
<td>Likely or very likely</td>
<td>0.667</td>
<td>0.524</td>
<td>0.617</td>
<td>0.448</td>
</tr>
<tr>
<td>4</td>
<td>0.674</td>
<td>0.557</td>
<td>0.501</td>
<td>0.599</td>
<td>0.667</td>
</tr>
<tr>
<td>5</td>
<td>0.667</td>
<td>0.667</td>
<td>0.699</td>
<td>0.617</td>
<td>0.524</td>
</tr>
</tbody>
</table>

Source: European Social Survey, 2006; Eurostat, 2010.

† = Significant moderation effects (where the 95% credible intervals do not cross zero).

Structured MCMC estimation (5000 iterations)

Control variables include household income, age, gender, reported general health, social interaction and job tenure.

Support, subjective economic vulnerability, presence of children in the household, optimism for the future and control variables include household income, age, gender, reported general health, social interaction and job tenure.

DIC = Deviance Information Criterion

Structural MCMC estimation (5000 iterations)
Table 5.5: Reduction in DIC for the moderation effects

<table>
<thead>
<tr>
<th>Moderator</th>
<th>DIC without interaction</th>
<th>DIC with interaction</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate ‘satisfaction with economy’</td>
<td>41267.73</td>
<td>41233.11</td>
<td>34.61</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>38484.77</td>
<td>38471.61</td>
<td>13.16</td>
</tr>
<tr>
<td>GDP</td>
<td>41267.91</td>
<td>41259.84</td>
<td>8.07</td>
</tr>
<tr>
<td>Average Δ unemployment</td>
<td>38484.78</td>
<td>38477.62</td>
<td>7.16</td>
</tr>
<tr>
<td>Average Δ GDP</td>
<td>41267.98</td>
<td>41265.62</td>
<td>2.37</td>
</tr>
</tbody>
</table>

Figure 5.4: Interaction between ‘aggregate satisfaction with the economy’ and job insecurity

A similar ‘buffering’ effect is shown in Figure 5.5, which plots the interaction between job insecurity and national GDP. As before, job insecurity is negatively associated with life satisfaction at all levels of GDP, but the strength of the association increases as GDP declines. Finally, Figure 5.6 shows that while job insecurity is negatively associated with life satisfaction in all countries, the association is strongest in countries where unemployment is highest. National unemployment, therefore, acts to amplify the negative association between job insecurity and life satisfaction.
**Figure 5.5:** Interaction between job insecurity and GDP

![Graph showing the interaction between job insecurity and GDP.](image)

**Figure 5.6:** Interaction between job insecurity and unemployment

![Graph showing the interaction between job insecurity and unemployment.](image)
5.7 Discussion and conclusions

Numerous studies have shown perceived job insecurity to be negatively associated with individual well-being. Elsewhere, it has been shown that unfavourable economic conditions may also be negatively associated with well-being. This chapter sought to extend these findings to test whether the association between job insecurity and life satisfaction is moderated by macro-level economic variables, such as national unemployment or GDP. The findings suggest that, not only are economic conditions directly associated with life satisfaction but, as hypothesised, they also moderate the association between insecurity and life satisfaction. While job insecurity is, on average, associated with reduced life satisfaction, the reduction is largest in countries where (a) people are least satisfied with the ‘present state of the economy’, (b) GDP is lowest and (c) unemployment is highest and (d) there has been an increase in the unemployment rate in preceding five years. Two limitations are particularly noteworthy:

- The study relies on cross-sectional data, and therefore, is limited to describing associations between variables at a fixed point in time. The robustness of the findings could be improved by testing these hypotheses using longitudinal data.

- The analysis has not considered (due to space constraints) how the moderating influence of economic climate may differ based on individual or job characteristics.

Notwithstanding these limitations, this study has provided useful evidence to suggest that national economic conditions can buffer, or amplify, the negative association between perceived job insecurity and life satisfaction.
6 Job insecurity and labour market policies across Europe

This chapter tests whether the link between job insecurity and life satisfaction is moderated by the generosity of labour market policies (LMPs) across Europe. Job insecurity provokes anxieties about (a) the difficulties of finding another job and (b) alternative sources of non-work income. These components can be related to active and passive labour market policies, respectively. Generous policy support is thus expected to buffer the experience of job insecurity by lowering the perceived difficulty of finding a similar job (active LMP) or providing income maintenance during unemployment (passive LMP). The study combines data for 22 countries from the 2010 European Social Survey with contextual information from Eurostat and the OECD. Based on a multilevel path analysis, initial support for this hypothesis is found. Perceived employment insecurity is negatively associated with life satisfaction but the strength of the relationship is inversely related to the generosity of national LMP. Employment insecurity, in other words, is more harmful in countries where LMP is less generous (expenditure is lower or where unemployment benefits replace a smaller proportion of in-work income). No effect is found for employment protection legislation.

6.1 Introduction

Research has consistently shown perceived employment insecurity to be negatively associated with individual health and well-being (de Witte 1999; Sverke et al. 2002; Burchell 2005; de Witte 2007; Cheng and Chan 2008), and there is good evidence to show that labour market policies are themselves associated with perceptions of labour market insecurity (Anderson and Pontusson 2007; Pacelli et al. 2008; Clark and Postel-Vinay 2009). The moderating potential of labour market policy, by contrast, has received little attention. Combining data from the 2010 European Social Survey with contextual information from the OECD and Eurostat, this
study tests whether the association between employment insecurity and life satisfaction is stronger in countries with less generous LMP provision.

Many studies have examined both the determinants and consequences of employment insecurity. Individual characteristics such as age (older workers), occupation (manual labour), education (primary or below) and contract type (temporary) have all been linked to higher levels of perceived insecurity (Näswall and de Witte 2003). Organisational determinants include the quality of communication between managers and employees (Kinnunen et al. 2000), workplace training (Kohlrusch and Rasner 2012) and major organisational changes, such as shifts in management style or moves between public and private sectors (Ferrie et al. 1998). At the national level both economic conditions (Erlinghagen 2008) and institutional arrangements (Lollivier and Rionx 2006; Clark and Postel-Vinay 2009) can motivate individual assessments of employment insecurity. The negative consequences of insecurity for health outcomes such as depression (Meltzer et al. 2009), psychological distress and burnout (Dekker and Schaufeli 1995) are equally well-documented (e.g. Sverke et al. 2002; Ferrie et al. 2005; DeWitte 2007; see chapter 2 for a review).

A corresponding literature has considered the potential moderators of employment insecurity (i.e. individual or contextual factors that influence the link between insecurity and well-being). At the individual level, factors such as social support (Lim 1996), job control (Bussing 1999) and employability (Silla et al. 2008; Green 2011) have all been shown to buffer the experience of insecure work. Fewer studies have considered contextual moderators, such as macro-economic conditions (see previous chapter) or societal attitudes and values (Eichhorn 2013). The scarcity of studies investigating contextual moderators of insecurity is unfortunate, because research shows significant cross-national variation in both the prevalence of employment insecurity (e.g. Böckerman 2004; Erlinghagen 2008) and the subsequent outcomes. As this chapter highlights, national context can influence the experience of job insecurity, even after controlling for individual characteristics. LMPs have been shown to influence employment insecurity directly (e.g. Chung and van Oorschot 2011), but no study to date has considered their potential to moderate the consequences of insecure work. Based on the theoretical model described below, it is hypothesised that generous policy provision (e.g. high replacement rates of unemployment benefits) will act as a buffer, such that the drop in life satisfaction associated with insecure work will be less in countries with more generous labour market policies.
The chapter is in four parts. First, the theoretical and analytical model is given, setting out how employment insecurity is thought to relate to LMP and life satisfaction. Second, an overview of the data and methods is given, as well as the measurement of the core concepts. The findings are presented third, before concluding with a discussion.

6.2 Subjective well-being, job insecurity and labour market policies

LMPs are defined by the European Union as “public interventions in the labour market aimed at reaching its efficient functioning and correcting disequilibria and which can be distinguished from other general employment policy interventions in that they act selectively to favour particular groups in the labour market” (Eurostat 2002: 4). According to Robinson (2000), labour market policies as seek to balance three distinct objectives: (a) the reduction of unemployment and inactivity; (b) the reduction of public expenditure; and (c) the reduction of income poverty (p. 14). Data on LMP expenditure typically differentiate between active and passive measures. Active interventions are aimed at “the improvement of the beneficiaries’ prospect of finding gainful employment or to otherwise increase their earnings capacity” (OECD 2006: 14). These include measures to improve access to the labour market for the unemployed (Powell and Barrientos 2004: 88), investment in skills and qualifications (Rønsen and Skarðhamar 2009: 62) and subsidised employment (Moncel et al. 2004: 59). Passive labour market policies include unemployment compensation schemes (unemployment benefits, redundancy and bankruptcy compensation) and programmes for early retirement (OECD 2011). Active policies, in short, are those that help the inactive or unemployed into work whereas passive policies seek to guarantee a minimum income for these individuals during unemployment.

As described in chapter 2, job insecurity is a multidimensional concept that goes beyond the fear of imminent job loss (Anderson and Pontusson 2007). Past studies often distinguish between ‘affective’ and ‘cognitive’ forms of insecurity. Cognitive insecurity is the individual’s estimate of the probability they will lose their job in the near future, whereas affective insecurity refers to worries or anxiety about becoming unemployed (Ashford 1989). Employment insecurity has been linked to subjective well-being both theoretically and empirically.

Affective insecurity, the anticipated consequences of job loss, can be decomposed into two discrete variables: (a) the prospects of finding
another similar job and (b) access to non-work sources of income. This is consistent with the notion of ‘job dependency’, defined by Greenhalgh and Rosenblatt (1984) as a function of occupational mobility and income insecurity (p. 445). Affective insecurity thus influences well-being by motivating anxieties about alternative employment options and income sources.

**Figure 6.1: Theoretical framework**

![Diagram of the theoretical framework](image)

Figure 6.1 posits that occupational mobility (‘the ability to find a similar job elsewhere’) and income insecurity (‘access to alternative income sources’) will depend on (a) individual circumstances, (b) labour market conditions (c) institutional factors. At the individual level, occupational mobility has been linked to human capital (Berntson et al. 2006), age (Ahmed et al. 2012) and social networks (Marmaros and Sacerdote 2002), while alternative incomes may be derived from savings or assets (such as home ownership) or from family and friends (e.g. income pooling within families; Esping-Andersen 1999). Local or national labour market conditions can also influence individual perceptions of labour market insecurity (Erlinghagen 2008). Periods of recession or high unemployment will increase the perceived difficulties of finding another job, subsequently strengthening the link between insecure work and life satisfaction.

The focus here, however, is on institutional determinants of job dependency. Three forms of support are considered: active and passive labour market policies and employment protection legislation (EPL). Active and passive policies can be linked theoretically to the twin components of job dependency – labour market insecurity and income insecurity, respectively. Active interventions (e.g. training, subsidised employment or job creation programmes) are expected to lower the barriers to re-employment and thereby reduce the perceived difficulties of finding
another job. To the extent that workers perceive activation support to be available and effective, the prospect of job loss will have a weaker stress reaction, and so the association with life satisfaction is reduced. Passive support (i.e. unemployment benefits) should address workers’ worries about income loss during unemployment, the second component of job dependency. More generous passive welfare programmes, which provide a greater level of ‘decommodification’ (the weakening of the link between income and employment; Esping-Andersen 1990), are expected to reduce the association between affective insecurity and life satisfaction. Current employees will worry less about the prospect of job loss if they are confident that their income (and relatedly, standard of living) will be adequately protected during unemployment. The more generous the benefit (i.e. the longer the duration or the greater the proportion of in-work income that is replaced) the less an individual should worry about unemployment.

While active and passive LMPs can be readily linked to the twin components of affective insecurity, their influence on cognitive insecurity is less clear. Simply put, there are few plausible mechanisms by which active and passive LMPs, which typically target the unemployed, can motivate the perceived risk of unemployment for current employees. This is a conceptual argument, since it is hard to see how cognitive or affective insecurities could exist in isolation, but is important nonetheless. Existing research showing a link between LMP and ‘job insecurity’ tends to conflate cognitive and affective forms (e.g. Lollivier and Rioux 2006). For example, the theoretical justification cites affective insecurity but the empirical analysis is based upon cognitive insecurity. Given the strict definition of cognitive insecurity as a probability, it is hard to justify a link to active or passive policies, which benefit the unemployed. Rather, individual assessments of cognitive insecurity are likely to depend on economic conditions (e.g. the unemployment rate, or economic growth) or individual circumstances (e.g. performance, skills or status). There are two possible exceptions. The first is employment protection legislation (EPL), an indicator that measuring regulations governing the ease with which employers can hire and fire workers (2004). EPL can be linked to cognitive insecurity insofar as it determines the ease with which employees can fired. Stricter, more protective EPL is associated with lower levels of cognitive insecurity (individuals’ assessment of how secure their jobs are). Since cognitive insecurity is linked to affective insecurity, stricter EPL can influence life satisfaction indirectly, by reducing affective insecurity and the consequent stress and anxiety. However, this naive interpretation
is problematic. EPL is often limited to permanent employees so can have a polarising effect. As Boeri et al. (2001) put it, “EPL concentrates the unemployment risk among outsiders” (p. 21). Stricter EPL has also been associated with prolonged unemployment (Nickell 1997) and higher use of temporary contacts (e.g. Dolado et al. 2002; Polavieja 2006). EPL might therefore increase affective insecurity, because by protecting the positions of the currently employed, it makes it harder for labour market outsiders to find work (e.g. Gautié 2011). It is plausible, therefore, that EPL might increase affective insecurity by making it harder to find alternative employment.

A second plausible exception arises from ‘prospect theory’ (Kahneman and Tversky 1979), and specifically, the notion of a ‘weighting function’ (p. 280). Put crudely, this states that the estimated probability of an event is not independent from the expected gains or losses of such an event. Instead, the estimated probability increases in line with the anticipated losses, such that individuals overestimate the probability of severe outcomes and underestimate more minor consequences. With regards to employment insecurity, this would imply that the supposed separation of cognitive and affective insecurity is problematic. Individuals who perceive job loss to be more harmful, following prospect theory, are likely to overestimate the probability of losing their job. Since LMPs can influence the perceived consequences of job loss (i.e. affective insecurity), they might also influence cognitive insecurity, due to the non-independence of perceived probabilities and perceived outcomes.

6.3 Existing evidence

Overall, there is good evidence to support the direct association between LMPs and employment insecurity, although some studies find no effect and others emphasise economic conditions, rather than the institutional framework, as the key determinant. For a sample of 15 OECD countries, Anderson and Pontusson (2007) find labour market institutions to influence employment insecurity in ways consistent with the above model. Expenditure on active interventions is found to reduce labour market insecurity (the ability to find another job), while more generous unemployment compensation reduces income insecurity (worries about alternative income) (p. 18). They find more restrictive EPL to be associated with reduced levels of cognitive security. Clark and Postel-Vinay (2009) similarly find ‘satisfaction with job security’ to be negatively associated with the strictness of EPL and positively associated with the
generosity of unemployment benefits (UB), but only for private sector workers. Using the French sample of the ECHP, Lollivier and Rioux (2006) show workers feel more secure when UB levels are more generous.

Other studies are less supportive. A multilevel analysis of the 2004 ESS by Erlinghagen (2008) shows no association between social security spending and perceived job insecurity, having controlled for unemployment rates, GDP growth rates and EPL. Chung and van Oorschot (2011) similarly show that, while LMP generosity is negatively associated with perceived employment insecurity, this association becomes insignificant when economic conditions are taken into account.

Very few studies have explicitly considered the potential for LMPs to moderate employment insecurity, rather than predict it. A rare exception is provided by Burchell (2009), who tests whether national flexicurity policies moderate the association between cognitive insecurity and psychological well-being. Using ESS and EWCS data, Burchell finds little evidence of any moderating effect. With few exceptions, the correlations between subjective well-being and job insecurity were no higher in countries with higher levels of flexicurity policies than those that lacked flexicurity.

The contribution of this chapter, therefore, is to consider how labour market policies can influence not only perceptions of insecurity (as demonstrated previously), but also the subsequent outcomes, such as life satisfaction. Summarised above, many studies have shown employment insecurity to be influenced by labour market policies, but the consequences for well-being are typically assumed. This study tests moderating hypothesis empirically.

6.4 The analytical model

While the substantive focus is on the moderating role of LMP, it is important to consider various direct and mediating pathways. Figure 6.2 illustrates the analytical model. ‘Between’ refers to variables and relationships that operate at the country-level, whereas ‘within’ refers to relationships at the individual level. The starting point is the well-established negative association between employment insecurity and subjective well-being. This paper’s contribution is to test whether this relationship varies cross-nationally, and whether this variation can be explained by LMP generosity. This test is represented by the bold arrow between LMP and s (the latter represents the country-level slope of the relationship between employment insecurity and life satisfaction; see below
for details). The model controls for a direct association between LMP generosity and subjective well-being (e.g. Pacek and Radcliff 2008) and a direct association between economic conditions and employment insecurity (e.g. Erlinghagen 2008). Given evidence showing that macro-economic conditions can directly influence individual well-being (e.g. Brenner 1973; Catalano and Dooley 1977; Di Tella et al. 2001; Clark et al. 2010) a path between economic conditions and well-being is also included. The model controls for a number of individual determinants of insecurity and life satisfaction. Past research has shown links between subjective well-being and attributes such as age, income, marital status, education or personality (see Coombs 1991; Helliwell 2003; Kroll 2010), so these variables are included as controls. Furthermore, such attributes can also influence employment insecurity directly (e.g. Anderson and Pontusson 2007; Erlinghagen 2008; Burgoon and Dekker 2010). Perceived insecurity has been linked to age (e.g. Hartley 1991; Mohr 2000; Näswall et al. 2005), sex (de Witte and Naswall 2003), employment history (Böckerman 2004), job tenure (Green et al. 2001), industry sector (Aaronson and Sullivan 1998) and working hours (Böckerman 2004). To reflect this, the model includes a direct path between relevant individual attributes and perceived job insecurity.

**Figure 6.2:** The analytical model

As a further complication, the moderating influence of LMP is itself likely to depend on the individual characteristics described above. For example, individual determinants of employability (such as age, skills or experience) are likely to interact with active labour market interventions, such that a weaker moderating effect is observed for more mobile employees.
(i.e. those who are most optimistic about their chances of finding another job, and so have least need for activation support). To take such ‘moderated moderation’ effects into account the model is also estimated for various subgroups separately.

To reiterate, the primary focus of this paper is on the moderating influence of labour market policies. Additional relationships are included to control for effects that would otherwise be problematic to ignore, but these relationships have been addressed previously. This model can be condensed to the following hypotheses:

1. Cognitive job insecurity is negatively associated with subjective well-being.

2. LMPs buffer the association between job insecurity and life satisfaction, such that a weaker association is observed in countries with more generous provision.

3. LMP generosity is negatively associated with perceptions of employment insecurity.

4. LMP generosity is positively associated with life satisfaction.

5. Favourable economic conditions (i.e. low unemployment, high growth) are negatively associated with perceived employment insecurity, and positively associated with life satisfaction.

Two limitations of this model are worth highlighting. First, it assumes employees are aware of the level of support available. Similarly, it assumes that eligibility and coverage is consistent across every region, sector and workplace. Secondly, it has been argued that financial loss is just one component of the psychological impact of job insecurity (Burchell 2009: 368), and “with the greater affluence in more recent times, the economic effects of unemployment are no longer the main mechanisms accounting for the low well-being of the unemployed” (p. 368). Johada’s (1981; 1982; 1997) latent deprivation model states that employment provides not only financial reward but also numerous latent functions, such as time structure, social contact, collective purpose, identity and activity. Consequently, passive LMPs aimed at maintaining income during unemployment address just one component of the psychological impact of job insecurity.

6.5 Data and measurements

This chapter combines data from the 2010 ESS (see chapter 3) with contextual information from Eurostat and the OECD. Of 50,781
respondents in the 2010 survey the analysis focuses solely on respondents who are currently employed (i.e. who respond to items on job security; 38% of the sample) and who live in a country for which contextual data is available. The final models include 12,517 workers from 22 countries. Subjective well-being, the main dependent variable, is operationalised using an 11-category ordinal measure of reported life satisfaction, treated here as continuous. Respondents were asked, “all things considered, how satisfied are you with your life as a whole nowadays?” (from 0 ‘extremely dissatisfied’ to 10 ‘extremely satisfied’). The main explanatory variable is ‘job insecurity’, a binary measure that combines cognitive and affective assessments. As Chung and van Oorschot (2011) note, cognitive measures of insecurity are problematic insofar as they include individuals who might lose their current job, but will easily find another one (p. 8). Employment insecurity has thus been operationalised as workers who (a) do not feel that their job is secure, and (b) think it would be difficult to find a similar job, were they to become unemployed. In 2010 respondents were asked whether the statement “My job is secure” is ‘very true’, ‘quite true’, ‘a little true’ or ‘not at all true’. The survey also asks respondents “how difficult or easy would it be for you to get a similar or better job with another employer, if you had to leave your current job?” (from 0 ‘extremely difficult’ to 10 ‘extremely easy’). These two measures have been dichotomised and combined. ‘High’ employment insecurity refers to individuals who feel the statement “My job is secure” is ‘not at all true’ and who rate the difficulty of finding a similar job as 2 or lower (i.e. very difficult\(^1\)). ‘Low’ job insecurity refers to everyone else. A total of 1,499 respondents report ‘high’ job insecurity (≈ 8% of the sample). Individual controls include age, gender, income, cohabitation status, divorce, subjective general health, religiosity\(^2\), experience of discrimination, citizenship status, whether there are children in the household, education and past experience.

\(^1\)The substantive findings are unchanged whether a cut-point of 1, 2, 3 or 4 is used.

\(^2\)A scale created by combining three items measuring religiosity: (1) ‘Regardless of whether you belong to a particular religion, how religious would you say you are?’ (2) ‘Apart from special occasions such as weddings and funerals, about how often do you attend religious services nowadays?’ (3) ‘Apart from when you are at religious services, how often, if at all, do you pray?’ (Cronbach’s alpha coefficient = 0.85).
of unemployment. The models also include a set of work-based controls\(^3\) and several measures of social capital\(^4\).

### Table 6.1: Measures of labour market policy

<table>
<thead>
<tr>
<th>Measure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Expenditure on passive labour market policies (% of GDP)</td>
<td>Eurostat</td>
</tr>
<tr>
<td>2. Short-term replacement rate of unemployment benefits</td>
<td>OECD</td>
</tr>
<tr>
<td>3. Long-term replacement rate of unemployment benefits</td>
<td>OECD</td>
</tr>
<tr>
<td>4. The ‘typical’ duration of unemployment benefits</td>
<td>MISSOC</td>
</tr>
<tr>
<td>5. Expenditure on active labour market policies (% of GDP)</td>
<td>Eurostat</td>
</tr>
<tr>
<td>6. Activation support (participants per 100 unemployed)(^a)</td>
<td>Eurostat</td>
</tr>
<tr>
<td>7. Employment protection legislation for regular workers</td>
<td>OECD</td>
</tr>
<tr>
<td>8. Employment protection legislation for temporary workers</td>
<td>OECD</td>
</tr>
</tbody>
</table>

\(^a\) Proportion of the unemployed who are engaged in labour market activation schemes

Eight measures of labour market policy are considered, summarised in Table 6.1. Since spending tends to increase with unemployment, all expenditure data have been standardised by the national unemployment rate (i.e. total expenditure as a percentage of GDP \(\times\) 100 divided by the standardised unemployment rate; see Hudson and Kuhner 2007; Vis 2007). The standardised measure represents the percentage of GDP that is spent on LMP per 1% standardised unemployment. OECD measures of employment protection legislation (EPL) for regular (7) and temporary (8) are also included. Finally, several macro-economic indicators are considered, including national GDP growth (percentage change on previous year), the unemployment rate and the average change in unemployment (for the previous 3 years).

### 6.6 Methods

This study implements a two-level path analysis model with random intercepts and random slopes. A random intercept model is used to represent the hierarchical structure of the data (i.e. individuals nested

---

\(^3\)Work-related controls include occupational class, help from colleagues, opportunities for advancement, variety in the content of work and a scale measuring work-family conflict.

\(^4\)The model includes indicators of interpersonal and institutional trust, as well as a binary item asking respondents ‘Do you have anyone with whom you can discuss intimate and personal matters?’
within countries; Snijders and Bosker 2011). Path analysis refers to a structural model that represents the hypothesised relationships between a set of observed variables, modelled in terms of systems of equations (Kaplan 2008: 13). The advantage of path analysis here is the ability to model the mediating pathways involving multiple dependent variables. The standard random intercept regression model (e.g. Snijders and Bosker 2011: 42) models the association between a set of explanatory variables and a single dependent variable, precluding any relationships between the explanatory variables themselves. The simplicity of this model is attractive, but only insofar as we can assume that the explanatory variables are unrelated. Given the theoretical model described above, such assumptions are problematic. Perceived insecurity has been shown to depend on macro-economic conditions, the institutional framework (e.g. LMP) and a range of individual characteristics such as age, education or tenure. To adopt a standard multilevel model would effectively fix these relationships at zero. A better alternative is to model these relationships explicitly, using path analysis, simultaneously estimating the determinants of employment insecurity and subjective well-being, as well as calculating any indirect (i.e. mediating) effects. Despite concerns about estimating mediation effects with cross-sectional data (e.g. Maxwell and Cole 2007), the bias introduced by omitting these pathways altogether is considered larger than the bias incurred from the reliance on cross-sectional data.

Two features of the model warrant explanation: the implementation of (a) mediating pathways and (b) cross-level interactions. The hypothesised model includes several mediating effects. These are indirect pathways where a third variable is placed between an explanatory and dependent variable in the hypothesised causal pathway. For single-level models the techniques for assessing mediation are well established (e.g. Baron and Kenny 1986; MacKinnon et al. 2002) but these methods are inappropriate in a multilevel context (Preacher et al. 2011). Several approaches have subsequently been proposed for testing mediation in a multilevel framework (e.g. Raudenbush and Sampson 1999; Krull and MacKinnon 2001; Kenny et al. 2003; Bauer et al. 2006; Pituch et al. 2006; MacKinnon 2008; Zhang et al. 2009). These techniques are an improvement over the single-level approach, but remain subject to two major limitations. First, multilevel models cannot accommodate upper-level mediators or outcome variables (e.g. a 1-1-2 or 1-2-2 design). Second, mediation models involving linkages between pairs of level-1 variables (e.g. in a 2-1-1 design) typically conflated the ‘within’ and ‘between’ components of these effects. That
is, the regressions of X on Y within and between clusters are implicitly constrained to be equal (Preacher et al. 2011: 162).

More recently, Preacher et al. (2010) have shown that these limitations can be overcome by using a multilevel structural equation modelling (MSEM) framework where the ‘between’ and ‘within’ parts of all variables are separated. This approach has been shown to reduce bias in contextual effects, when compared to the group mean-centred MLM approach (Lüdtke et al. 2008; Preacher et al. 2011). The analyses that follow adopt the recommendations of Preacher et al. (2010) for testing 2-1-1 mediation effects.

The second issue relates to the estimation of the cross-level interaction effects, that is, whereby a level-2 variable (W) influences the relationship between two level-1 variables (X and Y). In a traditional MLM cross-level interactions are implemented using interaction terms (i.e. the product of level-1 and level-2 variables). In a MSEM framework (and specifically, in Mplus) such interactions are instead implemented using random slopes. A random slope for the regression of X on Y (denoted s) allows this relationship to vary by cluster, and s is then regressed on the contextual variable, W. One can then calculate the association between X and Y at different levels of W.

All models have been estimated in Mplus 6.1 with the Bayes estimator using the default starting values and non-informative priors (see Appendix 1). Models were initially estimated using a robust maximum likelihood estimator (MLR), which gave results consistent with those obtained using Bayesian estimation.

### 6.7 Findings

This section is in four parts. It presents (a) descriptive statistics and (b) coefficients from the null and base models, (c) describes the moderating effect of LMP and (d) considers how this effect varies based on individual characteristics.

#### 6.7.1 Descriptive statistics

Across all current employees (\(N = 19,124\)) the average score for life satisfaction is 6.62, and of these, 7% of these report ‘high’ employment insecurity. However, these values vary considerably across Europe, as illustrated in Figure 6.3. This plots the aggregate level of life satisfaction against the proportion of respondents reporting high insecurity (both estimates are weighted), showing a significant negative trend: average
life satisfaction is lower in countries where more people feel insecure ($\rho = -0.65$).

**Figure 6.3:** Aggregate life satisfaction (weighted) against proportion of respondents reporting employment insecurity (weighted)

Figure 6.2 presents correlations between weighted aggregate levels of life satisfaction, employment insecurity, LMP generosity and economic context. The table shows life satisfaction to be negatively associated with employment insecurity (-0.65), and positively associated with active and passive LMP expenditure (0.72 and 0.52, respectively) and the long-term replacement rate (0.66). Employment insecurity is negatively correlated with ALMP expenditure (-0.53) and the long-term replacement rate (-0.63), but correlations with other variables are non-significant. As might be expected, the various measures of LMP generosity are all highly correlated with one another.

### 6.7.2 Base model

The base model, presented in Tables 6.3 and 6.4, includes all paths discussed above except for the moderating influence of LMP. The model includes 14,442 individuals from 22 countries. Table 6.3 presents
Table 6.2: Correlations between aggregate scores for life satisfaction, job insecurity, LMP and economic context

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life satisfaction</td>
<td>1.00 (26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment insecurity</td>
<td></td>
<td>1.00 (26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALMP expenditure</td>
<td></td>
<td></td>
<td>0.72* (20)</td>
<td>-0.53* (20)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLMP expenditure</td>
<td></td>
<td></td>
<td>0.52* (20)</td>
<td>-0.39 (20)</td>
<td>0.77* (20)</td>
<td>1.00 (20)</td>
<td></td>
</tr>
<tr>
<td>Long-term RR</td>
<td></td>
<td></td>
<td></td>
<td>0.66* (22)</td>
<td>-0.63* (22)</td>
<td>0.61* (19)</td>
<td>0.57* (19)</td>
</tr>
<tr>
<td>EPL (regular)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.09 (18)</td>
<td>-0.13 (16)</td>
</tr>
<tr>
<td>Unemployment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.30 (18)</td>
</tr>
</tbody>
</table>

Cell counts are shown in parentheses
* = significant at the 5% level
the individual-level coefficients and bayesian p-values\textsuperscript{5} for employment insecurity and life satisfaction. Table 6.4 presents the country-level coefficients. Employment insecurity is negatively associated with years of education, institutional trust, permanent job contract, opportunities for advancement and variety at work. A positive association (i.e. greater insecurity) is observed for older workers, women, workers from ethnic minorities or in lower occupational groups and for workers who report a long-term limiting illness. Life satisfaction is negatively associated with employment insecurity, work-family conflict, ‘belonging to an ethnic minority group’, ‘experience of discrimination’ and low levels of work-based support. ‘High’ employment insecurity is associated with a 0.41 reduction in life satisfaction, controlling for other variables in the model. The strongest determinant of life satisfaction is self-rated health. Satisfaction among workers reporting poor health is 1.94 units lower than among those with very good health. The model shows life satisfaction to be positively related to cohabitation, working hours, household income, religiosity, institutional and interpersonal trust, living in a rural area and ‘opportunities for advancement’ and ‘variety’ at work. These effects are consistent with the existing literature.

At the country-level, economic conditions are shown to have little effect. For both GDP growth and the ‘trend in unemployment’, the associations with employment insecurity and life satisfaction are non-significant. This is perhaps explained by the large, negative association between life satisfaction and the country-level component of employment insecurity (i.e. the random intercept for insecurity; a coefficient of -0.151). Mirroring the descriptive findings, this suggests that in countries where a higher proportion of respondents feel insecure, the average level of life satisfaction will be lower. Since economic conditions will be highly correlated with aggregate insecurity, it is possible that the impact of economic conditions are ‘explained away’ by high aggregate levels of insecurity.

The residual variance for employment insecurity is highly significant, indicating significant cross-national variation (consistent with the descriptive findings above). The intra-class correlation for life satisfaction

\textsuperscript{5}For a positive estimate the Bayesian p-value is the proportion of the posterior distribution that is below zero. For a negative estimate the p-value is the proportion of the posterior distribution that is above zero (see Muthén 2010). For practical purposes, these can be interpreted in the same way as standard (frequentist) p-values.
is 0.078 indicating that 7.8% of the variation in life satisfaction is attributable to country differences, controlling for other variables in the model.

### 6.7.3 Moderation effects

Moderation effects are tested using random slopes in a multilevel SEM framework (Preacher et al. 2010). The individual-level association between employment insecurity and life satisfaction is allowed to vary by country (i.e. a random slope) and this variation is regressed on a country-level measure of labour market policy. Eight measures of LMP are tested in turn. Other contextual variables (i.e. unemployment and GDP growth) are kept in the model as controls. It is then possible to estimate the strength of the association between employment insecurity and life satisfaction at various values of the contextual moderator.

Each model produces a large number of coefficients that, due to space limitations, cannot be presented in full. This discussion focuses on the moderating effect of LMP, that is, the association between each contextual moderator \( (LMP_j) \) and the slope of the regression between employment insecurity and life satisfaction \( (s) \). With the exception of this regression, the eight models are otherwise identical to the base model (the other coefficients do not change substantially).

Table 6.5 presents the unstandardised coefficients for each moderation effect. Each row of the table represents a separate model. Based on the 95% credible intervals, significant moderation effects are observed for (a) total LMP expenditure, (b) active LMP expenditure, (c) passive LMP expenditure, and (d) the long-term replacement rate. The interpretation of the coefficients themselves is not straightforward (they represent the change in the slope of the regression between employment insecurity and life satisfaction for a unit change in each measure of LMP). To illustrate these effects, therefore, Figures 6.4 to 6.7 plot the change in life satisfaction associated with high employment insecurity (y-axis) against each contextual measure of LMP (x-axis).

Importantly, all four plots show a positive gradient, indicating that employment insecurity is more harmful (i.e. is associated with a larger reduction in life satisfaction) in countries where expenditure is lower or unemployment benefits are less generous. For example, the plot for ‘total LMP expenditure’ shows the strongest associations in Mediterranean countries (Spain, Portugal and Greece) that spend a smaller proportion of GDP on labour market interventions. In these countries, where there isn’t much support for the unemployed through neither benefits nor activation...
Table 6.3: Individual-level coefficients for the base model

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Explanatory variable</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment insecurity</td>
<td>Total years of education</td>
<td>$-0.018^{***}$</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Gender (female)</td>
<td>0.066*</td>
</tr>
<tr>
<td></td>
<td>Belongs to ethnic minority</td>
<td>0.085</td>
</tr>
<tr>
<td></td>
<td>Institutional trust (scale)</td>
<td>0.035</td>
</tr>
<tr>
<td></td>
<td>Trade union member</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>Public sector employee</td>
<td>$-0.306^{***}$</td>
</tr>
<tr>
<td></td>
<td>Permanent employment contract</td>
<td>$-0.004^{***}$</td>
</tr>
<tr>
<td></td>
<td>Occupation (ISEI)</td>
<td>$-0.018^{***}$</td>
</tr>
<tr>
<td></td>
<td>Good opportunities for advancement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agree or agree strongly (ref.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neither agree nor disagree</td>
<td>$-0.402^{***}$</td>
</tr>
<tr>
<td></td>
<td>Disagree or disagree strongly</td>
<td>$-0.577^{***}$</td>
</tr>
<tr>
<td></td>
<td>Hampered by long-standing health problem</td>
<td>0.229***</td>
</tr>
<tr>
<td></td>
<td>Current job offers variety</td>
<td>$-0.062$</td>
</tr>
<tr>
<td>Life satisfaction</td>
<td>Age</td>
<td>0.070*</td>
</tr>
<tr>
<td></td>
<td>Gender (female)</td>
<td>$-0.001^*$</td>
</tr>
<tr>
<td></td>
<td>Children living at home</td>
<td>0.096**</td>
</tr>
<tr>
<td></td>
<td>Lives with partner/spouse</td>
<td>0.572***</td>
</tr>
<tr>
<td></td>
<td>Total hours normally worked per week</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Household income (after tax/social transfers)</td>
<td>0.144***</td>
</tr>
<tr>
<td></td>
<td>Total years of education</td>
<td>0.011**</td>
</tr>
<tr>
<td></td>
<td>Religiosity (scale; centred)</td>
<td>0.151***</td>
</tr>
<tr>
<td></td>
<td>Feels belongs to a discriminated group</td>
<td>$-0.427^{***}$</td>
</tr>
<tr>
<td>Subjective general health</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very good (ref.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>$-0.446^{***}$</td>
</tr>
<tr>
<td></td>
<td>Fair</td>
<td>$-0.965^{***}$</td>
</tr>
<tr>
<td></td>
<td>Bad</td>
<td>$-1.938^{***}$</td>
</tr>
<tr>
<td></td>
<td>Belongs to ethnic minority group in country</td>
<td>$-0.055$</td>
</tr>
<tr>
<td></td>
<td>Hampered by long-standing health problem</td>
<td>$-0.045$</td>
</tr>
<tr>
<td></td>
<td>Lives in a rural area (country village or farm)</td>
<td>0.095***</td>
</tr>
<tr>
<td></td>
<td>Occupation (ISEI)</td>
<td>0.005***</td>
</tr>
<tr>
<td></td>
<td>Can get support from co-workers when needed</td>
<td>$-0.251^{***}$</td>
</tr>
<tr>
<td>Job offers good opportunities for advancement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agree or agree strongly (ref.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neither agree nor disagree</td>
<td>0.142***</td>
</tr>
<tr>
<td></td>
<td>Disagree or disagree strongly</td>
<td>0.344***</td>
</tr>
<tr>
<td></td>
<td>Current job offers variety</td>
<td>0.200***</td>
</tr>
<tr>
<td></td>
<td>Work-family conflict (scale)</td>
<td>$-0.491^{***}$</td>
</tr>
</tbody>
</table>

$N_i$ 14,442  
$N_j$ 22

Bayesian p-values: $*** p < 0.001; ** p < 0.01; * p < 0.05$
Table 6.4: Unstandardised country-level coefficients for the base model

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Explanatory variable</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual variance</td>
<td>Life satisfaction</td>
<td>2.950***</td>
</tr>
<tr>
<td>Employment insecurity</td>
<td>Intercept</td>
<td>−0.774***</td>
</tr>
<tr>
<td></td>
<td>National unemployment rate</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
<td>0.006</td>
</tr>
<tr>
<td>Life satisfaction</td>
<td>National unemployment rate</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>Employment insecurity</td>
<td>−1.151***</td>
</tr>
<tr>
<td>Residual variance</td>
<td>Employment insecurity</td>
<td>0.165***</td>
</tr>
<tr>
<td></td>
<td>Life satisfaction</td>
<td>0.248***</td>
</tr>
<tr>
<td>Intercepts</td>
<td>s (slope)</td>
<td>−0.405***</td>
</tr>
<tr>
<td></td>
<td>Life satisfaction</td>
<td>5.771***</td>
</tr>
</tbody>
</table>

Bayesian p-values: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 6.5: Moderation effects (association between slope and LMP)

<table>
<thead>
<tr>
<th>Moderator</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total LMP expenditure</td>
<td>0.009*</td>
</tr>
<tr>
<td>Active LMP expenditure</td>
<td>0.037*</td>
</tr>
<tr>
<td>Activation support</td>
<td>−0.211</td>
</tr>
<tr>
<td>Regular EPL</td>
<td>−0.037</td>
</tr>
<tr>
<td>Temporary EPL</td>
<td>0.011*</td>
</tr>
<tr>
<td>Passive LMP expenditure</td>
<td>0.019*</td>
</tr>
<tr>
<td>Short-term replacement rate</td>
<td>0.006</td>
</tr>
<tr>
<td>Long-term replacement rate</td>
<td>0.009*</td>
</tr>
<tr>
<td>Typical duration of UB</td>
<td>0.011</td>
</tr>
</tbody>
</table>

Bayesian p-values: * $p < 0.05$
measures, the impact of insecure employment on life satisfaction is the strongest. Notably, the effect of EPL is non-significant. This extends a finding by Chung and van Oorschot (2011), who show employment protection to be less important for employment insecurity than active and passive LMPs. However, whereas their study finds institutional factors to lose their significance when economic conditions are taken into account, the same is not true here. LMP generosity moderates the relationship between insecurity and life satisfaction even when controlling for market conditions (although their study addresses the direct, rather than the moderating, effect of LMP).

Figure 6.4: Moderation effects for ‘total LMP expenditure’

![Figure 6.4](image)

Figure 6.5: Moderation effects for ‘passive LMP expenditure’

![Figure 6.5](image)

It is possible that LMP is not itself responsible for the moderating effect, but rather, that changes in life satisfaction are motivated by
other national characteristics that just happen to be correlated with LMP generosity. To rule this out, an additional set of country-level controls were entered into each model, one by one, to check whether the moderating effect of LMP remained significant. Six variables are considered: (1) income inequality (gini coefficient), (2) income poverty, (3) trade union density, (4) turnout at last election, (5) the proportion of households who have ‘great difficulty’ making ends meet and (6) ‘healthy

---

6Households at risk of poverty rate (60% median) after social transfers (Eurostat 2012)
7Armingeon et al. (2012)
life years’ for men and women
e. These contextual controls are entered,
one by one, as a predictor of life satisfaction and employment insecurity. Overall, the results from these models do not differ substantially from the earlier results, suggesting that the observed moderation effects are robust to the influence of these country characteristics.

6.7.4 Moderated moderation
So far, the findings indicate that employment insecurity is negatively associated with life satisfaction, but that the strength of this relationship depends on the generosity of labour market policy, as hypothesised. This average effect, however, is likely to mask considerable heterogeneity; LMPs are likely to be more important for some workers than others. Past research shows perceived insecurity to be predicted by individual characteristics such as age, sex, employment history, tenure or industry (e.g. Näswall and de Witte 2003). As described above, these attributes can be related to the twin components of affective insecurity: (a) the anticipated difficulties of finding another job, and (b) access to alternative sources of income. LMPs are likely to matter most to individuals who have least control over these components (i.e. those who are most pessimistic about their chances of re-employment, and who would struggle to maintain their present income during unemployment). LMPs, therefore, are likely to benefit vulnerable workers most, and be less important for highly mobile workers (in the case of active LMPs) or workers who can readily access alternative income (in the case of passive LMPs).

To test this a set of three-way interaction terms have been introduced one-by-one. These interact insecurity and LMP with a set of individual characteristics known to predict employment insecurity (age, gender, union membership, sector, industry, occupation and contract type). Each individual attribute has been dichotomised, as shown in Table 6.6. The significance of the three-way interaction is then tested using a Wald test, presented in Table 6.7. Significant three-way interactions are observed between active and passive LMP expenditure and (a) occupational class, (b) sector and (c) tenure. These are illustrated in Figure 6.8, which

---

8 Eurostat (2012)

9 This tests whether the overall model fit is significantly worsened when the group-specific interaction term is fixed at zero. These models have been estimated using robust maximum likelihood estimation, as the latest version of Mplus (7.1) does not provide model fit statistics (e.g. DIC) for multilevel models.
Table 6.6: Aggregate employment insecurity by subgroup (weighted)

<table>
<thead>
<tr>
<th>Group</th>
<th>Categories</th>
<th>Employment insecurity</th>
<th>Prop.</th>
<th>95% CIs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Age</td>
<td>&lt; 40</td>
<td>0.049</td>
<td>0.041</td>
<td>0.056</td>
</tr>
<tr>
<td></td>
<td>&gt; 40</td>
<td>0.086</td>
<td>0.077</td>
<td>0.096</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>0.083</td>
<td>0.074</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>0.056</td>
<td>0.049</td>
<td>0.064</td>
</tr>
<tr>
<td>Trade union</td>
<td>Member</td>
<td>0.074</td>
<td>0.060</td>
<td>0.088</td>
</tr>
<tr>
<td></td>
<td>Not member</td>
<td>0.068</td>
<td>0.062</td>
<td>0.075</td>
</tr>
<tr>
<td>Sector</td>
<td>Public</td>
<td>0.073</td>
<td>0.062</td>
<td>0.084</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>0.069</td>
<td>0.061</td>
<td>0.076</td>
</tr>
<tr>
<td>Breadwinner</td>
<td>Main breadwinner</td>
<td>0.072</td>
<td>0.062</td>
<td>0.081</td>
</tr>
<tr>
<td></td>
<td>Not breadwinner</td>
<td>0.069</td>
<td>0.061</td>
<td>0.077</td>
</tr>
<tr>
<td>Industry</td>
<td>Manufacturing</td>
<td>0.074</td>
<td>0.065</td>
<td>0.084</td>
</tr>
<tr>
<td></td>
<td>Services</td>
<td>0.063</td>
<td>0.055</td>
<td>0.072</td>
</tr>
<tr>
<td>Occupation</td>
<td>White collar</td>
<td>0.061</td>
<td>0.054</td>
<td>0.068</td>
</tr>
<tr>
<td></td>
<td>Blue collar</td>
<td>0.091</td>
<td>0.078</td>
<td>0.103</td>
</tr>
<tr>
<td>Tenure</td>
<td>Permanent</td>
<td>0.061</td>
<td>0.055</td>
<td>0.067</td>
</tr>
<tr>
<td></td>
<td>Temporary</td>
<td>0.116</td>
<td>0.097</td>
<td>0.135</td>
</tr>
</tbody>
</table>

Source: European Social Survey (2010)

plots the ‘total effects’ associated with each interaction to show how the buffering effect of LMP differs among individuals. The blue bar represents the reduction in life satisfaction associated with the main effect of job insecurity, without any moderating effect. The yellow and brown bars represent the combined effect of job insecurity and the interaction term (insecurity × LMP) for each group, respectively.

Overall, these results are consistent with expectations: LMP has a stronger moderating influence for groups that are more vulnerable to job insecurity. Active LMP expenditure, for example, has a stronger buffering effect for blue-collar (rather than white-collar) and temporary (rather than permanent) workers. White-collar workers appear to derive no benefit from passive LMP generosity. As shown elsewhere, the operationalisation of LMP is important. Temporary workers benefit more from active labour market interventions than do permanent workers, but both groups benefit equally from passive support.
Table 6.7: Wald tests for moderated moderation effects

<table>
<thead>
<tr>
<th></th>
<th>LMP expenditure</th>
<th>Long-term RR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active</td>
<td>Passive</td>
</tr>
<tr>
<td>Breadwinner</td>
<td>0.913</td>
<td>1.180</td>
</tr>
<tr>
<td>White collar</td>
<td>6.489*</td>
<td>5.685*</td>
</tr>
<tr>
<td>Female</td>
<td>0.000</td>
<td>0.368</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>7.860*</td>
<td>5.319*</td>
</tr>
<tr>
<td>Permanent tenure</td>
<td>6.382*</td>
<td>27.742*</td>
</tr>
<tr>
<td>Public sector</td>
<td>3.523</td>
<td>0.001</td>
</tr>
<tr>
<td>Union member</td>
<td>0.727</td>
<td>0.485</td>
</tr>
<tr>
<td>Young</td>
<td>0.309</td>
<td>0.605</td>
</tr>
</tbody>
</table>

* = significant at the 5% level

These are preliminary findings, and should be interpreted as such. Certainly, the moderating influence of labour market policy does appear to be unevenly distributed, benefiting some workers more than others, but further analysis is required. In particular, the lack of differentiation based on age, union membership and gender, is surprising, and warrants further research.

6.8 Discussion

Perceived employment insecurity has harmful consequences for well-being even if workers never actually lose their job. This is particularly important during periods of economic recession, such as the years since the 2007 financial crisis. As research shows, although the link between employment insecurity and life satisfaction is remarkably robust, the strength of this association depends on individual, organisational and national circumstances.

This study focused on the buffering potential of LMPs. It was hypothesised that insecurity influenced well-being via concerns about (a) future employment options and (b) replacement income during unemployment, and that these concerns could be offset by active and passive interventions, respectively. Based on data for 22 countries from the 2010 European Social Survey this hypothesis was mostly upheld. Employment insecurity was negatively associated with life satisfaction, but the negative association was stronger in countries with less generous LMP measures. This was found all types of LMP expenditure (active,
passive and total) and the long-term replacement rate of unemployment benefits. No effect was found for EPL.

This chapter’s key contribution is the bringing together of employment insecurity, labour market policy and life satisfaction in a single model. Several studies support a link between LMP and insecurity but the consequences for well-being are typically assumed. Other studies have considered potential moderators of employment insecurity, but so far have failed to address the role of LMP. By linking institutional support, employment insecurity and life satisfaction, empirically, this study has shown that LMP can not only influence perceived insecurities (as demonstrated previously) but can also determine the consequences for well-being. Furthermore, the analysis suggests that this moderating effect depends on individual attributes such as occupation and contract type (amongst others). Simplifying slightly, LMP was more important (as a buffer of insecurity) for individuals who were most vulnerable to employment insecurity (i.e. workers for whom the consequences of job loss would be most severe).

![Figure 6.8: Significant three-way interaction effects (moderated moderation)](image)

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Reduction in life satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job insecurity (only) × Active LMP × Blue collar</td>
<td>0.0</td>
</tr>
<tr>
<td>Job insecurity (only) × White collar</td>
<td>0.2</td>
</tr>
<tr>
<td>Passive LMP × Blue collar</td>
<td>0.4</td>
</tr>
<tr>
<td>Active LMP × White collar</td>
<td>0.6</td>
</tr>
<tr>
<td>Job insecurity (only) × Services</td>
<td>0.0</td>
</tr>
<tr>
<td>Passive LMP × Services</td>
<td>0.2</td>
</tr>
<tr>
<td>× Manufacturing</td>
<td>0.4</td>
</tr>
<tr>
<td>Job insecurity (only) × Temporary</td>
<td>0.0</td>
</tr>
<tr>
<td>Active LMP × Permanent</td>
<td>0.2</td>
</tr>
<tr>
<td>Passive LMP × Permanent</td>
<td>0.4</td>
</tr>
</tbody>
</table>

181
With regard to the policy implications of this study, it appears that the type of intervention is key. A range of measures were considered, including total expenditure (as a proportion of GDP), the replacement rate and duration of unemployment benefits and the protectiveness of employment legislation (EPL). While significant moderating effects were observed for data on expenditure, the strongest and most consistent moderating effect was observed for the long-term replacement rate.

It is worth considering why this might be. The proposed theoretical model assumes that workers are aware of the level of institutional support available. This mechanism is entirely perceived: individuals are protected because thoughts about future unemployment are not so immediately associated with anxiety, since the individual can be confident that sufficient support will be available. The model, in effect, assumes that ‘perceptions of LMP generosity’ and ‘expenditure on LMP’ are synonymous. Replacement rates, therefore, might be more influential because, of the measures considered, they are the most visible. Put another way, replacement rates are a better measure of ‘perceived unemployment support’ than are data on expenditure.

These findings would recommend an increase in the generosity (duration and replacement rate) of unemployment benefits. This option is particularly attractive because not only were passive measures shown to have the most consistent moderating influence, but given how LMP provides a stronger buffer for more vulnerable workers, generous benefits are an effective means of targeting support. Moreover, generous replacement rates are beneficial for non-recipients. In the same way that employment insecurity is harmful for workers who never lose their job, LMPs can benefit individuals who never actually receive support. While recommending an increase in UB generosity, however, it is worth noting studies that suggest generous benefits can prevent re-employment and lengthen spells of unemployment (e.g. Katz and Meyer 1990; Adamchik 1999; Jenkins and Garcia-Serrano 2004). There exists a trade-off, therefore, between generosity and re-employment: benefit levels should be increased to buffer anxieties about job loss, but not to the extent that they trap recipients and foster long-term unemployment.

This chapter suffers several limitations. First, the analysis includes mediating pathways but relies exclusively on cross-sectional data (e.g. from LMP to life satisfaction, via employment insecurity). Past studies have shown that cross-sectional approaches to mediation can generate substantially biased estimates (Maxwell and Cole 2007) and recommended using longitudinal data that can distinguish the temporal ordering of the
mediating pathway. Unfortunately, as described in chapter 3, there are no sources of longitudinal, cross-European data that include information on perceived employment insecurity. More positively, when the models were replicated using in a multilevel framework (i.e. ignoring the mediating pathway) the substantive conclusions were unchanged.

Noted earlier, the model makes strong assumptions about individuals’ awareness of LMP generosity. The awareness of LMP provision might differ markedly between two countries, due to cultural differences, even for similar levels of expenditure. It would be interesting, in future research, to include individual perceptions of labour market support, in addition to the contextual measures. Thirdly, the operationalisation of LMP is crude and overlooks qualitative differences in the configuration of support. To establish ‘what works’ from a policy standpoint, much greater disaggregation is required. Expenditure data are likely to hide significant cross-national variation in how support is delivered (particularly with regard to activation schemes).

A final issue is the temporal uniqueness of 2010. While not a limitation itself, it is important to frame the study within the historical context of the survey period. Unemployment rates across Europe remained high in 2010, following the rapid increase in 2007/2008. GDP growth had recovered somewhat, but remained below pre-recession levels. The fieldwork period for the UK overlapped with the 2010 general election, which saw the Labour Party replaced with a Conservative-led coalition. In Greece, the debt crisis was well underway when interviews were carried out in 2011. As interviews were carried out in Spain, national unemployment stood at around 22%, almost double the European average. In short, the aftermath of a global financial crisis is an unusual study period that is likely to differ systematically from pre-recession years.

Given the above limitations, and the scarcity of similar studies, these findings should be interpreted as preliminary. Future research should consider other years (besides 2010), other measures of well-being (besides life satisfaction), more disaggregated measures of LMP (besides expenditure) and alternative measures of employment insecurity.
7 A mixture regression analysis of the JD-R model

This chapter explores how the association between job demands and job strain varies among a sample of British workers, and moreover, how these differences relate to levels of job resources. While maintaining the emphasis on moderation, this chapter adopts a different methodological approach. Previous chapters tested moderating relationships using interaction effects in a regression framework. By contrast, this chapter introduces mixture regression analysis (Ding 2006) as a more flexible technique where subgroups in the sample are identified based on the regression coefficients. Recognising that the association between job demands and job strain will be stronger for some individuals than others, the model attempts to assign individuals to classes based on the strength of this relationship. The term mixture regression is based on the idea that, within a given sample, there exist several subgroups that the currently mixed, with the aim being to separate them.

Given the abundance of past research on job stress and strain, the contribution of this chapter is rather more methodological. It applies a new and innovative method to a long-standing theoretical problem. The chapter is split into four sections. Section 1 contrasts mixture regression analysis with more traditional techniques for studying moderation. Section 2 presents a latent class analysis of job demands. This simpler approach serves as introduction for Section 3, which presents the findings from the mixture regression analysis. Section 4 concludes.

7.1 Approaches to the study of moderation

A moderation effect is one where the association between two variables is influenced (a change of strength or direction) by the presence of a third variable, the moderator. Several methods are typically applied to the study of moderation. Previous chapters have considered just one,
namely, interaction effects in traditional regression framework. By way of introduction, some alternative techniques are outlined below.

The study of moderation can be framed as a study of heterogeneity within populations. A moderating effect is one where the relationship between two variables is different for some individuals (or groups of individuals) than it is for others. To define some terms, if ‘subpopulation’ refers to a cluster within a heterogeneous population then a ‘group’ refers to subpopulation where the heterogeneity is observed and ‘latent classes’ are subpopulations where heterogeneity is unknown (Lubke and Muthén 2005: 22). In addition to the observed/unobserved dichotomy, Lubke and Muthén identify two further criteria for categorising methods for the analysis of heterogeneous data: (a) whether observed variables within a subpopulation are assumed categorical, continuous or both; and (b) whether the method adopts a latent variable approach (p. 23). Based on these criteria they identify eight methods for the analysis of population heterogeneity, as summarised below.

Table 7.1: Methods for the analysis of population heterogeneity

<table>
<thead>
<tr>
<th>Method</th>
<th>Source of heterogeneity</th>
<th>Outcome variables</th>
<th>Latent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discriminant analysis</td>
<td>Observed</td>
<td>Continuous</td>
<td>No</td>
</tr>
<tr>
<td>Logistic regression</td>
<td>Observed</td>
<td>Categorical</td>
<td>No</td>
</tr>
<tr>
<td>MANOVA(^a)</td>
<td>Observed</td>
<td>Categorical</td>
<td>No</td>
</tr>
<tr>
<td>Multigroup CFA(^b)</td>
<td>Observed</td>
<td>Continuous/categorical</td>
<td>Yes</td>
</tr>
<tr>
<td>K-means clustering</td>
<td>Unobserved</td>
<td>Continuous</td>
<td>No</td>
</tr>
<tr>
<td>Latent class analysis</td>
<td>Unobserved</td>
<td>Categorical</td>
<td>Yes</td>
</tr>
<tr>
<td>Latent profile analysis</td>
<td>Unobserved</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>Factor mixture modelling</td>
<td>Unobserved</td>
<td>Continuous/categorical</td>
<td>Yes</td>
</tr>
</tbody>
</table>

\(^a\) MANOVA = multivariate analysis of variance  
\(^b\) CFA = conservatory factor analysis  
Source: (Lubke and Muthén 2005: 23)

For the case where heterogeneity is known, typical methods include discriminant analysis, logistic regression, MANOVA and multigroup confirmatory factor analysis (MGCFA; Jöreskog 1971). For logistic regression and MANOVA, interaction effects are used to test the moderating hypothesis, whereas with MGCFA the moderator is used to define group membership. When heterogeneity is unobserved, four methods are suggested: (a) K-means clustering, (b) latent class analysis (LCA), (c) latent profile analysis (LPA) and (d) factor mixture modelling (FMM; Muthén and Shedden 1999; Hagenaars and McCutcheon 2002). A
fifth alternative is mixture regression analysis, as applied in this chapter. Mixture regression differs from FMM in that it bases class membership on the model parameters (e.g. regression coefficients) rather than the means and variances of observed variables.

The essential criteria, for present purposes, is the distinction between observed and unobserved sources heterogeneity. Logistic regression, MANOVA and multigroup analysis all require prior knowledge about how individuals are assigned to classes. Latent variable techniques relax this constraint, and are able to assign membership based on variable means or model parameters. This chapter considers three research questions:

1. Can employees be assigned to latent classes based on levels of reported job demands (using LCA)?
2. Can individuals be assigned classes based on the association between job demands and job strain (using mixture regression)?
3. For (1) and (2), to what extent is class membership determined by levels of job resources?

7.2 Data and measurements

This study uses cross-sectional data from the 2004 Workplace Employment Relations Survey (WERS; see chapter 3). The 2004 survey included 22,451 employees from 2295 establishments. The overall response rate is 60.7% (Kersley et al. 2005). The dependent variable throughout this chapter is job strain, defined as the consequences of paid employment for psychological well-being. This is operationalised using a scale derived by summing the responses to five items measuring how the respondent’s job made them feel. Respondents were asked:

*Thinking about the past few weeks, how much of the time has your job made you feel each of the following?*

The five categories were ‘tense’, ‘calm’, ‘relaxed’, ‘worried’ and ‘uneasy’ and responses were given on a 5-point scale, from ‘all of the time’ to ‘never’. The five variables have been recoded so they follow a consistent direction (i.e. a higher score represents more frequent psychological strain), and then summed to give a continuous variable ranging from 1 to 25 (Cronbach’s alpha = 0.843).

Five measures of work intensity are considered, as summarised in Table 7.2. With the exception of ‘total weekly working hours’, all variables
Figure 7.1: Histogram for ‘job strain’

![Histogram for 'job strain']

Table 7.2: Unweighted summary statistics for five measures of work intensity

<table>
<thead>
<tr>
<th>Measure</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My job requires that I work very hard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>6,144</td>
<td>27.81</td>
</tr>
<tr>
<td>Other</td>
<td>15,947</td>
<td>72.19</td>
</tr>
<tr>
<td>2. I never seem to have enough time to get my work done</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>9,097</td>
<td>41.59</td>
</tr>
<tr>
<td>Other</td>
<td>12,776</td>
<td>58.41</td>
</tr>
<tr>
<td>In the last 12 months, how often have you worked more than 48 hours a week?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2+ times a month</td>
<td>17,787</td>
<td>79.84</td>
</tr>
<tr>
<td>Once or less</td>
<td>4,491</td>
<td>20.16</td>
</tr>
<tr>
<td>3. Do you use a computer for word processing or sending and receiving email?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>8,098</td>
<td>36.07</td>
</tr>
<tr>
<td>Yes</td>
<td>14,353</td>
<td>63.93</td>
</tr>
<tr>
<td>4. Total weekly working hours, including overtime or extra hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

are binary indicators, recoded from ordinal items on the questionnaire. This dichotomisation is primarily for simplicity, to ease interpretation of the mixture regression output. Moreover, the substantive findings are unchanged whether one opts for a binary or ordinal operationalisation.

Two items ask respondents the extent to which they agree with the statements: ‘My job requires that I work very hard’ and ‘I never seem to have enough time to get my work done’. Responses were chosen from ‘strongly agree’, ‘agree’, ‘neither agree nor disagree’, ‘disagree’ and ‘strongly disagree’. Both variables were dichotomised such that 1 represents
‘strongly agree’ and 0 represents the other categories. The third measure of work intensity asks how often, in the last 12 months, the respondent has worked more than 48 hours a week. Responses were given on the range ‘every week’, ‘two or three times a month’, ‘once a month’, ‘less often than once a month’ and ‘never’. This has been recoded such that 1 represents ‘every week’ or ‘two or three times a month’ and 0 represents the other categories. The fourth item is a binary measure of computer use, indicating whether or not the respondent uses a computer for ‘word processing’ or ‘sending and receiving email’. Finally, a continuous measure of total weekly working hours is also included (illustrated in Figure 7.2).

Figure 7.2: Histogram for ‘total weekly working hours’

Three measures of ‘job resources’ are considered. Two of these assess the amount of influence an individual has over their work. Respondents were asked, “How satisfied are you with the amount of influence you have over your work?” Responses were given on a five-point scale from ‘very satisfied’ to ‘very dissatisfied’. This has been dichotomised such that 1 represents ‘very satisfied’ or ‘satisfied’ and 0 represents the other categories. A second measure of influence is derived from five questions measuring influence in various job domains: (1) the choice of tasks, (2) the pace of work, (3) how the respondent does their work, (4) the ordering of tasks and (5) the time they start or finish working. For each item the possible responses were ‘a lot’, ‘some’, ‘a little’ and ‘none”. These five variables are summed to give a score ranging from 0 to 15, with a mean of 5.07 and a standard deviation of 3.70 (Cronbach’s alpha = 0.806). Finally, an item measuring the quality of ‘relations between employees
and managers’ is also included (1 = ‘good’ or ‘very good’; 0 = ‘neither
good nor poor’, ‘poor’ or ‘very poor’).

The models also include a number of control variables representing
individual and organisational characteristics. Individual controls include
gender, age, nationality, cohabitation (living with a partner), whether
there are children in the household (aged seven or younger, or aged 8 to
18), limiting long-term illness, education, hourly pay\(^1\), personal income,
job tenure, occupational class\(^2\), whether they supervise other employees,
and a binary measure of flexible working\(^3\). The WERS also includes
information on organisational attributes, so the following four measures
are considered:

1. Log (number of employees on payroll at company)
2. Proportion of employees aged 50 or over
3. Proportion of employees working part-time
4. Proportion of employees who are current members of a trade union

### 7.3 Descriptive statistics

Figure 7.3 illustrates the association between job strain and four binary
measures of job demands. All four measures are significantly associated
with increased levels of job strain. Figure 7.4 similarly shows longer
working hours to be associated with, on average, higher levels of job
strain. Figure 7.5 plots average levels of job strain against three types of
job resource: relations between managers and employees, satisfaction with
influence at work and influence over working conditions. Again, consistent
with expectations, all three measures are associated with reduced levels
of job strain.

---

\(^1\)\(1\) represents pay of \(\leq £15\) per hour; \(0\) represents \(< £15\)

\(^2\)A binary measure of occupational class was derived from the National Statistics
socio-economic classification. Individuals in ‘white-collar’ jobs – managers and
intermediate occupations – are given a score of 1, while 0 represents workers lower
supervisory, technical, routine and semi-routine occupations.

\(^3\)Respondents were asked whether they could (a) use flexitime, (b) change their
working patterns or (c) work the same number of hours per week across fewer days. If
the respondent answered ‘yes’ to any one of these they were given a score of 1, and
zero otherwise.
Figure 7.3: Job strain by job demands

Figure 7.4: Job strain by weekly working hours
It is also possible to explore the association between job strain and individual characteristics. Figure 7.6 shows how job strain increases with income, whereas Figure 7.7 shows the association with age. Figure 7.8 shows how average job strain varies based on 11 demographic and work-related controls. No significant differences are observed for having children, cohabitation and ethnic minority status. Blue-collar workers and those able to work flexibly report on average, lower levels of job strain. Conversely, supervisors, those on a permanent contract, who receive high hourly pay or hold tertiary qualifications all report significantly higher levels of job strain, as do employees with a long-term limiting illness.
Figure 7.7: Job strain by age

Figure 7.8: Job strain by individual characteristics
These results are consistent with the existing literature. Job demands are associated, on average, with increased levels of job strain, while job resources are associated with reduced levels of strain. Notably, ‘higher status’ employees (e.g. well-paid, permanent, tertiary) tend to report high levels job strain.

7.4 An LCA approach to work intensity

This section employs latent class analysis (LCA) to consider how five types of ‘job demands’ relate to one another. It seeks to answer two questions. Firstly, are individuals affected by different types of demand equally, or more by some than others? Secondly, is the severity of the demand-strain relationship predicted by access to job resources? Based on past studies (e.g. Demerouti et al. 2001; Schaufeli and Bakker 2004) job resources are expected to be associated with lower levels of reported demands. The latent class model (LCM) is specified below, as a product of the latent class and conditional probabilities:

\[
\pi_{ijklmt} = \pi_{t} X_{it} \pi_{A|X_{it}} \pi_{B|X_{jt}} \pi_{C|X_{kt}} \pi_{D|X_{lt}} \pi_{E|X_{mt}}
\]

Where \(\pi_{t} X_{it}\) is the probability that an individual will be assigned to latent class \(t\) and the conditional probabilities \((\pi_{A|X_{it}} to \pi_{E|X_{mt}})\) are the probabilities that a respondent in class \(t\) will respond positively to the following five items:

\[i\] My job requires that I work very hard (1 = ‘strongly agree’; 0 = ‘agree’, ‘neither agree nor disagree’, ‘disagree’ or ‘disagree strongly’);

\[j\] I never seem to have enough time to get my work done (1 = ‘strongly agree’ or ‘agree’; 0 = ‘neither agree nor disagree’, ‘disagree’ or ‘strongly disagree’);

\[k\] In the last 12 months, how often have you worked more than 48 hours a week (1 = ‘every week’ or ‘2/3 times a week’; 0 = ‘once a month’ or less);

\[l\] Do you use a computer at work for word processing or sending and receiving email? (1 = ‘yes’ to either; 0 = ‘no’);

\[m\] Total weekly working hours (including overtime).

The model is estimated using robust maximum likelihood estimation, weighted by the ‘revised weight’ described above (seqwtnr2). The analysis incorporates three steps. First, it is necessary to decide the number of
classes for the model (i.e. how many groups should sample be split into). The criteria for this decision are both empirical and substantive. The preferred solution will be one that most parsimoniously minimises the model AIC statistic (or maximises the log-likelihood) and makes the most sense substantively. That is, what is the fewest number of classes that achieves the best overall model fit and which is most closely aligned with our existing theoretical expectations? The second step is to describe the chosen solution, before thirdly, examining which variables influence class membership (using logistic regression).

Table 7.3: Model fit statistics for 1 to 6 classes

<table>
<thead>
<tr>
<th>Classes</th>
<th>AIC</th>
<th>Log-likelihood</th>
<th>A-LMR†</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>283031.94</td>
<td>-141509.97</td>
<td>NA</td>
</tr>
<tr>
<td>2</td>
<td>276453.12</td>
<td>-138214.56</td>
<td>6482.98</td>
</tr>
<tr>
<td>3</td>
<td>268464.82</td>
<td>-134214.41</td>
<td>7869.39</td>
</tr>
<tr>
<td>4</td>
<td>266922.65</td>
<td>-133437.33</td>
<td>1528.74</td>
</tr>
<tr>
<td>5</td>
<td>264322.95</td>
<td>-132131.47</td>
<td>2336.50</td>
</tr>
<tr>
<td>6</td>
<td>264764.86</td>
<td>-132346.43</td>
<td>-422.88</td>
</tr>
</tbody>
</table>

† Adjusted Lo-Mendell-Rubin likelihood ratio test

Figure 7.9: Model fit statistics for 1 to 6 classes

Table 7.3 and Figure 7.9 present fit statistics for the LCM with 1 to 6 classes. Model fit improves with the number of classes, but there is an ‘elbow’ at three classes, after which the improvements are smaller. While this would suggest a three-class solution, it is important to consider the substantive interpretation of the model. What does this solution actually look like, in terms of the composition of the classes? Does this make sense theoretically? Overall, the three-class model includes 22,451 employees and gives an AIC of 268464.82 and log-likelihood of -134214.41. Based on the ‘most likely class membership’ the model produces one large
class, containing 14,525 employees, and two smaller classes with 4220 and 3706 employees, respectively. Table 7.4 presents the average latent class probabilities for each class that, along with an entropy value of 0.895, suggests a high certainty of classification.

Table 7.4: Average latent class probabilities

<table>
<thead>
<tr>
<th>Latent class</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most likely latent class membership</td>
<td>1</td>
<td>0.933</td>
<td>0.067</td>
</tr>
<tr>
<td>2</td>
<td>0.018</td>
<td>0.966</td>
<td>0.016</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.079</td>
<td>0.921</td>
</tr>
</tbody>
</table>

Figure 7.10: Predicted probabilities by latent class

Figure 7.10 presents the probabilities for the four binary items and the average weekly working hours for each latent class. These show job demands to be greatest for respondents in class 3, and lowest in class 1. On average, respondents in class 1 work fewer hours than those in classes 2 and 3, and are least likely to report any type of job demand. By contrast, individuals in class 3 are most likely to ‘never have enough time’ and be required to ‘work very hard’. Almost all respondents in class 3 frequently work more than 48 hours a week (a probability of 0.99), and it is this tendency to work long hours that separates these individuals from those in class 2.

In summary, this model produces three classes of increasing job demands. Class 1 captures part-time employees (working 15 hours per week, on average) who are least likely to report any type of job demand.
Class 2 includes full-time employees who worked an average of 38 hours a week and who are more likely (than those in class 1) to report each type of demand. Class 3 is similar, except in the frequency with which respondents work more than 48 hours a week.

There appear, therefore, to be both qualitative and quantitative differences between the three classes. Computer use, time pressure, hard work and average weekly hours increase almost uniformly from class 1 to 3. For ‘often works more than 48 hours a week’, however, the probabilities range from 0.04 and 0.05 (in classes 1 and 2) to 0.99 (in class 3). Respondents in classes 2 and 3 are extremely unlikely to report very long hours, whilst those in class 3 are almost certain to. This represents more of a qualitative difference in the type of demands experienced by each class.

7.4.1 Predicting class membership

A final step is to consider whether class membership is influenced an individual’s level of job resources. Multinomial logistic regression is used\(^4\), where the dependent variable is a categorical measure of class membership (1, 2 or 3) based on the values for ‘most likely class membership’. The model is defined below:

\[
\Pr(\text{class}_i = k) = \frac{\exp(X_i \cdot \beta_k)}{1 + \sum_{j=1}^{J} \exp(X_i \cdot \beta_j)}
\]

Where \(\text{class}_i\) is the dependent variable for categories \(J = 0, 1, 2\), (0 is the reference category, class 1). For each category above the base (i.e. \(J = 1, 2\)) the predicted probability of \(\text{class}_i\) being in that category is calculated. The probability of \(\text{class}_i\) being in \(J = 0\) the base category, is then given by:

\[
\Pr(\text{class}_i = 0) = \frac{1}{1 + \sum_{j=1}^{J} \exp(X_i \cdot \beta_j)}
\]

Where \(X_i\) is a vector of explanatory variables for individuals \(i\) and \(\beta_i\) is the vector regression coefficients in the \(j^{th}\) regression (i.e. for categories \(J = 0, 1, 2\)). An initial model including job resources and all relevant controls is specified. Each variable in the model is then tested separately, in turn, using an adjusted Wald test (\textit{svy}). The final model (omitting

\(^4\) Ordinal logistic regression is not used as the model does not satisfy the proportional odds assumption.
all non-significant variables) is then re-estimated using robust maximum likelihood estimation in Stata 11.2, weighted using the ‘revised weight’ described earlier. Six work attributes are considered as explanatory variables: whether the respondent (1) can use flexi-time; (2) holds a permanent contract; (3) is a blue-collar employee\(^5\); (4) is ‘satisfied’ or ‘very satisfied’ with the amount of influence they have over their work; (5) experiences ‘good’ or ‘very good’ employee-manager relations; and (6) is a member of a trade union.

Table 7.5 presents the relative risk ratios from the multinomial regression, while Figure 7.11 presents the predicted probabilities of being assigned to class 3 for six work attributes. The probability of being assigned to class 3 – the group of employees reporting the highest levels of job strain – increases for those (a) on a permanent contract, (b) who belong to a trade union, (c) are satisfied with the influence they have at work and, most notably, (d) are classified as ‘blue-collar’. Conversely, workers are less likely to be assigned to class 3 if (a) they can work flexibly or (b) report good relations between managers and staff. Broadly, these are in line with expectations: job resources increase the probability of being assigned to ‘lower demand’ classes. That trade union membership should increase the probability of experiencing higher demands is consistent with Gallie (2005), who similarly finds union membership to be associated with higher levels of work pressure. As Gallie suggests, it may be that trade unions raise employees’ awareness of their working conditions, or that unions attract membership where working conditions are already poor. Another surprising result is that ‘satisfaction with influence over work’ is associated with an increased probability of being placed in the ‘high demand’ class.

Demographic variables, such as income and gender, also play a role. Women are almost half as likely as men to be assigned to the ‘high demand’ class 3 (probability of 0.08 for women, compared to 0.15 for men). Shown in Figure 7.12, as income increases the probability of being assigned to class 1 (low job demands, part-time hours) falls rapidly, while the probability of membership in classes 2 and 3 rises. The probability of being assigned to Class 2 (moderate job demands, normal working...
Table 7.5: Multinomial logistic regression results (relative risk ratios)

<table>
<thead>
<tr>
<th></th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RRR</td>
<td>RRR</td>
</tr>
<tr>
<td>Age</td>
<td>0.844***</td>
<td>0.818***</td>
</tr>
<tr>
<td>Gender (female)</td>
<td>0.750***</td>
<td>0.375***</td>
</tr>
<tr>
<td>Income</td>
<td>2.163***</td>
<td>2.903***</td>
</tr>
<tr>
<td>Ethnicity (not British)</td>
<td>1.250</td>
<td>1.515***</td>
</tr>
<tr>
<td>Education (tertiary)</td>
<td>0.598***</td>
<td>0.507***</td>
</tr>
<tr>
<td>High pay (£15/hour)</td>
<td>0.068***</td>
<td>0.073***</td>
</tr>
<tr>
<td>Supervises other employees</td>
<td>1.216***</td>
<td>1.672***</td>
</tr>
<tr>
<td>Union membership at company (%)</td>
<td>0.771***</td>
<td>0.417***</td>
</tr>
<tr>
<td>Part-time workers at company (%)</td>
<td>0.989***</td>
<td>0.991***</td>
</tr>
<tr>
<td>Log(number of employees at company)</td>
<td>0.990</td>
<td>0.895***</td>
</tr>
<tr>
<td>Has children aged 7 or younger</td>
<td>0.391***</td>
<td>0.429***</td>
</tr>
<tr>
<td>Can work flexible hours</td>
<td>0.855***</td>
<td>0.707***</td>
</tr>
<tr>
<td>Permanent contract</td>
<td>1.619***</td>
<td>1.950***</td>
</tr>
<tr>
<td>Blue collar employee</td>
<td>2.000***</td>
<td>4.433***</td>
</tr>
<tr>
<td>Satisfied with influence over work</td>
<td>0.940</td>
<td>1.171</td>
</tr>
<tr>
<td>Good staff-manager relations</td>
<td>0.912</td>
<td>0.775***</td>
</tr>
<tr>
<td>Trade union membership</td>
<td>0.784***</td>
<td>1.091</td>
</tr>
</tbody>
</table>

\[ N = 16,099 \]
\[ F (34,16065) = 70.340 \]
\[ Prob > F = 0.000 \]

\[ ** p < 0.001 \]

hours) peaks at incomes of £18,721 to £22,360, whereas the probability of being assigned to Class 3 rises steadily with income. Class membership is therefore strongly tied to income.

This section has two main findings. First, a LCM based on five measures of job demands was used to assign individuals to three latent classes. With one exception, job demands increased almost uniformly across the three classes. Workers in class 3 were most likely to report each type of demand (except computer use) and worked the longest weekly hours. The exception to this trend was the probability of working very long hours (more than 48 hours per week). Individuals in classes 1 and 2 are highly unlikely to report long hours, whereas those in class 3 were almost certain to (a conditional probability of 0.99). The second step tested whether class membership was predicted by job resources. Good workplace relations and flexible working were, as one might expect, associated with
assignment to a lower class (and therefore, reduced demands). In contrast, trade union membership was associated with assignment to a higher class (i.e. a greater likelihood of reporting each job demand).

## 7.5 Mixture regression models

The previous analysis assigned individuals to latent classes based on their reporting of five types of job demand. This section follows a similar logic, except that class membership is assigned based on regression coefficients, rather than variable means and variances. Mixture regression analysis identifies latent classes based on the association between job demands.
that job strain. Motivated by Karasek’s JD-R model, this analysis hypothesises that job demands have a stronger health impact for some workers than others but, in contrast to the above analyses, does not specify the moderating or grouping variables a priori.

The analysis is in three steps. First, a base regression model is specified where job strain (the dependent variable) is predicted by five indicators of job demand as well as individual and organisational controls. Second, it is necessary to decide how many classes are empirically and substantively appropriate for the model. Finally, the influence of job resources on class membership is considered. Following the JD-R literature, resources are expected to weaken the link between demands and strains. That is, individuals with access to greater job resources are hypothesised to be assigned to latent classes where the negative relationships between demand and strain are lower.

### 7.5.1 Base model

The base model is a multiple regression model estimated in Mplus 6.1 using robust maximum likelihood estimation (MLR). The dependent variable is a scale measuring psychological job strain, described above, ranging from 1 to 25. An initial model is specified that includes the main theoretical variables (i.e. job demands) and all relevant controls. Each explanatory variable is then tested in turn (using a Wald test), and the model is re-specified omitting non-significant controls\(^6\). The model includes 15,540 employees and produces and \(R^2\) of 0.21 (AIC = 88933.53; -2 log-likelikood = 4447.77). The standardised coefficients\(^7\) are presented in Figure 7.13.

The results are largely as expected. Time pressure, measured with the question ‘I never have enough time to get my work done’ is associated with the largest rise in psychological job strain (0.629), followed by ‘long-term limiting illness’ and ‘working very hard’ (0.319 and 0.247, respectively). A negative association is observed for working in organisations where a large proportion of staff are aged 50+ (-0.315), flexible working (-0.179) and high pay (≥ £15/hour; -0.136). Consistent with earlier findings,

---

\(^6\)Some controls are kept despite having non-significant Wald tests (e.g. cohabitation status and ‘proportion of employees working full time’).

\(^7\)These are standardised with respect to the dependent variable only. They represent the standard deviations change in job strain for a unit change in the explanatory variable.
working in a company with high levels of unionisation is associated with higher levels of job strain.

### 7.5.2 Model specification

Mixture regression modelling is an extension of finite mixture modelling, a family of models that use latent classes to approximate an unknown population distribution of univariate or multivariate outcomes (Horn et al. 2009: 1303). For a sample of $n$ individuals measured on a set of $m$ continuous variables $Y = Y_1, Y_2, \ldots, Y_m$, the multivariate probability density function of $Y, f (y, \varphi)$, is modelled as a mixture (weighted sum) of a finite number of probability densities, $f_k(y, \theta_k)$, corresponding to outcome distributions for $K$ latent classes (Wedel and DeSarbo 2002).

Latent class membership is represented by latent categorical variable $C$, where $C = 1, 2, \ldots, K$. The number of classes $K$ is specified a priori but the class proportions, $\pi_1, \pi_2, \ldots, \pi_K$, are estimated by the model. The unconditional probability density function of $Y$ is expressed as:

$$f (y, \varphi) = \sum_{k=1}^{K} \pi_k f_k(y_k, \theta_k)$$

Where $\varphi$ denotes the vector of all unknown parameters to be estimated $\pi = \pi_1, \pi_2, \ldots, \pi_K$ and $\Theta = \theta_1, \theta_2, \ldots, \theta_K$. Assuming that each latent class
has a multivariate normal distribution, then outcome $Y$ conditional on membership in latent class $k$, can be expressed as:

$$Y_{ik} = \mu_k + \varepsilon_{ik}$$

$$\varepsilon_{ik} \sim N(0, \Sigma_k)$$

Where $\mu_k$ is the vector of means, $\Sigma_k$ is the variance-covariance matrix for class $k$ and $\theta_k = (\mu_k, \Sigma_k)$. For the regression mixture model, the above equation is extended to include predictor variables, so the outcome $Y$ conditional on membership in $k$ and on a set of $P$ observed covariates, $X = X_1, X_2, ..., X_P$, can be expressed as

$$Y_{i|X,k} = \beta_{0k} + \sum_{p=1}^{P} \beta_{pk} x_{ip} + \varepsilon_{ik},$$

$$\varepsilon_{ik} \sim N(0, \Sigma_k)$$

Where $\beta_{0k}$ is the vector of intercepts, $\Sigma_k$ is the residual variance covariance matrix for class $k$, and $\beta_{pk}$ is the vector of regression coefficients for $X_p$ in latent class $k$.

In practical terms, the regression mixture model is identical to the ‘base model’ described above, except that the coefficients for three job demand variables are allowed to vary across $K$ latent classes. In these models, $X$ is a vector of three indicators of job demands: (a) ‘I never have enough time to get my work done’; (b) ‘My job requires me to work very hard’; and (c) whether the respondent regularly works more than 48 hours a week. Model parameters are estimated using robust maximum likelihood in Mplus 6.1 (weighted to control for sample design and population size). The model is illustrated graphically in Figure 7.14, below.

**Figure 7.14:** The mixture regression model
As before, the first step is to decide on the number of classes that best fit the data. Table 7.6 presents the fit statistics for models with 1 to 6 classes (these are also plotted in Figure 7.15; N for all models = 15,540). This table also presents the adjusted Lo-Mendell-Rubin test results (Lo et al. 2001), which compares improvement in model fit between neighbouring class models (i.e. comparing $k$ and the $k-1$ class model). The p-value indicates whether there is a statistically significant improvement in model fit for the inclusion of one additional class.

Table 7.6: Model fit statistics for 1 to 6 classes

<table>
<thead>
<tr>
<th>Classes</th>
<th>AIC</th>
<th>BIC</th>
<th>LL (scaling factor)</th>
<th>A-LMR</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>88933.53</td>
<td>89078.90</td>
<td>-44447.77 (1.516)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>88832.67</td>
<td>89016.30</td>
<td>-44392.33 (1.581)</td>
<td>108.615</td>
<td>0.005</td>
</tr>
<tr>
<td>3</td>
<td>88661.04</td>
<td>88882.93</td>
<td>-44301.52 (1.601)</td>
<td>177.936</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>88585.04</td>
<td>88845.18</td>
<td>-44258.52 (1.603)</td>
<td>99.101</td>
<td>0.008</td>
</tr>
<tr>
<td>5</td>
<td>88497.66</td>
<td>88796.06</td>
<td>-44209.83 (1.559)</td>
<td>97.219</td>
<td>0.012</td>
</tr>
<tr>
<td>6</td>
<td>88484.22</td>
<td>88820.87</td>
<td>-44198.11 (1.500)</td>
<td>22.965</td>
<td>0.399</td>
</tr>
</tbody>
</table>

Figure 7.15: Log-likelihood and AIC for 1 to 6 classes

Table 7.6 shows model fit to improve as $k$ increases, up until the 5-class solution, after which model fit deteriorates (in the case of BIC) or begins to level off (for log-likelihood). The adjusted Lo-Mendell-Rubin test similarly shows significant improvements up until the 5-class solution. While this empirical evidence would suggest a five-class solution, it is important to examine the substantive interpretability of the model. Is the 5-class solution more readily interpretable than the 4 or 6 class solution? To answer this, Figure 7.16 presents the standardised coefficients from models with 2 to 6 classes. The latent classes are denoted C1, C2, ... C6.
and the figure in the corner of each plot represents the size of the class, based on the most likely class membership.

Several patterns emerge. The bulk of individuals are assigned to just one or two latent classes. For the 3-class and 4-class solutions, for example, the sample is roughly split between C1 and C2, with several hundred individuals occupying C3 and C4. For individuals in C1 a strong effect is observed for time pressure (‘never have enough time to get my work done’), while much smaller (and sometimes non-significant) coefficients are observed for ‘working very hard’ and ‘long working hours’. For C2 a moderate negative association is observed for ‘hard work’ while moderate positive coefficients are observed for ‘long hours’. C3 is a more moderate version of C1: a significant positive coefficient is observed for ‘time pressure’ but weaker (or non-significant) coefficients are observed for the other two variables. The 5-class solution introduces a new ‘type’ of class (shown as C5 in Figure 7.16 containing approximately 17% of the sample. For individuals in this class a moderate positive coefficient is observed for ‘time pressure’ (as in other classes) but in addition, a large significant coefficient is observed for ‘hard work’ (the coefficient for ‘long hours’ is non-significant).

This suggests 3 distinct class ‘types’ representing the different relationships between demands and strain that are possible. Workers in C1 are strongly affected by time pressures but less affected (if at all) by other job demands. Those in C5, by contrast, are most strongly affected by having to work very hard, but also see a moderate association for time pressure. C2, C3 and C4 are more mixed, with moderate associations for some variables and weaker (or non-significant) associations for others. Notably, in all large classes (those with > 600 individuals), a significant positive coefficient is consistently observed for time pressure.

In summary, the empirical evidence suggests a 5-class solution, and this is backed up by close examination of the class profiles, above. Going from 4 to 5 classes introduces a new ‘type’ of class profile that sees a strong association for ‘hard work’ and contains approximately 2600 employees. Going from 5 to 6 classes, by contrast, results in a new class containing just 41 individuals.

### 7.5.3 The five-class model

Table 7.7 presents the unstandardised regression coefficients for the five-class solution. The coefficients for ‘hard work’, ‘time pressure’, and ‘long hours’ are plotted in Figure 7.17. The intercept (i.e. the within-class average level of job strain) varies considerably, from a low of 11.88 in...
Figure 7.16: Standardised coefficients for 1 to 6 classes.
C5 to a high of 24.94 in C4. As noted earlier, the model is comprised of three large classes (C1, C2 and C5) with at least 2000 employees and two smaller classes (C3 and C4) containing less than 400 employees. The $R^2$ values also vary considerably across classes, from 0.29 in C3 to 0.81 in C5.

### Table 7.7: Coefficients for the 5-class solution

<table>
<thead>
<tr>
<th></th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
<th>Class 4</th>
<th>Class 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard work</td>
<td>$-1.293^{**}$</td>
<td>$-0.800^{*}$</td>
<td>$-1.107$</td>
<td>$1.083^{*}$</td>
<td>$9.714^{***}$</td>
</tr>
<tr>
<td>Time pressure</td>
<td>$5.679^{***}$</td>
<td>$2.576^{***}$</td>
<td>$-1.536$</td>
<td>$2.017^{***}$</td>
<td>$2.639^{***}$</td>
</tr>
<tr>
<td>Long hours</td>
<td>$0.484$</td>
<td>$0.495^{**}$</td>
<td>$1.761^{***}$</td>
<td>$-0.176$</td>
<td>$-0.587^{*}$</td>
</tr>
<tr>
<td>Gender (female)</td>
<td>0.253^{**}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>$-0.300^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity (not British)</td>
<td>0.519^{***}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with partner</td>
<td>$-0.034$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term illness</td>
<td>1.343^{***}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education (tertiary)</td>
<td>0.286^{**}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High hourly pay</td>
<td>$-0.490^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>0.167^{***}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can use flexi-time</td>
<td>$-0.789^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue collar employee</td>
<td>$-0.386^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of workforce (log)</td>
<td>0.107^{***}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees aged 50+ (%)</td>
<td>$-1.131^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time employees (%)</td>
<td>$-0.004^{*}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Union membership (%)</td>
<td>0.570^{***}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| N       | 5319 | 6875 | 323 | 386 | 2637 |
| R$^2$   | 0.608 | 0.321 | 0.290 | 0.293 | 0.809 |

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$

Figure 7.17 presents the coefficient profiles for the five classes. For C1, a strong positive association is observed between ‘time pressure’ and job strain, with a weak negative association for ‘hard work’ and a very weak positive association for ‘long hours’. C2 is almost identical to C1, except that the association for ‘time pressure’ is weaker. C3 and C4, which contain just 700 individuals between them, show weak or non-significant effects for all three types of job demand. Finally, C5 show the moderate association for ‘time pressure’ and a strong association for ‘hard work’. The largest three classes could therefore be labelled as:
Class 1: *Severe time pressure*
Time pressure is associated with large increases in job strain, but other demands have little effect.

Class 2: *Moderate time pressure*
As class 1, but with a weaker association for time pressure.

Class 5: *Moderate time pressure and hard work*
Job strain is associated with both time pressure and hard work.

Figure 7.17: Unstandardised coefficients for the five-class model

![Coefficient Graph]

Table 7.8 presents the average latent class probabilities for the ‘most likely class membership’ (the average probability that individuals in class $K$ were assigned to that class). Compared to earlier analyses, this model has greater difficulty assigning individuals to classes. For example, while individuals in C1 will most likely be assigned to C1 (a probability of 0.51), there were also moderately likely to be assigned to C2, C3 or C5 (probabilities of 0.15, 0.15 and 0.20, respectively). This is also reflected in the lower entropy value of 0.458.

Horn et al. (2009) suggest that low entropy in mixture regression models is to be expected, since with no predictors of class membership the classes are differentiated solely by the regression coefficients. Low entropy, they argue, should not play “a large role in model selection”, although

---

8Entropy is a measure of how well the model is able to assign individuals to classes. Values approaching 1 indicate clear delineation of classes (Celeux and Soromenho 1996).
Table 7.8: Average Latent Class Probabilities for Most Likely Latent Class Membership by Latent Class

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most likely class membership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.509</td>
<td>0.146</td>
<td>0.140</td>
<td>0.000</td>
<td>0.204</td>
</tr>
<tr>
<td>2</td>
<td>0.145</td>
<td>0.695</td>
<td>0.074</td>
<td>0.023</td>
<td>0.062</td>
</tr>
<tr>
<td>3</td>
<td>0.151</td>
<td>0.010</td>
<td>0.710</td>
<td>0.000</td>
<td>0.128</td>
</tr>
<tr>
<td>4</td>
<td>0.002</td>
<td>0.162</td>
<td>0.001</td>
<td>0.770</td>
<td>0.065</td>
</tr>
<tr>
<td>5</td>
<td>0.202</td>
<td>0.074</td>
<td>0.129</td>
<td>0.029</td>
<td>0.567</td>
</tr>
</tbody>
</table>

it is important to examine model stability (p. 1305). As covariates are introduced into the model (in the following section), the interpretation of the classes (i.e. class profiles) should not change.

7.5.4 Class profiles for the five-class model

The remainder of this chapter examines the five-class solution in more detail. The aim is to highlight more clearly the differences between these classes, in terms of their characteristics and determinants. Given the space available, this section focuses solely on the three largest classes (N = 5319, 6875 and 2637) and omits the two smallest classes (N = 323 and 386). Two approaches are taken. First, descriptive statistics are presented highlighting differences between the classes in terms of key demographic variables (e.g. age, gender and ethnicity) as well as employment characteristics such as occupation and tenure. The second section considers the determinants of class membership, presenting a multinomial logistic model showing the association between class membership and background variables.

To recall, the three largest classes were labelled above as ‘Severe time pressure’ (Class 1), ‘Moderate time pressure’ (Class 2) and ‘Moderate time pressure and hard work’ (Class 5). On average, workers in Class 2 are least affected by job demands (i.e. the positive association between job demands and job strain is weaker for these respondents). The focus below, therefore, is how membership of this ‘lower strain’ class is associated with individual and workplace characteristics (in particular, job resources such as control or support). Are workers less affected by demands when they enjoy high levels of control or support?

Tables 7.9 and 7.10 present descriptive statistics by latent class for a range of categorical and continuous variables. The $\chi^2$ and F-test statistics are provided to indicate the significance of each association. Significant between-class differences are observed for age, gender, cohabitation status,
income, years with current employer, job insecurity, workplace relations, supervisory status, working hours and job control (i.e. ‘influence at work’). Although significant, however, many of the observed differences are small. Older workers are marginally more likely to report job strain associated with ‘hard work’ (i.e. Class 5), compared to other classes. Workers in Class 1 (‘severe time pressure’) earn less than those in other classes, on average, and are slightly more likely to have been working for their employer for a short period of time.

More substantial differences are observed for other work domains. Workers in Class 2 (i.e. those least affected by job demands) are considerably more likely to disagree with the statement “I feel my job is secure”, compared to those in Classes 1 and 5. These respondents also tend to assess manager-employee relations more negatively and report significantly lower levels of ‘influence at work’ that workers in Class 5. They also work longer hours, on average, than respondents in other classes (significant at the 5% level).

Such conflicting views are intriguing. Workers in Class 2 are least affected by job demands (in terms of the the association with job strain), but report higher average levels of job strain than respondents in other classes (18.66, compared with 13.03 and 11.88 in Classes 1 and 5, respectively). Moreover, they are at a disadvantage with regards to other work-related outcomes, such as job security, workplace relations or influence. Conversely, although workers in Class 1 are strongly influenced by ‘time pressure’ (attributable to an increase in job strain of 5.68), the average level of job strain for this class (i.e. the intercept; 13.03) is significantly lower than the average in Class 2 (18.66). Moreover, those in Class 1 enjoy higher levels of job security, better workplace relations and shorter working hours (on average).

There are several possible explanations for this paradox. Most simply, job demands may become less important at higher levels of job strain. That is, for workers who already report very high levels of job strain, the additional impact of ‘time pressure’ or ‘hard work’ may be weaker than for those currently reporting low levels of job strain. A further possibility is that workers make trade-offs between different job domains, and so tolerate of low levels of support or control in return for a weaker demand-strain association (although this view is undermined by high overall levels of job strain in Class 2).

Further research is required to disentangle these findings. Particularly research that draws upon longitudinal data to better separate pre-existing job strain and responses to current demand. In other words, as job
demands vary over time, how do individual responses (in terms of job
strain) differ, and how these related to job resources?

**Table 7.9:** Descriptive statistics by latent class (for categorical
variables)

<table>
<thead>
<tr>
<th></th>
<th>Class:</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>5</td>
<td></td>
<td>χ² (df)</td>
<td></td>
</tr>
<tr>
<td>Severe time pressure</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate time pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time pressure and hard work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-29</td>
<td>23.2</td>
<td>23.6</td>
<td>19.9</td>
<td>3,381</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-49</td>
<td>51.1</td>
<td>51.8</td>
<td>52.8</td>
<td>7,664</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50+</td>
<td>25.7</td>
<td>24.6</td>
<td>27.3</td>
<td>3,773</td>
<td>18.24*</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>46.1</td>
<td>49.1</td>
<td>49.7</td>
<td>7,133</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>53.9</td>
<td>50.9</td>
<td>50.3</td>
<td>7,685</td>
<td>13.63**</td>
<td></td>
</tr>
<tr>
<td>Cohabitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>31.9</td>
<td>33.7</td>
<td>31.5</td>
<td>4,844</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lives partner or spouse</td>
<td>68.1</td>
<td>66.3</td>
<td>68.5</td>
<td>9,974</td>
<td>6.77*</td>
<td></td>
</tr>
<tr>
<td>Dependent children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>72.8</td>
<td>73.0</td>
<td>72.3</td>
<td>10,789</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27.2</td>
<td>27.0</td>
<td>27.7</td>
<td>4,029</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Long-term limiting illness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>96.0</td>
<td>95.3</td>
<td>95.1</td>
<td>14,154</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4.0</td>
<td>4.70</td>
<td>4.9</td>
<td>664</td>
<td>4.41</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British</td>
<td>91.2</td>
<td>91.4</td>
<td>90.4</td>
<td>13,504</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>8.8</td>
<td>8.60</td>
<td>9.6</td>
<td>1,314</td>
<td>2.35</td>
<td></td>
</tr>
<tr>
<td>Weekly pay from main job</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>£0 to £180</td>
<td>24.2</td>
<td>19.8</td>
<td>21.1</td>
<td>3,198</td>
<td></td>
<td></td>
</tr>
<tr>
<td>£181 to £360</td>
<td>37.9</td>
<td>39.9</td>
<td>39.8</td>
<td>5,802</td>
<td></td>
<td></td>
</tr>
<tr>
<td>£361+</td>
<td>37.9</td>
<td>40.3</td>
<td>39.1</td>
<td>5,818</td>
<td>35.68***</td>
<td></td>
</tr>
<tr>
<td>Years with employer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>16.9</td>
<td>15.0</td>
<td>16.3</td>
<td>2,355</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>40.6</td>
<td>40.3</td>
<td>39.1</td>
<td>5,947</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5+</td>
<td>42.4</td>
<td>44.7</td>
<td>44.5</td>
<td>6,485</td>
<td>12.21**</td>
<td></td>
</tr>
<tr>
<td>Employment contract</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

211
Table 7.9 – continued from previous page

<table>
<thead>
<tr>
<th>Class:</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>N</th>
<th>χ² (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary/fixed</td>
<td>8.2</td>
<td>7.2</td>
<td>7.4</td>
<td>1,122</td>
<td></td>
</tr>
<tr>
<td>Permanent</td>
<td>91.8</td>
<td>92.8</td>
<td>92.6</td>
<td>13,663</td>
<td>4.14</td>
</tr>
<tr>
<td>Feels job is secure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree/agree</td>
<td>61.9</td>
<td>57.1</td>
<td>58.2</td>
<td>6,940</td>
<td>242.10***</td>
</tr>
<tr>
<td>Neither agree/disagree</td>
<td>24.5</td>
<td>17.9</td>
<td>25.0</td>
<td>2,538</td>
<td></td>
</tr>
<tr>
<td>Strongly disagree/disagree</td>
<td>13.6</td>
<td>25.1</td>
<td>16.8</td>
<td>2,275</td>
<td></td>
</tr>
<tr>
<td>Can work flexibly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>46.0</td>
<td>46.8</td>
<td>48.6</td>
<td>6,937</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>54.0</td>
<td>53.2</td>
<td>51.4</td>
<td>7,881</td>
<td>4.49</td>
</tr>
<tr>
<td>Trade union member</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>65.6</td>
<td>63.5</td>
<td>65.7</td>
<td>9,563</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34.4</td>
<td>36.5</td>
<td>34.3</td>
<td>5,224</td>
<td>7.30*</td>
</tr>
<tr>
<td>Relations at work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor/very poor</td>
<td>9.5</td>
<td>18.9</td>
<td>15.0</td>
<td>2,171</td>
<td></td>
</tr>
<tr>
<td>Neither good/poor</td>
<td>20.4</td>
<td>28.8</td>
<td>21.2</td>
<td>3,579</td>
<td></td>
</tr>
<tr>
<td>Very good/good</td>
<td>70.2</td>
<td>52.3</td>
<td>63.7</td>
<td>8,876</td>
<td>436.24***</td>
</tr>
<tr>
<td>Highest qualification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>75.6</td>
<td>74.3</td>
<td>75.7</td>
<td>11,115</td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>24.4</td>
<td>25.7</td>
<td>24.3</td>
<td>3,703</td>
<td>3.26</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White-collar</td>
<td>57.5</td>
<td>58.8</td>
<td>56.7</td>
<td>8,586</td>
<td></td>
</tr>
<tr>
<td>Blue-collar</td>
<td>42.5</td>
<td>41.2</td>
<td>43.3</td>
<td>6,232</td>
<td>3.96</td>
</tr>
<tr>
<td>Supervises other employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>68.1</td>
<td>65.2</td>
<td>66.8</td>
<td>9,843</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>31.9</td>
<td>34.8</td>
<td>33.2</td>
<td>4,963</td>
<td>11.57**</td>
</tr>
</tbody>
</table>

Table 7.10: Descriptive statistics by latent class (continuous variables)

<table>
<thead>
<tr>
<th>Class</th>
<th>Overall</th>
<th>F-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Usual weekly hours†</td>
<td>34.96</td>
<td>36.41</td>
</tr>
<tr>
<td>Influence at work (scale)</td>
<td>4.73</td>
<td>4.89</td>
</tr>
<tr>
<td>Proportion employees aged 50+</td>
<td>0.22</td>
<td>0.22</td>
</tr>
<tr>
<td>Proportion white collar employees</td>
<td>0.50</td>
<td>0.49</td>
</tr>
<tr>
<td>Proportion union members</td>
<td>0.31</td>
<td>0.32</td>
</tr>
<tr>
<td>N</td>
<td>5,284</td>
<td>2,597</td>
</tr>
</tbody>
</table>

† including overtime or extra hours
To provide further clarification, results from the multinomial logistic regression model are presented in Table 7.11. This presents the relative risk ratios (RRR) of membership in Classes 1 and 5, compared to the base category (Class 2). Significant coefficients are observed for age, cohabitation status, ethnicity, supervisory status, job security, trade union membership, workplace relations and job control (‘influence at work’). The coefficients can be summarised as follows.

- Consistent with the cross-tabulations presented above, older workers are significantly more likely (odds ratios between 1.28 and 1.28) to be assigned to Class 5 than Class 2. By extension, job strain among older workers is more strongly linked to hard work (“my job requires that I work very hard”) than it is for younger workers.

- Respondents who live with a partner or spouse are 1.12 times more likely to be assigned to Class 1 (“severe time pressure”) than Class 2 (significant at the 95% level). Cohabitants, in other words, are more strongly affected (in terms of their reported job strain) by the feeling that they “never seem to have enough time to get their work done”. This may reflect family commitments associated with cohabitation, which conflict with work-based time pressures.

- Workers with supervisory responsibilities are significantly less likely to be assigned to Classes 1 or 5 than Class 2 (an odds ratio of 0.77). Conversely, supervisors are significantly more likely to be assigned to Class 2 (i.e. higher job strain overall, but less susceptible to job demands).

- Job insecurity is associated with reduced odds of assignment to Classes 1 or 5 (or conversely, increased odds of assignment to Class 2). This is consistent with the cross-tabulations presented above.

- Flexible working arrangements are also associated with increased odds of assignment to Class 2 (over Classes 1 and 5; OR = 0.64 and 0.74, respectively). This is somewhat surprising, since on most other work-based measures (e.g. job insecurity, workplace relations) respondents in Class 2 are at a relative disadvantage.

- Good relations between managers and employees are strongly associated with membership to Classes 1 and 5 (OR = 2.19 and 1.47, respectively). Again, this is consistent with the cross-tabulations above.
### Table 7.11: Relative risk ratios for the multinomial logistic model predicting membership in Classes 1 and 5 (base is Class 2)

<table>
<thead>
<tr>
<th></th>
<th>Class 1</th>
<th>Class 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RRR</td>
<td>RRR</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-29 (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-49</td>
<td>0.996</td>
<td>1.285***</td>
</tr>
<tr>
<td>50+</td>
<td>0.960</td>
<td>1.282**</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1.053</td>
<td>1.124</td>
</tr>
<tr>
<td><strong>Cohabitation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lives with partner or spouse</td>
<td>1.106*</td>
<td>1.075</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other ethnic group</td>
<td>1.048</td>
<td>1.211*</td>
</tr>
<tr>
<td><strong>Long-term limiting illness</strong></td>
<td>0.833</td>
<td>1.026</td>
</tr>
<tr>
<td><strong>Weekly income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>£0 to £180 (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>£181 to £360</td>
<td>0.899</td>
<td>0.895</td>
</tr>
<tr>
<td>£361+</td>
<td>0.881</td>
<td>0.820</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White-collar (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue-collar</td>
<td>1.057</td>
<td>1.055</td>
</tr>
<tr>
<td><strong>Supervises other employees</strong></td>
<td>0.774***</td>
<td>0.767***</td>
</tr>
<tr>
<td><strong>Job tenure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent</td>
<td>0.938</td>
<td>0.929</td>
</tr>
<tr>
<td><strong>Feels job is secure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree/agree (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neither agree/disagree</td>
<td>1.173**</td>
<td>1.271***</td>
</tr>
<tr>
<td>Strongly disagree/disagree</td>
<td>0.641***</td>
<td>0.744***</td>
</tr>
<tr>
<td><strong>Can work flexibly</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.892*</td>
<td>0.834**</td>
</tr>
<tr>
<td><strong>Trade union member</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.142**</td>
<td>1.038</td>
</tr>
<tr>
<td><strong>Relations between managers and employees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor/very poor (ref.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neither good/poor</td>
<td>1.279**</td>
<td>0.926</td>
</tr>
<tr>
<td>Very good/good</td>
<td>2.187***</td>
<td>1.465***</td>
</tr>
<tr>
<td><strong>Influence at work (scale)</strong></td>
<td>1.170***</td>
<td>1.120***</td>
</tr>
<tr>
<td><strong>Usual weekly working hours</strong></td>
<td>0.997</td>
<td>1.004</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>11,196</td>
<td></td>
</tr>
<tr>
<td>Log-likelihood</td>
<td>-11267.901</td>
<td></td>
</tr>
</tbody>
</table>

***p < 0.001; **p < 0.01; *p < 0.05
7.5.5 Summary

This section has used data from the 2004 WERS to identify five latent classes that categorise workers based on the association between job demands and job strain. The three largest classes, containing 95% of the sample, varied both in terms of the level of job strain (within each class) as well as the strength of the associations between demands and strain. To summarise the results most succinctly: workers reporting high levels of job strain are least affected by (the additional impact of) job demands. Respondents in Class 2 reported the highest levels of job strain and job insecurity, the lowest levels of control (‘influence at work’) and were most negative about manager-employee relations. At the same time, however, these workers were least affected by job demands. This paradox requires further research.

7.6 Conclusion

This chapter sought to apply a new method to a long-standing theoretical problem (the JD-R model). Mixture regression analysis was framed as an alternative way of studying moderation, contrasting with established techniques such as multigroup analysis or interaction effects. By relaxing the requirement to specify moderating or grouping variables a priori, it was hoped that this approach might offer new insights into the JD-R model.

The analysis was in two parts. The first used latent class analysis to assign workers to three classes based on five measures of job demands. Differences between the classes were mostly quantitative. The probability of reporting ‘time pressure’, ‘hard work’ and ‘computer use’ increased steadily across the classes, but those in the third class were substantially more likely to report ‘very long hours’ compared to those in other classes. Multinomial logistic regression was then used to show how class membership (i.e. a higher or lower level of job demands) was predicted by job resources. In line with past studies, good workplace relations and flexible working were associated with lower levels of job demands, whereas trade union membership was associated with higher levels of job demands.

The second part used mixture regression analysis to identify latent classes based on the regression coefficients (rather than the observed variables) for the association between job demands and job strain. Three latent classes were identified, labelled as (1) ‘severe time pressure’, (2) ‘moderate time pressure’ and (3) ‘moderate time pressure and hard work’. Detailed examination of the class profiles revealed an apparent paradox.
whereby workers experiencing the highest levels of strain were least affected by job demands. Job resources were negatively associated with job strain, but not with the associations between demands and strain. The most intuitive interpretation of these findings is that, when workers are already experiencing a high level of job strain, additional demands have little impact. However, further research is required to unpick such paradoxes, particularly using longitudinal data. To assess both the level and determinants of job strain simultaneously is problematic. Future studies should explore how changes in job demands influence changes in job strain (and subsequently, how these changes are motivated by job resources).

On a methodological note, mixture regression was presented in this chapter as an alternative to existing, simpler techniques for studying moderation. For the most part, this has been successful. The flexibility afforded by mixture regression helped unpick nuanced differences in the relationships between work and health. On the other hand, the additional complexity is unhelpful. For applied researchers (and more importantly, lay audiences) the process by which individuals are assigned to classes is opaque. The mixture model resembles a black box, with variables and cases going in, and latent classes coming out. This is particularly problematic when it comes to presenting and disseminating the results. To echo a recurrent theme: it is important to balance methodological complexity (and the insights new techniques generate) with the difficulty of explaining such methods to non-statistical audiences. While there is great demand for advanced quantitative methods (e.g. the ESRC’s AQM programme), this is sometimes at the expense of legibility. New methods should be applied insofar as they contribute substantively, rather than on the basis of statistical innovativeness.
8 Job demands, job resources and perceived risk of occupational stress: A cross-European analysis

This chapter considers the associations between job demands, resources and occupational stress in 17 European countries. Adopting a multilevel approach based on data from the 2005 European Working Conditions Survey (EWCS), it examines (a) the association between job demands and the perceived risk of occupational stress and (b) how this relationship varies cross-nationally; (c) whether job resources buffer job demands more effectively in some countries than others; and (d) what national characteristics might explain these differences. The influence of job demands on subsequent stress or strain has been tested in a variety of countries, including Germany (Demerouti et al. 2001), the Netherlands (Bakker et al. 2003), Finland (Hakanen et al. 2006) and Spain (Salanova et al. 2005). However, few have examined this relationship across several countries simultaneously (Kirkcaldy et al. 1992; Llorens et al. 2006). As Daniels et al. (2007) put it, in spite of the international breadth of research on job control and health, there has been little consideration of the role of national variables (p. 1).

Whereas the previous chapter focused specifically upon Karasek’s demand-control-support (DCS) model, this chapter instead considers ‘perceived risk of occupational stress’ as the main dependent variable. The 2005 EWCS includes two questions asking respondents to assess how work affects their health. Due to issues of wording and sequencing, these questions introduce an unfortunate degree of subjectivity that make it difficult to ascertain whether positive responses indicate the presence of job strain, or merely the perception of it. While an analysis of the determinants of ‘perceived risk of occupational stress’ remains worthwhile, it would not be appropriate to describe this as a measure of job strain.
Thus the chapter remains motivated by Karasek’s model, but the outcome differs. This is discussed in more detail below.

This chapter has three sections. The first outlines the substantive basis for cross-national variation. The second section discusses the data, methods and operationalisation of key concepts. The third section presents the findings, the fourth concludes.

8.1 Why expect variation between countries?

This section reviews the theoretical basis for cross-European variation in the associations between job demands, job resources and perceived risk of occupational stress. It focuses on three areas: national culture, macro-economic conditions and the role of trade unions. While the cited studies are drawn from JD-R literature (and as such, focus upon job strain as the dependent variable) they are nonetheless informative when considering the determinants of perceived stress.

8.1.1 National culture

There is no single accepted definition of ‘culture’, but most definitions share certain characteristics. Triandis (1994) defines culture as the “human-made part of the environment” (p. 1), consisting of the shared perceptions of the social environment (Robert et al. 2000: 644). Definitions of culture typically include objective and subjective elements (Triandis 1972) produced and reproduced by interconnected individuals to solve complex social problems (Kashima 2000).

A common approach the study of national culture is to assume that societies vary along a number of cultural dimensions (e.g. Schwartz 1994). Perhaps the most well known framework is Geert Hofstede’s study of 116,000 IBM employees spread across 40 countries (Hofstede 1984). Hofstede defined culture as “the collective programming of the mind which distinguishes the members of one group or category of people from another” (Hofstede et al. 1991: 5). His study considers work-related values along four dimensions: power-distance, collectivism vs. individualism, femininity vs. masculinity and uncertainty avoidance. Power-distance is the degree to which inequalities among people are seen as appropriate and acceptable. High power-distance (or ‘vertical’) societies are contrasted with low power-distance (or ‘horizontal’), which emphasise equality and avoidance of hierarchical relationships (Robert
et al. 2000: 644). In vertical cultures, organisations are characterised by “a paternalistic work relationship between superior and subordinate. Involvement in the decision-making process is not sought by subordinates nor encouraged by superiors” (Joiner 2001: 232).

The second dimension describes the relationship between the individual and the collectivity, reflected in the way people live and work together (Pheng and Yuquan 2002: 9). Individuals from individualistic societies (e.g. North America, Australia) value “self-actualising goals and strive to gratify individualised needs” (Cheng et al. 2011: 833) whereas those from collectivist countries (e.g. China, South Korea) value “social harmony and strive to maintain harmonious interpersonal relations” (p. 833).

Uncertainty avoidance is the extent to which members of a society (or organisation) feel threatened by, and try to avoid, future uncertainty or unambiguous situations. Hofstede (2001) defines the concept as “the extent to which a culture programs its members to feel either uncomfortable or comfortable in unstructured situations” (p. xix). Lastly, masculinity vs. femininity refers to the distribution of emotional roles and the extent of role division between sexes. ‘Masculine’ societies tend to emphasise work goals, assertiveness, tenacity, a focus on material success, contrasting with ‘feminine’ values of personal goals and nurturance.

Using data for 116,000 IBM employees, and based on the four dimensions listed above, Hofestede (1984) identifies 11 country clusters. The anglophone nations form one cluster (the United Kingdom, Ireland, the United States, Canada, Australia and New Zealand), and Belgium and France form a couple. A Mediterranean cluster consists of Spain, Greece and Turkey, while Denmark, Norway, Finland, Sweden and the Netherlands form a Northern European cluster. Finally, Germany, Switzerland and Italy are clustered together and Austria clusters with Israel.

Several alternative frameworks have been proposed. Schwartz (1999) identifies seven cultural values including affective autonomy (positive affective experiences), intellectual autonomy (independent pursuit of goals and creative ideas), mastery (controlling environment and asserting oneself to achieve), hierarchy (differentiation of power, roles and resources), conservatism (tendencies toward status quo), harmony and egalitarianism (equality and opportunities for all). Leung et al. (2002) use data for Europe, the United States, Hong Kong and Venezuela to identify five ‘social axioms’: cynicism, social complexity, reward for application, spirituality and fate control. Other studies (e.g. Singelis et al. 1995; Triandis and Gelfand 1998) cross the concepts of individualism
and collectivism with power-distance to produce four cultural types. Horizontal individualism (H-I) is cultural type that emphasises autonomy but where individuals share equal status. Vertical individualism (V-I) is where autonomy is emphasised but inequality between individuals is expected. Horizontal collectivism (H-C) is tied to group membership, with shared status among members. Vertical collectivism (V-C) emphasises group membership but individual differences and inequalities are tolerated.

Few studies have examined job demands and resources in a cross-cultural context. Xie (1996) tests the job-demand-control model for 1200 workers in China, a country typically designated as ‘collectivist’ with high power-distance. Xie finds good support for the demand-control hypothesis (i.e. anxiety and depression were highest where demands were high and control was low; p. 1604), suggesting Karasek’s DCS model is compatible with a collectivist culture. Spector et al. (2007) compare work-family conflict among managers in an individualistic cluster (Anglo) and three collectivistic clusters (Asia, East Europe and Latin America). They find significant cross-national differences, with stronger associations between job demands and job strains (associated with family conflict) in the Anglo cluster (Australia, Canada, New Zealand, the UK and USA). National context was also shown to moderate the link between work-family conflict and other work-related outcomes, such as turnover intention or job satisfaction (again, these associations were strongest in Anglo countries).

Glazer et al. (2004) consider how national culture influences the relationship between Type A personality\(^1\) and job stress. Based on a survey of 2032 nurses in five countries (Hungary, Italy, Israel, the UK and USA), they hypothesise that the association between Type A and job stress will be weakest among Hungarian nurses. Having lived through a political culture with strong government influence, Hungarians “have learned that trying to get many things done and being hurried or being casual and slow bears similar results in terms of job stress” (p. 648). Nurses in more hierarchical cultures are expected to report greater job stress, since “people are encouraged to do many things in an attempt to dominate the environment, resulting in greater workloads” (p. 648).

\(^1\) Type A individuals respond to environmental challenges in aggressive, assertive, impatient, ambitious, irritated and hostile way (Cooper et al. 1994), whereas Type B individuals tend to be “casual, easy-going and never in a rush to get things done” (Glazer et al. 2004: 648).
Their analysis finds Type A personality to be positively associated with job stress in Italy, Israel and the USA, whereas non-significant correlations are observed for Hungary and the UK. Type A personality and low control (the belief that other people or forces determine major events) were most strongly associated with job stress, but again, these differed by culture, with more severe outcomes observed in cultures not endorsing external control.

Joiner (2001) suggests that national culture moderates the consequences of job stress insofar as it is incongruent with organisational culture. Organisational culture is defined as “a system of shared meaning within an organization which influences how employees act” (p. 230). ‘Eiffel Tower’ is a model of organisational culture that emphasises high centralisation (a focus on hierarchy) and greater reliance on formalisation. Following person-environment fit theory (Coelho et al. 1974), Joiner hypothesises that the implementation of an Eiffel Tower culture, among her sample of 78 Greek managers, will be associated with reduced job-related stress and increased performance, since these organisational values fit with the Greek societal values of high power-distance and high uncertainty avoidance. An organisational culture of formalisation, for example, is congruent with societal values of high uncertainty avoidance since the rule-based nature of formalisation techniques, such as standard operating procedures, tend to “reduce internal uncertainty by offering clear, unambiguous guidance on task-related matters” (Joiner 2001: 234). Using multiple regression analysis Joiner finds support for this hypothesis. For Greek managers, an increase in formalisation or centralisation is associated with reduced job stress. The alignment of societal values of high-power distance and strong uncertainty avoidance with organisational values of centralisation and formalisation resulted in reduced feelings of job-related stress (p. 237).

A similar argument is made by Robert et al. (2000), who hypothesise that cultural differences moderate the influence of managerial policies on work-related attitudes and behaviours. This suggests that effective management is dependent “on the fit between the assumptions, values and beliefs inherent in any given managerial practice and the culturally based assumptions, values, and beliefs held by those who are being managed” (p. 643).

Relatedly, Au and Cheung (2004) suggest that aggregate working conditions within a society may influence the health consequences of work by moderating the impact of job demands. High aggregate levels of job autonomy within a country implies that social practices and constraints
allow most people to adjust to their work. This is expected to reduce levels of job stress since “when people find that others around them are less stressed, their mood is inclined to improve and they become more sympathetic and helpful to others” (p. 1343). High aggregate levels of job autonomy may also indicate a policy and legislative environment that facilitates a high level of worker participation at work (Susman 1976). For example, Wilpert et al. (1993) find employee participation to be affected by the degree of overlap between labour regulations on worker involvement in decision-making and the national legal and socio-political context.

In summary, there is good reason to expect national culture to moderate relationships between job demands, resources and strain, but this effect is rarely investigated empirically.

8.1.2 Economic conditions

The associations between demands, resources and strain may also depend on levels of economic development or the prevailing economic conditions. Cooper (1984) considers job demands and mental health in five ‘developed’ countries (Sweden, Germany, the United States, the UK and Japan) and five ‘developing’ countries (Singapore, Nigeria, Brazil, Egypt and South Africa). Based data for 1065 executives across the 10 countries, the study shows the determinants of job stress to vary significantly between developed and developing countries. In regions of major social and economic change (e.g. Brazil, Egypt, Nigeria and Singapore) job stressors reflect economic pressures, such as work overload, time pressures and deadlines and long working hours (p. 402). In Japan, another country experiencing rapid social change, ‘competition for promotion’ is an important predictor of job stress, reflecting a cultural emphasis in Japan on individual achievement and career progress. By contrast, executives in countries with more mature economic systems are more affected by issues of autonomy and influence, suffering instead from the perception of powerlessness or “that they are doing a job below their level of competence” (p. 402). In the United States, West Germany and Sweden, for example, ‘lack of autonomy’ is a particularly strong predictor of job dissatisfaction and mental health problems. Echoing earlier notions of cultural fit, Cooper notes that the determinants of job stress tend to reflect “the idiosyncratic nature of the stressor in that country” (p. 402). That the ‘threat of job loss’ is a significant predictor of job stress in Germany is explained by high levels of unemployment and job losses among managerial and professional workers. In the United States,
competition for promotion represents an important stressor, reflecting cultural values of competition and achievement orientation (p. 402).

Smulders et al. (1996) show working conditions to be better in richer countries (in terms of national income per head) and worse in poorer countries. Workers in wealthy nations such as the Netherlands, Belgium, Luxembourg, and Denmark report, on average, lower levels of psychosocial job demands, higher job control and social support and shorter working hours, compared to those from poorer nations (e.g. Greece, Portugal and Ireland). There are, however, exceptions to this rule (e.g. working conditions in France and the UK should be better, given the relative wealth of these countries), suggesting that other determinants remain important.

Other national characteristics, related to economic development, may also play a role. Daniels et al. (2007) show that the association between job control and health can depend on level of research and development (R&D) activity. For 17,275 employees in 14 European countries, the association between job control and three work-related outcomes (dissatisfaction, absence and stress) was stronger in countries where R&D activity was higher (p. 10). Green and McIntosh (2001) consider the wage inequality as a potential predictor of working conditions, citing research linking wage inequality and long working hours in USA and UK (Gregg 1994; Bell and Freeman 1994). Greater distribution in earnings, it is argued, increases the financial gains to be made from working for long. Green applies this argument to work effort, hypothesising that effort will increase where wage inequalities have significantly widened. However, for a sample of six countries, no association is found between changes in effort and changes in income inequality between 1991 and 1996.

8.1.3 Trade union density

Despite declines in trade union strength in recent decades (Green and McIntosh 2001), there remain substantial differences across Europe. Trade unions are expected to reduce work stress insofar as they can resist or reduce managerial strategies of work intensification (Gallie 2005: 362). Evidence to support this hypothesis, however, is inconsistent. Green and McIntosh (2001) find a strong association between changes in trade union density and changes in work effort between 1991 and 1996 (using EWCS data). As Figure 8.2 shows, countries where union density declined saw larger increases in average work effort, while countries where union density increased saw smaller increases in work effort (i.e. Denmark, Belgium and Spain). In contrast, however, Gallie (2005) finds union membership to
be associated with higher reported levels of work pressure, rather than lower levels. It may be that unions increase employees’ awareness of their working conditions or that unions are more likely to attract membership where working conditions are already poor (p. 363).

Green and McIntosh (1997) consider whether the pace of work is less responsive to labour market conditions in strongly unionised workplaces than weakly unionised ones. Power unions, they hypothesise, reduce the potency of labour market threats by making it more difficult for employers to dismiss workers. Their analysis of the 1990 Workplace Industrial Relations Survey supports this hypothesis (p. 387). Clark and Tomlinson (2001) similarly find trade union membership and density to be associated with reduced work effort. Using data from the 1992 Employment in Britain survey they show that workers who belong to trade unions or work in firms where there is a strong union presence were less likely to report supplying additional effort (in return for wages above the market level). They explain with reference to the bargaining power of unions, and their ability to secure less intense and more secure working conditions. Most recently, Clark (2005) shows changes in job satisfaction to be negatively correlated with changes in trade union density, using data from the British Household Panel Survey (BHPS).

Trade unions appear to offer some protection against pressures to increase work effort and intensity, but it is unclear whether this is due to individual membership (i.e. belonging to a trade union) or collective membership (working in a company with high levels of unionisation). The current emphasis is on the latter: does working in a country where average union density is high reduce the association between job stress and well-being?

8.1.4 Summary

Other potential moderators go beyond the space available here. Green and McIntosh (2001) consider computer use, which could increase job stress by increasing the efficiency of workflows (and thereby reducing idle time) or allowing for more performance monitoring. Since technological development has expanded at different rates across Europe, country differences in computer use might help explain variations in job stress. Job demands may also be associated with job insecurity. As Gallie (2005) notes, insecure workers will be in a weaker position to resist managerial policies that increase job effort.
Figure 8.1: Hofstede’s cultural clusters in Europe

Figure 8.2: Change in effort and trade union density (1991-1996)

Source: Green (2001)
8.2 Methodology

Chapter 3 framed ‘methodology’ as the *process* by which suitable data and methods are selected, rather than the chosen methods themselves. Research outputs hide a substantial period of ‘muddling through’, where methods are evaluated and rejected until an optimal approach is found. This was particularly true for the present chapter. Over many months, between outlining aims for the chapter and producing the results, I explored an array of competing approaches. These meanders are described below.

The aim for this chapter was to examine the moderated consequences of job stress. Drawing on past research, I sought to identify data and methods that could illuminate the interaction of demands, resources and strain, and show how these relationships varied across Europe. I began by looking at the 2006 and 2008 rounds of the *European Social Survey* (ESS), since these had been used in previous chapters. Unfortunately, while the ESS has good coverage of subjective well-being, it provides little information on working-related stress or strain. I then considered the 2005 *European Working Conditions Survey* (EWCS). The EWCS provides much better coverage of job demands and job resources, but little information on job strain (i.e. the health consequences of work). The survey asks respondents whether work ‘affects their health’ but, as described below, responses to this question will depend on personality, mood and affect. It captures the *perceived risk* of job strain, rather than job strain itself. After several months exploring both surveys, I settled on the EWCS due to the better coverage of demands and resources, despite the problematic measurement of strain.

Methodological choices were constrained by the research objectives, and in particular, the need to consider cross-national variation. Three key decisions were to be made: the treatment of groups (i.e. multiple group vs. multilevel), the treatment of variables (i.e. observed vs. latent) and the estimation method (i.e. frequentist vs. Bayesian). These options are set out in Table 8.1. Detailed below, the chosen method is a compromise between *quality* and *complexity*. The former refers to the degree of overlap between substantive concepts and their empirical representation. Many concepts relating to job stress are inherently latent; they form an unobserved construct that we seek to measure using a set of observed indicators. While latent methods would be preferable, therefore, such techniques are sometimes technically unfeasible – because either a required technique is not yet available, or because a problem is so computationally intensive that it cannot be estimated with the time and resources available. For
example, interactions between latent variables in frequentist framework (i.e. maximum likelihood or weighted least squares) are computationally exorbitant (not to mention, unstable). Bayesian estimation is faster, but latent interactions (i.e. \texttt{XWITH} in \texttt{Mplus}) have not yet been implemented (as of \texttt{Mplus 6.1}).

At the opposite end of the spectrum, simpler methods are more easily estimated and interpreted, but increase the separation between theoretical and empirical models. Traditional multilevel models are widely understood, but assume that underlying substantive concepts can be adequately represented by observed indicators. This chapter experimented with a range of approaches, ruling out multigroup analysis due to the complexities arising from many groups (a problem that has only recently been addressed; Asparouhov and Muthén 2013). Latent variables were also ruled out, partly due to computational limitations and partly since most existing studies in the JD-R literature relied on observed indicators.

8.3 Data

This chapter uses data from the 2005 European Working Conditions Survey (EWCS; see chapter 3). From a total sample of 29,680 employees, this analysis focuses upon 16,591 from 17 Western Europe countries (for reasons set out in previous chapters). Several cases have been omitted due to item non-response. These include missing values on the main dependent variable ‘Does your work affect your health?’ (288), working hours (303), union membership (879), job security (672), workplace size (635), occupation (192), sector (147) and, most notably, household income (2357). As detailed above, this chapter adopts a multilevel framework using observed variables. The models have been implemented in \texttt{R} using the \texttt{MCMCglmm} package (Hadfield 2010).

8.4 Measurements

8.4.1 Perceived risk of occupational stress

The measurement of job strain in this chapter has been problematic and changed several times during the research process. The aim was to identify a dependent variable that captured the impact of work on psychological well-being. Two indicators of the health impact of work are available in the 2005 EWCS. Firstly, a question asking respondents “does your work affect your health, or not?” Secondly, those responding ‘yes’ to this
<table>
<thead>
<tr>
<th>Variables</th>
<th>Inference</th>
<th>Software</th>
<th>Estimator</th>
<th>Estimation Speed</th>
<th>Interaction Effects</th>
<th>Latent Groups</th>
<th>Observed Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>Frequentist Mplus WLSMV/MLR</td>
<td>Extremely slow</td>
<td>Extremely slow (and unstable).</td>
<td>Yes. Yes.</td>
<td>Yes.</td>
<td>Yes.</td>
<td></td>
</tr>
<tr>
<td>Fixed</td>
<td>Bayesian Mplus Bayes</td>
<td>Very fast</td>
<td>Fast</td>
<td>Not possible. Not possible.</td>
<td>Extremely slow</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
</tbody>
</table>

**Table 8.1: Methodological Options**
screening question are then asked to specify how their work affects their health, choosing from a list of 16 health complaints\(^2\). These measures introduce two significant problems.

Firstly, and most seriously, they rely entirely on an employee’s ability to accurately assess whether and how ‘their work’ affects ‘their health’. Neither term (‘work’ nor ‘health’) is defined in sufficient detail, and since respondents are only asked the second question (‘How does it affect your health?’) if they respond positively to the first, this measure of job strain is susceptible to varying reporting tendencies among respondents, linked perhaps to differences in personality, mood or positive and negative affect (see Watson 1988; Watson and Pennebaker 1989). The second question is also problematic in so far as it assumes that workers can reliably determine which health problems are motivated specifically by work-related factors, as opposed to other life domains. Overall, these measures introduce such a degree of subjectivity and ambiguity that they cannot be considered representative of job strain or psychological well-being, but rather, capture the respondent’s perception that work is associated with health.

Secondly, there is the issue of how best to combine these indicators, if at all. The simplest approach would be to combine the two indicators into a single continuous variable, ranging from 0 (individuals who say their work does not affect their health) to 16 (individuals who report all 16 health complaints). However, this produces a highly skewed distribution, meaning recoding or transformation is required before using this as the dependent variable in a regression analysis. Various strategies were considered, including (a) standardising the binary variables, (b) tobit or zero-inflated negative binomial regression, (c) confirmatory factor analysis (saving factor scores), (d) multilevel structural equation modelling (i.e. multilevel factor analysis) and (e) recoding the variables. For example, one option would be to recode the two items into a single ordinal measure (see Figure 8.3), distinguishing between individuals reporting no health consequences of work (‘no effect’) and those who report ‘low’, ‘moderate’, or ‘high’ health consequences.

The solution to these issues has been twofold. Firstly, the dependent variable has been re-labelled to ensure the chosen indicators align more closely with the purported theoretical construct. The two items concerning

\(^2\)These include: problems with hearing, vision or skin, backache, headaches, stomach ache, muscular pains, respiratory difficulties, heart disease, injury, stress, overall fatigue, sleeping problems, allergies, anxiety, irritability and ‘other’.
the health consequences of work are a poor measure of actual job strain or psychological distress, but instead, reflect the respondent’s perception of these outcomes. Sidestepping the issue, therefore, these indicators are interpreted in this chapter as the ‘perceived risk of occupational stress’. This follows similar approaches in existing studies that have used the 2005 EWCS (e.g. Jones et al. 2011; Leoni 2010). Focusing upon the perceived risk of job strain represents a departure from Karasek’s model, but remains a worthwhile exercise. As demonstrated in earlier chapters and past studies, perceived risks can have negative consequences for psychological well-being even independently of the actual threat (e.g. Fishbain et al. 1997; Origo and Pagani 2009; Iversen and Sabroe 2010).

To combine these indicators this chapter follows the example of Daniels (2004), who uses principal components analysis with data from the 2000 EWCS to identify a factor measuring ‘perceived risk of occupational stress’. From the list of 16 health complaints, Daniels identifies a set of 7 conditions, linked to occupational stress, that load onto a single factor. These include: ‘stress’, ‘anxiety’, ‘irritability’, ‘sleeping problems’, ‘stomach ache’, ‘headaches’, and ‘overall fatigue’. The the present analysis, therefore, the ‘perceived risk of occupational stress’ is operationalised based on (a) whether the respondent responds positively to the first question on health affect (‘yes’ = 1; ‘no’ = 0); and (b) whether they mention one of the seven health complaints listed above, associated with occupational stress (see Figure 8.4). This produces a binary indicator for 15,691 respondents (94.6% of the sample) of whom 5,068 (32.4%) report
perceived occupational stress ($\text{riskst} = 1$) and 10,605 (67.6%) do not ($\text{riskst} = 0$). More detailed descriptive statistics are provided below.

**Figure 8.4:** Operationalisation of ‘perceived risk of occupational stress’

---

### 8.4.2 Job demands

Five types of job demand are considered. ‘Job complexity’, a scale measuring the technical difficulties faced at work, is comprised of seven observed variables. Four binary items ask whether the respondent’s job involves (a) meeting precise quality standards, (b) solving unforeseen problems, (c) learning new things or (d) completing tasks that require different skills. The scale also includes an item that asks respondents how often they find their job intellectually demanding (‘almost always’, ‘often’, ‘sometimes’, ‘rarely’ or ‘almost never’). Two items assess the use of technology, asking whether the respondent’s job involves ‘working with computers’ or using ‘internet and email for professional purposes’ (responses range from ‘all or almost all of the time’ to ‘never or almost never’).

The second measure is a scale measuring long or unsocial hours, based on five items. Four questions cover working hours, asking how many times a month the respondent works (a) for more than 10 hours a day, (b) at night or (c) in the evening (for at least two hours) and (d) at the weekend. A fifth item asks whether ‘your working hours fit in with your
family or social commitments’. Responses are given on a four-point scale
(‘very well’, ‘well’, ‘not very well’ and ‘not at all well’)

Thirdly, a scale measuring work intensity is derived from three items on working (a) at very high speed or (b) to tight deadlines, and (c) having enough time to get the job done. Responses to (a) and (b) are given on a 7-point scale, from ‘never’ to ‘all of the time’. Responses to (c) are given on a 5-point scale, ranging from ‘almost always’ to ‘almost never’. Finally, the models consider how often work is emotionally demanding (from ‘almost always’ to ‘almost never’) as well as an ordinal measure of usual weekly working hours.

8.4.3 Job resources

A scale measuring job control is derived from six observed variables. Three of these are binary indicators of whether the respondent feels they can change (a) the order of tasks or (b) the methods or (c) pace of work. Two items ask (d) whether workers can decide when to take holiday and (e) whether they can take their break when they wish (from ‘almost always’ to ‘almost never’). Finally, the scale includes a measure of flexible working, asking respondents how their working time arrangements are set. The response categories are:

- They are set by the company, with no possibility for changes;
- You can choose between several fixed working schedules, with no possibility for changes;
- You can adapt your working hours within certain limits (e.g. flexitime); or
- Your working hours are entirely determined by yourself.

All six items have been recoded so they follow a consistent direction (i.e. higher scores indicate greater control). The second measure of job resources is a scale assessing ‘help received at work’. Respondents are asked whether they can get assistance from (a) their boss, (b) their colleagues or (c) external sources. Responses were given on a 5-point scale from ‘almost always’ to ‘almost never’. Finally, item on ‘friends at work’ asks respondents how much they agree with the statement “I have very good friends at work” (from ‘disagree or disagree strongly’ to ‘neither agree nor disagree’, ‘agree’ and ‘strongly agree’).

The Cronbach’s alpha for each scale is presented in Table 8.2. With the exception of ‘work intensity’, the coefficient is greater than 0.70 for all
As a further test, Table 8.3 presents correlations between each scale and the principal components factor scores for that measure. The factor scores are calculated using principal components factor analysis for the variables included in each scale. All scales correlate highly with the corresponding factor scores, indicating good reliability. These measures are summarised in Table 8.4.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Items</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job complexity</td>
<td>7</td>
<td>0.757</td>
</tr>
<tr>
<td>Unsocial hours</td>
<td>5</td>
<td>0.730</td>
</tr>
<tr>
<td>Work intensity</td>
<td>3</td>
<td>0.670</td>
</tr>
<tr>
<td>Job control</td>
<td>6</td>
<td>0.746</td>
</tr>
<tr>
<td>Help at work</td>
<td>3</td>
<td>0.715</td>
</tr>
</tbody>
</table>

Table 8.3: Correlation between PCA factor scores and scales

<table>
<thead>
<tr>
<th></th>
<th>Job complexity</th>
<th>Work intensity</th>
<th>Job control</th>
<th>Help at work</th>
<th>Unsocial hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job complexity</td>
<td>0.995</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work intensity</td>
<td></td>
<td>0.999</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job control</td>
<td></td>
<td></td>
<td>0.998</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help at work</td>
<td></td>
<td></td>
<td></td>
<td>0.998</td>
<td></td>
</tr>
<tr>
<td>Unsocial hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.998</td>
</tr>
</tbody>
</table>

8.4.4 Control variables

Listed in Table 8.5, control variables include standard demographic controls (e.g. age, gender and income) as well as working conditions and attitudes such job security, workplace size and tenure. A relative measure of income is used in the EWCS, such that cross-national comparisons are possible despite differences in absolute incomes. This is constructed using data on monthly earnings, which are adjusted to take inflation, income tax and social contributions into account. The resulting monthly earnings are then split into 10 deciles, providing a comparable measure of income across the 17 countries (see Macías 2006). This scale has been recoded.
Table 8.4: Measures of job demands and resources used in this chapter

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job demands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job complexity</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>Unsocial working hours</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>Work intensity</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>Emotionally demanding work</td>
<td>Ordinal</td>
<td>No</td>
</tr>
<tr>
<td>Usual weekly working hours</td>
<td>Ordinal</td>
<td>No</td>
</tr>
<tr>
<td>Job resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job autonomy (or control)</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>Help at work</td>
<td>Continuous</td>
<td>Yes</td>
</tr>
<tr>
<td>Has good friends at work</td>
<td>Ordinal</td>
<td>No</td>
</tr>
</tbody>
</table>

and is provided in the EWCS as a 4-category ordinal variable (‘very high’, ‘high’, ‘low’ and ‘very low’).

8.5 Descriptive statistics

8.5.1 Perceived risk of occupational stress

Figure 8.5 plots the weighted proportion of respondents reporting the perceived risk of occupational stress’ in 17 European countries. The plot shows significant variation (at the 5% level) cross-nationally, with higher levels of perceived risk in the Scandinavian countries (e.g. Sweden, Norway, Finland and Denmark) and Cyprus. Lower rates are reported in United Kingdom, the Netherlands, Germany and Ireland.

8.5.2 Job demands

Figure 8.6 plots the aggregated scores, means and proportions for the five measures of ‘job demands’ considered above. Although significant cross-national variation is observed for all measures (where the 95% confidence intervals do not overlap), it is again difficult to identify consistent trends. With the exception of ‘working hours’, the graphs are consistent with Esping-Andersen’s model of welfare regimes (1990). ‘Social democratic’ countries tend to be found at opposite ends of the index to ‘Southern European’ or ‘Mediterranean’ countries, particularly for the measures of ‘job complexity’ and ‘work intensity’.

To summarise the above trends, Table 8.6 ranks the countries for each type of job demand. A higher rank (closer to 1) indicates greater job demands, while a lower rank (closer to 17) indicates less job demands. The final column in the table presents the summed ranks. Austria, Switzerland
Table 8.5: Weighted counts and percentages for control variables

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11,723</td>
<td>55.53</td>
</tr>
<tr>
<td>Female</td>
<td>9,389</td>
<td>44.47</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low</td>
<td>3,753</td>
<td>26.37</td>
</tr>
<tr>
<td>Low</td>
<td>3,635</td>
<td>25.54</td>
</tr>
<tr>
<td>High</td>
<td>3,546</td>
<td>24.91</td>
</tr>
<tr>
<td>Very high</td>
<td>3,300</td>
<td>23.18</td>
</tr>
<tr>
<td><strong>Living with partner/spouse</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7,164</td>
<td>33.94</td>
</tr>
<tr>
<td>No</td>
<td>13,947</td>
<td>66.06</td>
</tr>
<tr>
<td><strong>Children living in household</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11,516</td>
<td>54.55</td>
</tr>
<tr>
<td>No</td>
<td>9,596</td>
<td>45.45</td>
</tr>
<tr>
<td><strong>Citizen of country</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>20,274</td>
<td>96.12</td>
</tr>
<tr>
<td>No</td>
<td>818</td>
<td>3.88</td>
</tr>
<tr>
<td><strong>Works in public sector</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>15,747</td>
<td>75.49</td>
</tr>
<tr>
<td>Yes</td>
<td>5,112</td>
<td>24.51</td>
</tr>
<tr>
<td><strong>Self-employed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>17,864</td>
<td>84.76</td>
</tr>
<tr>
<td>Yes</td>
<td>3,212</td>
<td>15.24</td>
</tr>
<tr>
<td><strong>Permanent contract</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>3,739</td>
<td>21.57</td>
</tr>
<tr>
<td>Yes</td>
<td>13,592</td>
<td>78.43</td>
</tr>
<tr>
<td><strong>Industry (NACE)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture, forestry</td>
<td>512</td>
<td>2.43</td>
</tr>
<tr>
<td>Industry</td>
<td>5,893</td>
<td>27.91</td>
</tr>
<tr>
<td>Services</td>
<td>7,841</td>
<td>37.14</td>
</tr>
<tr>
<td>Administration</td>
<td>1,500</td>
<td>7.11</td>
</tr>
<tr>
<td>Other services</td>
<td>5,137</td>
<td>24.33</td>
</tr>
<tr>
<td><strong>Job security: “I might lose my job in the next 12 months”</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>7,583</td>
<td>47.63</td>
</tr>
<tr>
<td>Disagree to strongly agree</td>
<td>8,336</td>
<td>52.37</td>
</tr>
<tr>
<td><strong>Occupational class</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White collar</td>
<td>7,022</td>
<td>33.72</td>
</tr>
<tr>
<td>Blue collar</td>
<td>13,802</td>
<td>66.28</td>
</tr>
<tr>
<td><strong>Political or trade union activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>18,045</td>
<td>92.46</td>
</tr>
<tr>
<td>Once a year or more often</td>
<td>1,472</td>
<td>7.54</td>
</tr>
<tr>
<td><strong>Workplace size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2,011</td>
<td>9.99</td>
</tr>
<tr>
<td>2-9</td>
<td>5,240</td>
<td>26.03</td>
</tr>
<tr>
<td>10-49</td>
<td>5,741</td>
<td>28.52</td>
</tr>
<tr>
<td>50-249</td>
<td>3,961</td>
<td>19.68</td>
</tr>
<tr>
<td>250+</td>
<td>3,174</td>
<td>15.77</td>
</tr>
<tr>
<td><strong>Highest level of education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary or less</td>
<td>1,366</td>
<td>6.5</td>
</tr>
<tr>
<td>Any post-secondary</td>
<td>1,571</td>
<td>7.47</td>
</tr>
<tr>
<td>Tertiary</td>
<td>5,766</td>
<td>27.44</td>
</tr>
<tr>
<td>Secondary</td>
<td>12,312</td>
<td>58.59</td>
</tr>
</tbody>
</table>
and Sweden are the countries where respondents report, on average, the greatest level of job demands (across the five measures). The lowest level of job demands are reported in the Luxembourg, UK, the Netherlands, the UK and France.

Overall, there does appear to be some division across Europe in the level of job demands reported by employees, particularly between Scandinavian and southern European nations (the ‘Mediterranean’ or ‘Latin Rim’ regimes, e.g. Katrougalos 1996). However, this trend is not straightforward. Job complexity and work intensity are, on average, higher in Scandinavian countries, but this is not true for other indicators (e.g. working hours or the emotional content of work).

### 8.5.3 Job resources

Figure 8.7 shows all three measures of job resources (help at work, friends at work and job control) to vary significantly across the 17 countries (at the 5% level). Consistent with Esping-Andersen’s regime model (1990), job resources tend to be higher in ‘social democratic’ countries and lower in Southern or Mediterranean countries. However, there are
Figure 8.6: Variation in job demands across Europe

Source: EWCS (2005)
Table 8.6: Country ranks for job demands

<table>
<thead>
<tr>
<th>Country</th>
<th>Job complexity</th>
<th>Unsocial hours</th>
<th>Work intensity</th>
<th>Emotional work</th>
<th>Total hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Switzerland</td>
<td>2</td>
<td>14</td>
<td>8</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Finland</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Spain</td>
<td>17</td>
<td>2</td>
<td>13</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Denmark</td>
<td>3</td>
<td>17</td>
<td>4</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Belgium</td>
<td>9</td>
<td>6</td>
<td>9</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Cyprus</td>
<td>16</td>
<td>15</td>
<td>3</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Norway</td>
<td>7</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Portugal</td>
<td>14</td>
<td>8</td>
<td>17</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Ireland</td>
<td>12</td>
<td>3</td>
<td>16</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Italy</td>
<td>15</td>
<td>1</td>
<td>10</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>Germany</td>
<td>11</td>
<td>13</td>
<td>6</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>8</td>
<td>16</td>
<td>14</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>UK</td>
<td>13</td>
<td>11</td>
<td>12</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4</td>
<td>9</td>
<td>11</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>France</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>11</td>
<td>17</td>
</tr>
</tbody>
</table>

Highest level of demands

Lowest level of demands

some notable exceptions. The country where the lowest proportion of respondents feel they have ‘very good friends at work’ is the Netherlands (a social democratic country), whereas Cyprus, from the ‘Mediterranean’ regime, has among the highest proportion of respondents agreeing with the statement.

These trends become clearer in Figure 8.8, which plots the three indicators against one another. The x-axis is the aggregate score for ‘job control’ and the y-axis is the aggregate score for ‘help at work’. The size of each point represents the proportion of respondents who feel they have ‘very good friends at work’. The upper-right corner of the graph is, with the exception of Ireland, occupied exclusively by Scandinavian nations. Workers in these countries, on average, report higher levels of control and receive more help at work. It is harder to identify consistent trends elsewhere on the graph. The middle of the plot is occupied by central and southern European countries, whereas the bottom of the
Figure 8.7: Variation in job resources across Europe

<table>
<thead>
<tr>
<th>Help at work (scale)</th>
<th>I have very good friends at work (&quot;strongly agree&quot;)</th>
<th>Job control (scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>Netherlands</td>
<td>Germany</td>
</tr>
<tr>
<td>Portugal</td>
<td>Italy</td>
<td>Spain</td>
</tr>
<tr>
<td>France</td>
<td>Luxembourg</td>
<td>Portugal</td>
</tr>
<tr>
<td>Belgium</td>
<td>Cyprus</td>
<td>UK</td>
</tr>
<tr>
<td>Cyprus</td>
<td>Spain</td>
<td>France</td>
</tr>
<tr>
<td>Germany</td>
<td>Switzerland</td>
<td>Austria</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>Finland</td>
<td>Belgium</td>
</tr>
<tr>
<td>Spain</td>
<td>France</td>
<td>Luxembourg</td>
</tr>
<tr>
<td>Austria</td>
<td>Spain</td>
<td>Italy</td>
</tr>
<tr>
<td>Switzerland</td>
<td>UK</td>
<td>Ireland</td>
</tr>
<tr>
<td>UK</td>
<td>Ireland</td>
<td>Norway</td>
</tr>
<tr>
<td>Norway</td>
<td>Austria</td>
<td>Finland</td>
</tr>
<tr>
<td>Finland</td>
<td>Denmark</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Sweden</td>
<td>Cyprus</td>
<td>Sweden</td>
</tr>
<tr>
<td>Ireland</td>
<td>Norway</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Sweden</td>
<td>Denmark</td>
</tr>
</tbody>
</table>

Weighted mean

Proportion

Weighted mean

All estimates weighted to control for population size and sampling strategy.
Source: EWCS (2005)

Graph (i.e. countries with low levels of ‘help at work’) is occupied by the Mediterranean countries of Portugal, France and Italy.

Table 8.7 presents correlations between these variables. Significant positive correlations (at the 5% level) are observed between ‘job control’ and ‘help at work’. In countries where workers enjoy high levels of control, they tend also to receive high levels of ‘help at work’.

Table 8.7: Pearson Correlation Coefficients (N = 17)

<table>
<thead>
<tr>
<th></th>
<th>help</th>
<th>friends</th>
<th>control</th>
</tr>
</thead>
<tbody>
<tr>
<td>help</td>
<td>1.000</td>
<td>0.419†</td>
<td>0.590*</td>
</tr>
<tr>
<td>friends</td>
<td>1.000</td>
<td>0.161</td>
<td></td>
</tr>
<tr>
<td>control</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05; † p < 0.1

Finally, Table 8.8 ranks countries based on each type of resource, and sums these to give a total score (lower ranks are associated with higher levels of job resources). Workers in Denmark report the highest levels of resources, while those in Germany and Portugal report the lowest levels. This table again highlights the regional divide between northern countries (and Scandinavia) and the rest of Europe.
To summarise: (a) there does appear to be significant national variation in aggregate levels of demands, resources and strain; (b) the evidence suggests a north-south divide (or more precisely, a division between Scandinavian and Mediterranean countries).

8.6 Null and base models

This section presents a multilevel logistic regression analysis that explores cross-European variation in the associations between job demands, job resources and the ‘perceived risk of occupational stress’. The results for the null and base models are considered first. These models contain the main dependent and explanatory variables, a random country-level intercept, but omit any random slopes or interaction effects. Random slopes for demands and resources are tested second, before lastly examining fixed and random interaction effects (demands $\times$ resources).
Table 8.8: Ranks for job resources

<table>
<thead>
<tr>
<th>Country</th>
<th>Friends at work</th>
<th>Help at work</th>
<th>Job control</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Norway</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Ireland</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Finland</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Switzerland</td>
<td>11</td>
<td>8</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>Netherlands</td>
<td>17</td>
<td>2</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>Austria</td>
<td>5</td>
<td>9</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>UK</td>
<td>6</td>
<td>7</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>Cyprus</td>
<td>3</td>
<td>13</td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>14</td>
<td>11</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>Spain</td>
<td>9</td>
<td>10</td>
<td>16</td>
<td>35</td>
</tr>
<tr>
<td>Belgium</td>
<td>12</td>
<td>14</td>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td>France</td>
<td>10</td>
<td>15</td>
<td>12</td>
<td>37</td>
</tr>
<tr>
<td>Italy</td>
<td>16</td>
<td>17</td>
<td>8</td>
<td>41</td>
</tr>
<tr>
<td>Germany</td>
<td>15</td>
<td>12</td>
<td>17</td>
<td>44</td>
</tr>
<tr>
<td>Portugal</td>
<td>13</td>
<td>16</td>
<td>15</td>
<td>44</td>
</tr>
</tbody>
</table>

The null model is specified below, where the response $\text{risk}st_{ij} = 1$ if respondent $i$ in country $j$ responds says that work does affect their health. $\pi_{ij}$ denotes the probability $Pr(\text{risk}st_{ij} = 1)$.

$$\logit(\pi_{ij}) = \beta_{0j}$$

$$\beta_{0j} = \beta_0 + u_{0j}$$

Where $\beta_0$ is the intercept and $u_{0j}$ is the country-level random effect. Table 8.9 presents MCMC estimates for the null model ($N_i = 11,316; N_j = 17$). A coefficient of -0.864 for the intercept represents the log odds of reporting ‘perceived risk of occupational stress’, controlling for the clustering of individuals within countries (this equates to a probability of 0.327). The intra-class correlation (ICC) is 0.066, indicating that 6.6
Table 8.9: Null model for affect (using MCMC estimation)

<table>
<thead>
<tr>
<th>$\beta$</th>
<th>95% CI</th>
<th>ESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Constant</td>
<td>$-0.864$</td>
<td>$-1.107$</td>
</tr>
<tr>
<td>Variance</td>
<td>$0.232$</td>
<td>$0.094$</td>
</tr>
</tbody>
</table>

$N_i = 11,316$

$N_j = 17$

DIC = 14017.562

ESS = Effective sample size
Chain length = 45,000
Burn-in = 5,000
Thinning = 10

percent of variation in the log-odds of risk is attributable to country differences.

The base model introduces demands, resources and relevant control variables. The odds ratios, credible intervals and effective sample sizes (ESS) are presented in Table 8.10 ($N_i = 11,316$; $N_j = 17$). The results are as expected. Unit increases in ‘job complexity’, ‘unsocial hours’ and ‘work intensity’ are associated with increased odds of reporting perceived risk of psychological stress (odds ratios of 1.11, 1.65 and 1.41, respectively). Emotionally demanding work is associated substantial increases in the odds of reporting perceived stress (OR = 2.27 for respondents whose work is ‘almost always’ emotionally demanding). All three types of job resource are significantly associated (based on the 95% credible intervals) with reduced odds of perceived stress, controlling for other variables in the model. Respondents who ‘strongly agree’ that they have ‘very good friends at work’ are almost half as likely (odds ratio of 0.59) to report perceived risk of occupational stress, compared to those who ‘disagree’ or ‘disagree strongly’.

The coefficients for control variables are consistent with past studies, although there are several non-significant results (i.e. where the 5% credible intervals cross 0). Age and income are positively associated with perceived risk of stress, controlling for other variables in the model. Having children, working in the public sector and being active in a trade or political union are all associated with increased odds of perceived stress. This latter finding is consistent with Gallie (2005), who also shows a positive association between trade union activity and reported job
### Table 8.10: Odds ratios for the base model

<table>
<thead>
<tr>
<th></th>
<th>OR</th>
<th>5% CIa</th>
<th>ESSc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.082</td>
<td>0.054</td>
<td>0.126</td>
</tr>
<tr>
<td>Job complexity (scale)</td>
<td>1.110</td>
<td>1.052</td>
<td>1.194</td>
</tr>
<tr>
<td>Unsocial hours (scale)</td>
<td>1.652</td>
<td>1.561</td>
<td>1.745</td>
</tr>
<tr>
<td>Work intensity (scale)</td>
<td>1.412</td>
<td>1.372</td>
<td>1.452</td>
</tr>
<tr>
<td>Work is emotionally Rarely</td>
<td>1.143</td>
<td>0.999</td>
<td>1.312</td>
</tr>
<tr>
<td></td>
<td>1.316</td>
<td>1.151</td>
<td>1.455</td>
</tr>
<tr>
<td></td>
<td>1.711</td>
<td>1.526</td>
<td>1.966</td>
</tr>
<tr>
<td></td>
<td>2.269</td>
<td>1.971</td>
<td>2.509</td>
</tr>
<tr>
<td>Job control (scale)</td>
<td>0.888</td>
<td>0.825</td>
<td>0.940</td>
</tr>
<tr>
<td>Help at work (scale)</td>
<td>0.804</td>
<td>0.759</td>
<td>0.849</td>
</tr>
<tr>
<td>Very good friends at work</td>
<td>0.725</td>
<td>0.631</td>
<td>0.850</td>
</tr>
<tr>
<td></td>
<td>0.638</td>
<td>0.559</td>
<td>0.734</td>
</tr>
<tr>
<td></td>
<td>0.594</td>
<td>0.513</td>
<td>0.682</td>
</tr>
<tr>
<td>Age</td>
<td>1.008</td>
<td>1.004</td>
<td>1.011</td>
</tr>
<tr>
<td>Gender (female)</td>
<td>1.040</td>
<td>0.942</td>
<td>1.123</td>
</tr>
<tr>
<td>Income</td>
<td>Very low</td>
<td>1.143</td>
<td>1.031</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>1.225</td>
<td>1.096</td>
</tr>
<tr>
<td></td>
<td>Very high</td>
<td>1.268</td>
<td>1.087</td>
</tr>
<tr>
<td>Lives with partner/spouse</td>
<td>0.892</td>
<td>0.806</td>
<td>0.961</td>
</tr>
<tr>
<td>Children living in household</td>
<td>1.255</td>
<td>1.169</td>
<td>1.377</td>
</tr>
<tr>
<td>Not a citizen of country</td>
<td>1.108</td>
<td>0.919</td>
<td>1.304</td>
</tr>
<tr>
<td>Works in public sector</td>
<td>1.169</td>
<td>1.068</td>
<td>1.310</td>
</tr>
<tr>
<td>Sector (NACE)</td>
<td>Industry</td>
<td>1.222</td>
<td>0.955</td>
</tr>
<tr>
<td></td>
<td>Services</td>
<td>1.068</td>
<td>0.766</td>
</tr>
<tr>
<td></td>
<td>Administration</td>
<td>1.120</td>
<td>0.818</td>
</tr>
<tr>
<td></td>
<td>Other services</td>
<td>1.189</td>
<td>0.907</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>1.001</td>
<td>0.552</td>
</tr>
<tr>
<td>Workplace size</td>
<td>2-9</td>
<td>1.084</td>
<td>0.948</td>
</tr>
<tr>
<td></td>
<td>10-49</td>
<td>1.282</td>
<td>1.086</td>
</tr>
<tr>
<td></td>
<td>50-249</td>
<td>1.229</td>
<td>1.021</td>
</tr>
<tr>
<td></td>
<td>250+</td>
<td>1.295</td>
<td>1.093</td>
</tr>
<tr>
<td>Political/trade union activity</td>
<td>1.326</td>
<td>1.152</td>
<td>1.476</td>
</tr>
<tr>
<td>Blue collar employee</td>
<td>1.610</td>
<td>1.437</td>
<td>1.750</td>
</tr>
<tr>
<td>Highest education</td>
<td>Secondary</td>
<td>0.948</td>
<td>0.800</td>
</tr>
<tr>
<td></td>
<td>Post-secondary</td>
<td>0.940</td>
<td>0.781</td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>0.964</td>
<td>0.786</td>
</tr>
<tr>
<td>Job is secure</td>
<td>0.855</td>
<td>0.791</td>
<td>0.929</td>
</tr>
<tr>
<td>Variance (level 1)</td>
<td>0.270</td>
<td>0.110</td>
<td>0.500</td>
</tr>
</tbody>
</table>

\(N_i\) 11,316

\(N_j\) 17

DIC 12562.615

<table>
<thead>
<tr>
<th><strong>a</strong> Credible interval</th>
<th><strong>b</strong> Chain length = 45,000; Burn-in = 5,000; Thinning = 10</th>
<th><strong>c</strong> Effective sample size</th>
</tr>
</thead>
</table>
pressures. High job security is associated with lower odds of perceived stress, as is work in ‘white-collar’ jobs.

8.7 Random coefficients for the main effects

To test cross-national variation a random coefficient is introduced. In the model below, where $x_{ij}$ is a variable measuring demands or resources, the subscript $j$ is introduced to represent the country-level component.

\[
\logit(\pi_{ij}) = \beta_{0j} + \beta_{1j}x_{ij} \\
\beta_{0j} = \beta_0 + u_{0j}
\]

Random coefficients for each type of demand and resource are tested in turn, using MCMC estimation. The change-in-DIC statistic indicates the contribution of the random coefficient to the overall model. Presented in Table 8.11, significant random coefficients (a change in DIC of 4 or greater) are observed for (a) job complexity, (b) work intensity, (c) emotionally demanding work, (d) job control and (e) help at work. For these variables, allowing the coefficient to vary cross-nationally produces a significant improvement in overall model fit.

**Table 8.11: Change-in-DIC for random coefficients**

<table>
<thead>
<tr>
<th>Demand</th>
<th>No RE</th>
<th>With RE</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job complexity</td>
<td>12562.615</td>
<td>12548.838</td>
<td>13.777†</td>
</tr>
<tr>
<td>Weekly working hours</td>
<td>12562.615</td>
<td>12561.125</td>
<td>1.490</td>
</tr>
<tr>
<td>Unsocial working hours</td>
<td>12562.615</td>
<td>12562.499</td>
<td>0.117</td>
</tr>
<tr>
<td>Work intensity</td>
<td>12562.615</td>
<td>12551.715</td>
<td>10.900†</td>
</tr>
<tr>
<td>Emotionally demanding work</td>
<td>12562.615</td>
<td>12539.142</td>
<td>23.473†</td>
</tr>
<tr>
<td>Job control</td>
<td>12562.615</td>
<td>12534.928</td>
<td>27.688†</td>
</tr>
<tr>
<td>Help at work</td>
<td>12562.615</td>
<td>12556.102</td>
<td>6.514†</td>
</tr>
<tr>
<td>Have ‘very good friends’ at work</td>
<td>12562.615</td>
<td>12560.212</td>
<td>2.403</td>
</tr>
</tbody>
</table>

*Chain length = 45,000; Burn-in = 5,000; Thinning = 10
† Reduction in DIC ≥ 4

Figures 8.9 and 8.10 plot the country-level residuals for the random coefficients. These plots can be interpreted as follows:
• A significant random effect is one where the 95% confidence intervals do not cross zero.

• The residual is the amount by which the coefficient for a given country deviates from the fixed effect.

• A positive residual for variable X in country J indicates that the increase in the log odds of the outcome associated with a unit change in X is greater in J than on average.

• Conversely, a negative residual for variable X in country J indicates a smaller than average increase in the log-odds of the outcome.

For example, taking the fixed effect for ‘job complexity’ of 0.45 (log-odds, not the odds ratio.), a significant positive residual for the UK indicates that, for a unit increase in job complexity, the increase in the likelihood of reporting ‘risk of occupational stress’ is greater in the UK than the average across all countries. Conversely, the residual for Sweden is significantly below the average, indicating a weaker association between job complexity and the perceived risk of occupational stress.

8.8 Fixed interaction effects

These findings suggest that, as hypothesised, the strength of the associations between job demands, job resources and ‘perceived risk of psychological stress’ vary significantly across Europe. The final step is to consider interaction effects. Do resources significantly buffer the association between demands and perceived stress? Moreover, do these buffering effects vary cross-nationally? This section first considers fixed interaction effects, before later introducing random interaction effects. All two-way interactions between four job demands and three job resources are considered, giving 12 interaction terms.

Table 8.12 presents the change-in-DIC associated with each fixed interaction effect. Significant effects are observed for just 2/12 interactions: (a) ‘job complexity × job control’ and (b) ‘job complexity × help at work’ (reductions in DIC of 25.03 and 5.00, respectively). These interactions are illustrated in Figure 8.11, which plots the predicted probabilities of ‘perceived risk of occupational stress’ at high and low levels of job control and ‘help at work’ (the mean ± one standard deviation). The plot shows a buffering effect for both variables. As job complexity increases, workers with low control or low support become more likely to perceive their health to be at risk. Conversely, workers with high levels of control or
Figure 8.9: Random effects for job demands

- Work intensity
- Emotional demand
- Job complexity

Random intercepts for different countries.
Table 8.12: Change-in-DIC for fixed interactions

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Base DIC</th>
<th>DIC</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Job control</td>
<td>12626.456</td>
<td>12601.429</td>
</tr>
<tr>
<td>Job complexity</td>
<td>Help at work</td>
<td>12626.456</td>
<td>12621.509</td>
</tr>
<tr>
<td></td>
<td>Friends at work</td>
<td>12626.456</td>
<td>12626.461</td>
</tr>
<tr>
<td></td>
<td>Job control</td>
<td>12626.456</td>
<td>12628.125</td>
</tr>
<tr>
<td>Unsocial hours</td>
<td>Help at work</td>
<td>12626.456</td>
<td>12627.092</td>
</tr>
<tr>
<td></td>
<td>Friends at work</td>
<td>12626.456</td>
<td>12627.066</td>
</tr>
<tr>
<td></td>
<td>Job control</td>
<td>12626.456</td>
<td>12627.458</td>
</tr>
<tr>
<td>Work intensity</td>
<td>Help at work</td>
<td>12626.456</td>
<td>12626.614</td>
</tr>
<tr>
<td></td>
<td>Friends at work</td>
<td>12626.456</td>
<td>12628.495</td>
</tr>
<tr>
<td></td>
<td>Job control</td>
<td>12626.456</td>
<td>12622.987</td>
</tr>
<tr>
<td>Emotional work</td>
<td>Help at work</td>
<td>12626.456</td>
<td>12629.500</td>
</tr>
<tr>
<td></td>
<td>Friends at work</td>
<td>12626.456</td>
<td>12627.129</td>
</tr>
</tbody>
</table>

Chain length = 45,000; Burn-in = 5,000; Thinning = 10
† Reduction in DIC ≥ 4

support become less likely to report perceived risk of stress (although to a much lesser degree). This is consistent with the demand-control-support model: high demands and low control or support (i.e. high job strain) are associated with poorer health outcomes (in terms of the perceived risk), whereas those in ‘active jobs’ (i.e. high demands, high control and support) are less likely to consider their health to be at risk.
8.9 Random interaction effects

To test whether the above interaction effects vary cross-nationally, a random coefficient for the interaction term is introduced (as well as random coefficients for each main effect involved in the interaction). As before, the DIC statistic is used to test the significance of each random effect. An initial model includes random coefficients for each main effect involved in the interaction; the comparison model introduces an additional random coefficient for the interaction term. The initial model therefore has three random effects; the comparison model has four: the random intercept, random coefficients for A and B and a random coefficient for $A \times B$. Table 8.13 presents the change-in-DIC statistics, showing 5/12 interactions to vary cross-nationally:

a) Job complexity × job control
b) Job complexity × help at work
c) Work intensity × job control
d) Work intensity × friends at work
e) Emotionally demanding work × job control

To illustrate the country-level differences a ‘total effect’ for each interaction has been calculated. This represents the sum, for each country, of the fixed and random effects for (a) the intercept, (b) the measure of job demands, (c) the measure of job resources and (d) the interaction term. An example is given in Table 8.14. The ‘total effect’ is calculated twice, both excluding and including the interaction term. It represents the log odds of ‘perceived risk of occupational stress’, given the fixed and
random effects of the interaction term and the intercept. The log odds are then converted to probabilities and plotted in the figures below.

**Table 8.13:** Change-in-DIC for random interactions

<table>
<thead>
<tr>
<th></th>
<th>Base DIC</th>
<th>DIC</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12532.089</td>
<td>12550.293</td>
<td>9.815†</td>
</tr>
<tr>
<td>Job complexity × Job control</td>
<td>12551.402</td>
<td>12549.874</td>
<td>1.527</td>
</tr>
<tr>
<td></td>
<td>12540.447</td>
<td>12539.634</td>
<td>0.813</td>
</tr>
<tr>
<td>Unsocial hours × Help at work</td>
<td>12561.316</td>
<td>12567.523</td>
<td>−6.207</td>
</tr>
<tr>
<td></td>
<td>12565.897</td>
<td>12567.763</td>
<td>−1.867</td>
</tr>
<tr>
<td></td>
<td>12533.232</td>
<td>12526.116</td>
<td>7.115†</td>
</tr>
<tr>
<td>Work intensity × Help at work</td>
<td>12549.784</td>
<td>12546.703</td>
<td>3.081</td>
</tr>
<tr>
<td></td>
<td>12554.011</td>
<td>12544.974</td>
<td>9.037†</td>
</tr>
<tr>
<td></td>
<td>12520.652</td>
<td>12515.835</td>
<td>4.817†</td>
</tr>
<tr>
<td>Emotional work × Help at work</td>
<td>12538.866</td>
<td>12540.526</td>
<td>−1.660</td>
</tr>
<tr>
<td></td>
<td>12542.410</td>
<td>12545.299</td>
<td>−2.889</td>
</tr>
</tbody>
</table>

Chain length = 45,000; Burn-in = 5,000; Thinning = 10
† = reduction in DIC ≥ 4

Figure 8.12 plots the random interaction between job complexity and job control. The y-axis is the predicted probability that a worker reports perceived occupational stress. The dark grey bars represent the ‘total effect’, that is, the sum of the fixed effect and the country-level residual for (a) the intercept, (b) job complexity, (c) job control and (d) the interaction term (holding all other variables at their mean values). Overall, job complexity is associated with an increased likelihood of perceived stress, but this association is offset (or ‘buffered’) by job control. Most importantly, the size of this buffering effect varies across countries. A strong buffering effect is observed for Norway, Sweden, Cyprus, Italy and Denmark, whereas weaker effects are observed in Germany, France, the Netherlands and Austria. Notably, job control appears to provide a stronger buffering effect in countries where job complexity is more strongly associated with perceived stress (e.g. Norway, Sweden and Cyprus).

The interaction between job complexity and ‘help at work’ is plotted in Figure 8.13. In most countries, ‘help at work’ provides very little protection against job complexity (i.e. the light and dark grey bars are approximately equal). However, in a few countries – for example, Denmark, Norway and Sweden – a substantial buffering effect is observed. In these countries job complexity increases the likelihood of perceived
Table 8.14: Calculating 'total effects' for random interaction terms

<table>
<thead>
<tr>
<th>Country</th>
<th>Fixed effect</th>
<th>Random effect</th>
<th>Total effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>-2.28</td>
<td>-2.22</td>
<td>-2.27</td>
</tr>
<tr>
<td>Denmark</td>
<td>-2.88</td>
<td>-2.39</td>
<td>-2.89</td>
</tr>
<tr>
<td>Germany</td>
<td>-1.93</td>
<td>-1.31</td>
<td>-2.27</td>
</tr>
<tr>
<td>Spain</td>
<td>-2.11</td>
<td>-2.22</td>
<td>-2.18</td>
</tr>
</tbody>
</table>

Where

$\beta_0$ = Intercept
$\beta_1$ = Job complexity
$\beta_2$ = Help at work
$\beta_3$ = Interaction term
risk of stress, but the increase is lower for workers who enjoy high levels of ‘help at work’.

**Figure 8.12:** Predicted probabilities of perceived occupational stress for the interaction between ‘job complexity’ and job control

![Graph showing predicted probabilities of perceived occupational stress for job complexity and job control across countries.]

**Figure 8.13:** Predicted probabilities of perceived occupational stress for the interaction between ‘job complexity’ and ‘help at work’

![Graph showing predicted probabilities of perceived occupational stress for job complexity and help at work across countries.]

Figures 8.14 and 8.15 present two interactions involving work intensity. Job control appears to have little buffering influence in most countries, and in some appears to amplify (that is, worsen) the consequences of work intensity (e.g. Cyprus, Italy, Portugal and Norway). The sole exception
is the Netherlands, where control does appear to reduce the association between work intensity and perceived risk of occupational stress. A similar picture is presented in Figure 8.15. In most countries having ‘good friends at work’ has no discernible impact on consequences of work intensity. The notable exceptions are Norway and (to a lesser extent) Denmark and France.

**Figure 8.14:** Predicted probabilities of perceived occupational stress for the interaction between ‘work intensity’ and ‘job control’

Finally, Figure 8.16 presents the interaction between ‘emotionally demanding work’ and job control. In contrast to previous figures, job control provides a substantial buffering influence in most countries, although the strength of the effect varies. The largest buffering effects are observed in countries where the main effect for ‘emotionally demanding work’ is greatest (i.e. the tallest dark grey bars). For example, workers in Norway, Italy and Sweden benefit greatly from job control, whereas those in Germany, Switzerland and the Netherlands derive little benefit.

Overall, this section highlights significant cross-national variation. Job resources are more important (as a buffer of job demands) in some countries than others, although this depends on the measure in question. The two interactions involving ‘work intensity’ differed little between countries (despite significant change-in-DIC statistics). Most consistently, job resources appear to more effectively buffer job demands in countries where these demands are themselves most strongly associated with the outcome (i.e. the perceived risk of occupational stress).
Figure 8.15: Predicted probabilities of perceived occupational stress for the interaction between ‘work intensity’ and ‘I have good friends at work’

Figure 8.16: Predicted probabilities of perceived occupational stress for the interaction between ‘emotionally demanding work’ and ‘job control’
8.10 Discussion and conclusions

This section summarises the above findings and attempts to relate the observed country-level differences to the contextual variables discussed earlier (i.e. national culture, economic climate and trade union density). This chapter posed five questions regarding the cross-cultural consistency of the JD-R model, which can now be addressed:

1. To what extent do job demands and job resources predict the perceived risk of occupational stress?

2. To what extent is there an interaction between demands and resources, whereby resources buffer the association between demands and perceived stress?

3. To what extent do these relationships vary across Europe?

4. To what extent is this variation explained by contextual variables, such as culture, the economy or trade union density?

The first question has been addressed extensively in the existing literature (see earlier review). With regards to the additive, fixed associations between job demands, resources and perceived occupational stress, this chapter is consistent with past research. All four types of job demand were positively associated with perceived risk of occupational stress. Conversely, with few exceptions, all three types of job resource were significantly associated with reduced odds of perceived stress. As in past studies, support for an interactive relationship between demands and resources was much weaker. Of 12 interaction effects considered, just two were shown to be significant (based on the DIC statistic). These interactions showed work-based control and support to significantly buffer the association between job complexity and perceived occupational stress.

There was good evidence to suggest that the main effects of job demands and resources vary cross-nationally. For 5/8 measures the introduction of a random coefficient significantly improved overall model fit (in terms of DIC). Job demands and resources, in other words, are more important (as a determinant of perceived risk of stress) in some countries than others. What the analysis did not provide, however, is any explanation for these differences. There do appear to be systematic differences between northern and southern Europe (or more precisely, between Scandinavian and Mediterranean countries), but it is not clear which of these are methodologically or substantively motivated. Do workers in Scandinavia experience greater demands or higher levels of
occupational stress, or are they simply more aware of such issues? Are job resources less important in some countries than others, or do the observed differences instead reflect differences in interpretation, linked to cultural or societal norms? These issues are discussed below.

Finally, good support was also found for cross-national variation in the interaction between demands and resources. For 5/12 interactions, introducing a country-specific interaction term significantly improved the overall model fit. This is a substantial finding. While there is weak support for the interactive demand-resource relationship across Europe as a whole, significant random interactions would imply that job resources are important in some countries but not others. This is supported by the figures plotted above. Job resources, such as control or support, weaken the association between demands and perceived stress much more effectively in some countries than others. This again underlines the need for cultural sensitivity when seeking to identify and prevent adverse working conditions.

**Contextual determinants of cross-national differences**

It was earlier hypothesised Karasek’s DCS model might depend on contextual variables such as national culture, macro-economic conditions or trade union density. Unfortunately, there is not space in this chapter to give such factors adequate empirical consideration. The preferred approach would be to introduce contextual variables into the models directly, as level-2 moderators. One could then test whether the interaction between demands and resources is itself dependent on contextual variables (i.e. a three-way, cross-level interaction). This is a topic for future research.

As a simpler solution, Table 8.15 presents correlations between contextual variables and the country-level variation observed in the above regression models. Three statistics are considered: (a) aggregate scores for demands, resources and perceived risk of occupational stress; (b) random effects for the associations between these variables (i.e. level-2 residuals); and (3) random interaction effects between demands and resources. Seven contextual variables are considered:

- Macro-economic conditions (national GDP and unemployment)
- Trade union density
- National culture (power-distance, individualism, masculinity and uncertainty avoidance)
Overall, there are few significant correlations between the ‘perceived risk of stress’ and national context. A notable exception is trade union density which is positively correlated with the proportion of respondents perceiving occupational stress ($\rho = 0.65$). This is consistent with other chapters in this thesis, and the existing literature (e.g. Gallie 2005). Trade unions may increase awareness of health and safety issues, which may increase the proportion of respondents who perceive their health to be at risk due to work. Job complexity and work intensity are, perhaps for similar reasons, also positively associated with trade union density.

Table 8.15 presents many significant correlations that are difficult to summarise succinctly. The results suggest potential linkages between working conditions, perceived health and national context, but highlight the need for further analysis. As argued elsewhere, macro-level differences are a starting point for more detailed analysis that disaggregates the relevant contextual variables. The perceived health consequences of stressful work differ significantly between, for example, Scandinavian and Mediterranean countries. Job resources can buffer job demands, but only in some countries. The next step, therefore, is to explain these differences. This chapter considered national culture, the economy and unionisation, but further disaggregation is required.

**Limitations**

This chapter is subject to several limitations. As discussed above, the dependent variable introduces a high degree of subjectivity and is likely to reflect fluctuations in personality, mood and context (Siegrist et al. 2004). The ‘perceived risk of occupational stress’ is a poor proxy for actual psychological distress. For a host of reasons, a worker’s perception of their health risk may be at odds with the objective threat. Efforts have been made throughout the chapter to reiterate that these findings relate to the perceived risk of occupational stress, rather than stress itself. While these indicators are the best available in the 2005 EWCS, it would be preferable to repeat this analysis with an alternative dataset, that does not depend on workers’ self-definition or self-diagnosis of health problems.

A second limitation is that, in focusing on geographic differences, this chapter overlooks temporal variation. As Hasselhorn et al. (2008) show, work-related health can vary considerably even over short periods. Whereas this study captures respondents at a single time point, future research should address longitudinal (as well as geographic) variation in the DCS or JD-R models. Do the associations between demands,
resources and health mirror changes in local or national circumstances (e.g. recession, political upheaval)?

In conclusion, this analysis questions the cross-cultural applicability of the JD-R model. While reliant on a measure of perceived health risk, the study nonetheless underlines the need for cultural sensitivity when evaluating the consequences of stressful or demanding working conditions. The next step is to explain these differences. National culture, economic conditions and unionisation appear relevant, but other factors are likely to play a role. Future research should: (a) develop theories underpinning the interaction of working conditions and national context; (b) avoid measures of perceived health risk in favour of more objective outcomes; (c) incorporate more appropriate methods (e.g. multilevel SEM) and (d) consider other regions, beyond Western Europe (e.g. Brough et al. 2013); (e) repeat these findings with the 2010 EWCS or (f) longitudinal data; and (g) consider other macro- and meso-level factors related to job stress.
Table 8.15: Correlations between national context and means and associations between job demands, resources and perceived risk of occupational stress

<table>
<thead>
<tr>
<th></th>
<th>Economy</th>
<th>National culture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDP</td>
<td>National culture</td>
</tr>
<tr>
<td>Perceived risk of stress</td>
<td>0.03</td>
<td>-0.21</td>
</tr>
<tr>
<td></td>
<td>-0.10</td>
<td>-0.20</td>
</tr>
<tr>
<td></td>
<td>0.65*</td>
<td>-0.53</td>
</tr>
<tr>
<td></td>
<td>-0.28</td>
<td></td>
</tr>
<tr>
<td>Job complexity</td>
<td>0.54</td>
<td>-0.68*</td>
</tr>
<tr>
<td></td>
<td>-0.49</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>0.60*</td>
<td>-0.50</td>
</tr>
<tr>
<td></td>
<td>-0.65*</td>
<td></td>
</tr>
<tr>
<td>Work intensity</td>
<td>0.33</td>
<td>-0.68*</td>
</tr>
<tr>
<td></td>
<td>-0.04</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>0.64*</td>
<td>-0.24</td>
</tr>
<tr>
<td></td>
<td>-0.52</td>
<td></td>
</tr>
<tr>
<td>Emotionally demands</td>
<td>-0.03</td>
<td>-0.35</td>
</tr>
<tr>
<td></td>
<td>-0.12</td>
<td>-0.57*</td>
</tr>
<tr>
<td></td>
<td>-0.18</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>-0.09</td>
<td></td>
</tr>
<tr>
<td>Unsocial hours</td>
<td>-0.19</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>0.20</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>0.02</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Total hours</td>
<td>-0.59*</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>0.24</td>
<td>-0.68*</td>
</tr>
<tr>
<td></td>
<td>-0.01</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>Job control</td>
<td>0.55</td>
<td>-0.47</td>
</tr>
<tr>
<td></td>
<td>-0.63*</td>
<td>0.67*</td>
</tr>
<tr>
<td></td>
<td>0.68*</td>
<td>-0.49</td>
</tr>
<tr>
<td></td>
<td>-0.72*</td>
<td></td>
</tr>
<tr>
<td>Help at work</td>
<td>0.61*</td>
<td>-0.76*</td>
</tr>
<tr>
<td></td>
<td>-0.58*</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>0.58*</td>
<td>-0.41</td>
</tr>
<tr>
<td></td>
<td>-0.82*</td>
<td></td>
</tr>
<tr>
<td>Friends at work</td>
<td>0.38</td>
<td>-0.45</td>
</tr>
<tr>
<td></td>
<td>-0.33</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>0.54</td>
<td>-0.34</td>
</tr>
<tr>
<td></td>
<td>-0.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.56*</td>
<td></td>
</tr>
<tr>
<td>Job complexity</td>
<td>-0.08</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>-0.22</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>-0.47</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>Emotional demands</td>
<td>0.06</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>-0.28</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>-0.10</td>
<td>-0.25</td>
</tr>
<tr>
<td></td>
<td>-0.04</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>-0.25</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>0.56*</td>
<td></td>
</tr>
<tr>
<td>Job control</td>
<td>-0.06</td>
<td>-0.66*</td>
</tr>
<tr>
<td></td>
<td>0.58*</td>
<td>-0.73*</td>
</tr>
<tr>
<td></td>
<td>-0.73*</td>
<td>0.66*</td>
</tr>
<tr>
<td></td>
<td>-0.40</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>0.84*</td>
<td></td>
</tr>
<tr>
<td>Help at work</td>
<td>-0.66*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.58*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.73*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.66*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.84*</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>Job complexity</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>-0.41</td>
<td>0.71*</td>
</tr>
<tr>
<td></td>
<td>-0.25</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>-0.56*</td>
<td>-0.47</td>
</tr>
<tr>
<td></td>
<td>0.29</td>
<td>-0.34</td>
</tr>
<tr>
<td></td>
<td>-0.34</td>
<td>0.81*</td>
</tr>
<tr>
<td></td>
<td>-0.44</td>
<td>-0.44</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>-0.56*</td>
</tr>
<tr>
<td></td>
<td>-0.58*</td>
<td></td>
</tr>
<tr>
<td>Work intensity</td>
<td>0.14</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>-0.18</td>
<td>-0.12</td>
</tr>
<tr>
<td></td>
<td>0.39</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>-0.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.78*</td>
<td>-0.37</td>
</tr>
<tr>
<td></td>
<td>0.16</td>
<td>-0.27</td>
</tr>
<tr>
<td></td>
<td>0.46</td>
<td>-0.39</td>
</tr>
<tr>
<td></td>
<td>-0.44</td>
<td></td>
</tr>
</tbody>
</table>

* = significant at the 95% level
9 Discussion

This chapter relates the foregoing empirical results to the broader theoretical argument of the thesis. The original motivation was to build on the macro-level literature on post-industrialisation, but it soon became clear that to do this required a move to the micro-level. The essence of the argument is that post-industrialisation has brought about new working arrangements and conditions, but as preceding chapters show, the individual consequences of these changes depend on who is experiencing them, and where.

This chapter goes the other way, reflecting on the wider substantive and methodological implications of the micro-level findings. The discussion is split into four sections. The first briefly reiterates the core theoretical argument and the second summarises the substantive results. The third section contrasts the comparative findings of the thesis with the established welfare regime framework (Esping-Anderson 1990). The final section extends the theme of moderation, developing a more holistic argument about the role of complexity in the study of social change.

This chapter was particularly challenging to write because of how the thesis straddles the macro- and micro-level literatures. The analytical chapters stand on their own, that is, they have relevance within particular disciplinary or substantive fields. Organising them into a coherent narrative, however, requires a conceptual leap. These chapters epitomise an integrated approach to research that is a direct response to the disciplinary separation of micro (i.e. epidemiology, public health) and macro (i.e. sociology, social policy). Their purpose, therefore, has been twofold. First, to advance current understanding of the link between working conditions and health. Second, as the building blocks of a broader argument about the study of social change. The core contribution of the thesis is thus the spanning (empirically and theoretically) of the micro-macro divide (illustrated in Figure 9.1).
9.1 The moderated consequences of post-industrial employment

The premise of this thesis is that post-industrialisation has led to new working arrangements that have important consequences for individual well-being. Crucially, however, these consequences will depend on (i.e. be moderated by) a range of individual characteristics and contextual variables. Since Bell’s original thesis (1974), which charted an economic shift from industry to services, the concept of post-industrialisation has been applied to just about every societal development of the past four decades. This interest has spawned a plethora of related terms, such as the ‘information society’, the ‘knowledge economy’ or the ‘creative class’. Whether emphasising knowledge, technology (Negroponte 1996) or the economic potential of ‘creative workers’ (Florida 2002), the arguments are similar: industrial society has ended, and facilitated by advances in technology, qualitatively new forms of society are emerging, based around a different economic logic to that of the post-war years.

These concepts have been overused in policy documents, political rhetoric and in large swathes of the academic literature, to the point where their meaning has become lost. ‘Post-industrial society’ is not a theory; but a vague term used to label just about any process or trend one cares to bring under the umbrella. Most critically, it fails to describe the individual, everyday experience of shifting economic priorities. While providing context for debates about social change in recent times, it should remain in the periphery.
Moving beyond the macro-level, this thesis highlighted specific labour market trends, focusing upon consequences of job insecurity and work intensity for individual health and well-being. It is widely acknowledged that paid employment has become more precarious in recent decades. Workers no longer expect a ‘job-for-life’ and are likely to find themselves moving between temporary positions in ‘patchwork’ careers (Mills and Blossfeld 2006). Equally, if physical demands declined in the shift away from industrial employment, they have been replaced by psychological pressures, unsocial hours and work-home overlap (Burchell et al. 2002). Importantly, these are trends that can be measured. Surveys can ask about, for example, people’s fear of becoming unemployed or the demands placed on them at work. Whether these changes fit within any grand theory is unimportant. Broader context is useful but what matters is the perceived (rather than theorised) changes and the impact these have on everyday lives. One can study individual outcomes without reference to broader societal transformations, but the reverse is not true. It is not possible (or advisable) to examine societal change without reference to individual experiences. Social research, in other words, is inescapably multilevel.

9.2 Summary of the empirical findings

This thesis focused on job insecurity and work intensity as two trends that typify post-industrial employment. Chapters 4, 5 and 6 considered the association between job insecurity and subjective well-being, while chapters 7 and 8 focused on the inter-relationships between job demands, job resources and self-reported psychological outcomes. Each chapter addressed a specific moderating factor, guided by the existing literature. These were, in turn: (4) family or household context, (5) national economic climate and (6) labour market policies, (7) job resources such as control or support and (8) contextual moderators such as national culture or trade union density. Together, these chapters test the hypothesis that, although job stressors are invariably linked with poor health, this relationship depends on who is experiencing them and where. This hypothesis was mostly upheld. The association between work and health was influenced by individual and national circumstances, although some factors were more important than others. Family arrangements (chapter 4) appeared to have no effect, whereas national economic conditions (chapter 5) and labour market policies (chapter 6) did. The substantive findings of each chapter are detailed below.
Chapter 4

This chapter tested whether the link between job insecurity and depression was influenced by family circumstances such as the presence of children, sole occupancy or partner’s employment status. Consistent with past studies, perceived insecurity was positively associated with depression in all countries, but no support was found for the moderating hypothesis. The increase in depression associated with high job insecurity was no greater among workers reporting low levels of social support or high levels of job dependency. This calls for further research. Despite strong theoretical support for the moderating role of family arrangements this is not – at least, for this dataset (the 2006 ESS) and these variables – borne out by the empirical evidence.

Chapter 5

Again using data from the 2006 ESS, chapter 5 showed that although job insecurity was negatively associated with life satisfaction, the strength of this association depended on the wider economic climate. Labour market insecurities – such as trends in GDP, unemployment or aggregate satisfaction with the national economy – compounded individual fears, such that the threat of unemployment had the greatest bearing on life satisfaction in countries where economic conditions were least favourable. While intuitive, this finding makes a worthwhile contribution to the existing literature. The direct link between macro-economic conditions and perceived insecurity is well supported, but the moderating effect has received little attention.

Chapter 6

Chapter 6 also examined the link between perceived insecurity and life satisfaction, but focused instead on the buffering potential of labour market policies (LMPs). Generous policy support was hypothesised to address the twin determinants of affective insecurity, namely, the perceived difficulty of finding another job (in the case of active LMP) and access to alternative income sources during unemployment (in the case of passive LMP). Based on data from the 2010 ESS, these hypotheses were mostly upheld. Controlling for individual circumstances and economic context, more generous policy support (i.e. higher expenditure or replacement rates) weakened the association between job insecurity and life
satisfaction. Moreover, this buffering effect appeared to be strongest among more vulnerable groups in the labour market. This is a substantial finding. While several studies have explored the link between LMP and perceived insecurity (e.g. Erlinghagen 2008; Chung and van Oorschot 2011), none to date have considered how LMPs might indirectly motivate well-being, via job insecurity.

Chapter 7

Chapter 7 presented a latent class and mixture regression analysis of the associations between job demands, job resources and strain. Despite hundreds of articles on the JD-R model, none to date has adopted a mixture regression approach. The chapter was in two parts. The first used latent class analysis to identify three classes of increasing levels of demand. Class 1 was comprised of part-time workers who were least likely to report any type of demand. Class 3, by contrast, contained workers who regularly worked more than 48 hours a week and reported the highest levels of demand. Multinomial regression analysis showed class membership to be significantly associated with job resources. As in past studies, flexible working and good workplace relations were associated with reduced demands. Surprisingly, however, permanent tenure and job control were associated with increased demands. These respondents appear to represent the ‘active’ workers in Karasek’s model (i.e. a high level of demand but which is offset by corresponding levels of control).

The second part used mixture regression analysis to assign workers to classes based on the association between demands and strain (rather than the means and variances of these variables). Overall, job demands were significantly associated with increased job strain, but the strength of the relationship varied considerably across classes. To explain these differences a multinomial regression model examined the determinants of class membership. Intriguingly, workers who reported the highest levels of job strain were least affected by job demands (in terms of the association between demands and strain). Moreover, while job resources were negatively associated with the level of reported job strain, they were positively associated with demand-strain relationship. Workers with good job security, high levels of control and positive manager-employee relations had the strongest reactions to additional job demands. Further research is needed to disentangle this relationship.
Chapter 8

Finally, chapter 8 highlighted cross-national differences in (a) the association between job demands and perceived occupational stress, and (b) the interaction between demands and resources. Based on data for 17 countries from the 2005 EWCS, the analysis demonstrated that not only are demands and resources more strongly associated with perceived risk of stress in some countries than others, but equally, the extent to which resources buffer demands varies also. This is an important finding that questions the cross-cultural applicability of the DCS or JD-R models.

9.3 The comparative lessons

This section synthesises the comparative findings and contrasts the observed national differences with the established ‘welfare regime’ framework (e.g. Esping-Andersen 1990). By way of introduction, a critical overview of the welfare regime literature is presented first.

9.3.1 Welfare regime theory

Scholars have long been concerned with how states can be classified according to the configuration of welfare policy (Wilensky 1974; Skocpol 1985; Skocpol and Amenta 1986). However, it was Esping-Andersen’s seminal study The Three Worlds of Welfare Capitalism (1990) that cemented the concept of welfare regimes into the social policy lexicon. Using data on ‘decommodification’ (the extent to which individual welfare depends on the market), ‘stratification’ (the extent to which the welfare state breaks down social divisions) and the ‘public-private mix’ (of welfare provision), Esping-Andersen identifies three ‘ideal types’ of welfare state. The ‘liberal’ regime (which includes Anglophile countries such as the UK, USA, Ireland, Canada, Australia and New Zealand) is typified by weak social rights, low levels of decommodification and high inequality. The ‘conservative’ regime (e.g. Germany, France, Austria, Belgium and Italy) is typified by weaker reliance on market provisions of welfare, strong social rights (but often attached to occupation or status) and low levels of redistribution (i.e. minimal role for the state in addressing inequality). Finally, the ‘social democratic’ regime (e.g. Sweden, Finland and Norway) is typified by universal welfare provision, high levels of decommodification and low inequality.
The ‘three worlds’ model has been subject to considerable criticism, replication and revision over the past two decades (see Arts and Gelissen 2002; Bambra 2006; Jæger 2006). Several theorists have suggested additional regime types, such as the ‘Mediterranean’ or ‘Latin Rim’ model (Leibfried 1992; Ferrera 1996) or the ‘Antipodean’ regime (Castles 1998). Some highlight the neglect of gender issues (Lewis 1992; Bambra 2004) while others emphasise weaknesses of the data or method (Scruggs and Allan 2006). These criticisms notwithstanding, the basic premise of welfare regimes – namely, a macro-level typology of countries based on various indicators of welfare effort and configuration – has remained remarkably resilient across the literature. Indeed, it is hard to find an article on comparative social policy that does not reference the 1990 study.1

Despite (or perhaps, because of) their popularity, the established welfare typologies introduce two distinct problems. Firstly, they conflate many important differences under a single label and encompass far more than the provision of welfare. Individual experiences will depend on the historical, political, economic and cultural contexts in which social policies are implemented – and not just on the generosity or configuration of welfare. The term ‘cultural regimes’ would be more appropriate (see Pfau-Effinger 2005). The more serious problem is that the predominance of the ‘three worlds’ model discourages more disaggregated analysis of welfare effort. It may be useful to group countries, but only insofar as these groupings are relevant to the topic in question. Given the range of topics to which Esping-Andersen’s model has been applied, this relevance is questionable. There undoubtedly exist systematic differences between, for example, Scandinavian and Mediterranean countries, and these groupings appear repeatedly in cross-national analysis, but it is not clear whether the decommodifying and stratifying potential of welfare policy are the salient distinctions. The ‘three worlds’ typology, in short, is misappropriated in studies where these clusters are convenient and consistent with empirical findings.

In emphasising moderation, this thesis underlines the need for analysis that can ‘unpack’ regime types (Matsumoto and Yoo 2006). What is it, for example, about the ‘social democratic’ regime that is thought to moderate a given outcome? Is it the generosity of welfare? Is it attitudes

---

1As of December 2013, The Three Worlds of Welfare Capitalism (1990) has been cited 18,183 times (on Google Scholar).
towards welfare state? Is it the role of family and church in the provision of welfare? Is it the influence of trade unions, the extent of gender equality or historical political tendencies? If the data exist to identify welfare regimes, then these same data should be used in our empirical analyses. As Poortinga et al. (1987) argue:

In our approach culture is a summary label, a catchword for all kinds of behaviour differences between cultural groups, but within itself, of virtually no explanatory value. Ascribing intergroup differences in behaviour, e.g., in test performance, to culture does not shed much light on the nature of these differences. It is one of the main tasks of cross-cultural psychology to peel off the cross-cultural differences, i.e., to explain these differences in terms of specific antecedent variables, until in the end they have disappeared and with them the variable culture (p. 22).

9.3.2 Cross-national variation in this thesis

Four chapters considered national differences in the prevalence and consequence of work-based stressors, and of these, three examined the role of contextual variables. Chapters 4, 5 and 6 use ESS data to examine the association between job insecurity and subjective well-being for 5, 14 and 22 Western European nations, respectively. Chapter 8 uses EWCS data to consider the association between job demands and perceived occupational stress for 17 European countries. In many ways, these chapters are not concerned with cross-national differences per se, but rather, in their disaggregation. Identifying variation is a starting point; explaining variation is the goal.

Chapter 4

Chapter 4 considered job insecurity and family context using data from the 2006 ESS. Across Europe, average levels of perceived insecurity were highest in Mediterranean countries (e.g. Portugal, Spain and France) and lowest in Northern European countries, such as Norway, the Netherlands and Sweden. Five countries were chosen to represent the conservative (Germany), social democratic (Sweden), Mediterranean (Portugal) and liberal (Ireland and the UK) types of welfare regime. Overall, perceived job insecurity was significantly associated with increased depression, but the strength of this association varied cross-nationally. Respondents in Ireland and Portugal reacted more strongly to the threat of job loss (an
increase in depression of 0.99 and 0.51, respectively), whereas workers in Sweden and the United Kingdom were less affected (increases of 0.37 and 0.36, respectively). To repeat a recurring theme, there appear to be significant differences between central and northern European countries, on the one hand, and southern or Mediterranean countries, on the other.

Chapter 5

Chapter 5 showed that while job insecurity is significantly associated with reduced life satisfaction, the strength of this association depends on the prevailing economic climate (e.g. economic growth and national unemployment). By emphasising individual variables, rather than the countries themselves, this chapter exemplifies the type of disaggregated analysis called for above. Job insecurity was shown to be more strongly associated with life satisfaction in countries where, in 2006, economic growth was lower and unemployment was higher – for example, Spain, France, Portugal, Germany and Belgium. Respondents were less affected where economic conditions were more favourable, for example, in the Netherlands, Denmark, Ireland and Norway.

Chapter 6

This chapter similarly sought to detach country labels from the contextual variables that were ‘doing’ the moderating effect. Based on data from the 2010 ESS, the analysis showed the association between perceived insecurity and life satisfaction to depend on the generosity of passive and active labour market policies (LMPs). For workers in countries with more generous unemployment benefits (in terms of duration or replacement rate) or activation support (in terms of expenditure), the threat of job loss accrued a smaller decrease in life satisfaction, compared to countries with more meagre provision. From the data on LMP generosity, a north-south divide was again evident. Workers in Northern Europe (e.g. Sweden, the Netherlands, Finland and Denmark) enjoy more generous LMP provision than do those in Southern Europe (e.g. Spain, Portugal and France).

Chapter 8

Finally, chapter 8 found both levels of, and associations between, job demands, resources and the ‘perceived risk of occupational stress’ to vary significantly across 17 Western European countries. With several exceptions, the north-south divide remained intact, although the more relevant distinction was perhaps between Scandinavia and the rest of Europe. Aggregate levels of ‘perceived risk of occupational stress’ were
highest in Sweden, Norway, Finland and Denmark. Respondents in these
countries also tended to report the highest levels of job demands and job
resources, on average. This is largely consistent with past studies. de
Smet et al. (2005) and Smulders et al. (1996) similarly identify divisions
between Northern Europe and Mediterranean countries, while Taipale
et al. (2011) find levels of demands and resources to go hand-in-hand.
Significant variation was also observed with regards to the associations
between demands and perceived stress (for 5/8 measures), although the
trends are harder to summarise. For some measures (e.g. work intensity)
the familiar north-south divide appears, for others the results were less
consistent.

The most interesting findings related to the random (i.e. country-
specific) interactions between demands and resources. Across Europe as a
whole, there was very little support for the interactive relationship between
demands and resources (just 2/12 interactions were significant). However,
these fixed effects hid considerable between-country heterogeneity: job
resources had a substantial buffering effect in some countries, but no effect
in others. Consistent with earlier findings, job control and social support
buffered job demands more effectively in Sweden, Norway and Denmark
(but also, unusually, Italy and Cyprus). Weaker or non-significant
buffering effects were observed for Central and Southern Europe.

9.3.3 Summary

These four chapters demonstrate significant cross-national variation that is
suggestive of a north-south divide. Although hard to summarise succinctly,
there do appear to be systematic differences between Scandinavian
countries and the rest of Europe. On some measures, the Mediterranean
countries of Spain, Portugal and France also emerge as a separate cluster.
These findings are consistent with Esping-Andersen’s typology insofar
as they delineate regional clusters resembling the ‘Social Democratic’
and ‘Latin Rim’ (Leibfried 1992) regime types. The Central European
countries, by contrast, are much harder to separate, and the liberal
and conservative regime types simply do not emerge from the empirical
findings. For the reasons set out above, this is perhaps unsurprising.
The health consequences of stressful or insecure employment will depend
on many factors besides the decommodifying or stratifying role of state
welfare. Cultural or geographic clusters are indeed intuitive, but do a
disservice to our capacity for more disaggregated analysis.
9.4 A moderation perspective

Two main findings emerge from previous chapters. First is the remarkable reliability with which work-based stressors can be linked to subjective well-being. Across five analytical chapters, perceived job insecurity, time pressure and work overload were consistently associated with reduced life satisfaction and impaired mental health. These relationships held across multiple surveys, years and having controlled for a range of background variables. This finding, which is consistent with past studies, underlines the significance of these topics for policy-making. Over the past four decades, the post-industrialisation of Western economies has had a profound impact on labour market structures and processes. Not only has the experience of work changed, in terms of content and conditions, but career trajectories have become more varied and uncertain. The notion of a ‘job-for-life’, if it ever held true, is a distant memory. Frequent job changes, temporary contracts, permanent states of uncertainty and a shrinking safety net – these are the hallmarks of work in the 21st century.

Such upheaval only reiterates the significance of this first finding. Post-industrialisation has reshaped working lives, but paid employment (or the lack of it) remains a principal determinant of health and well-being. The shift from industry to services may have changed the types of demand, pressure or strain that employees face, but the consequences for health remain.

The second, more notable finding is not how consistently work influences health, but rather, how frequently this relationship depends on specific individual and national circumstances. Successive chapters demonstrated that, when faced with the threat of job loss or excessive demands, some individuals fair worse than others. Not all moderators are equally important – family context had no discernible impact, whereas economic conditions and LMPs did – but overall, empirical support for the moderation hypothesis was compelling.

Such heterogeneity of outcomes holds academic interest, but is even more relevant when it comes to policy-making. Policy responses typically take one of two forms: they can reduce the incidence of work-based stressors (i.e. reduce the prevalence of job insecurity), or they can weaken the link between a stressor and the subsequent health outcomes (a buffering effect). This thesis has emphasised the latter. Most people will experience insecurity in their working life or feel they are unable to meet the demands of their job. While the capacity of policy to reduce the prevalence of work-based stressors is often limited (e.g. during a recession), much can be done to mitigate the associated outcomes. Effective policy-
making requires an understanding of the link between work and health. Why do employees react to similar threats in different ways? What forms of support can successfully reduce the consequences of perceived insecurity? What factors exacerbate them?

These are questions of moderation. The Oxford English Dictionary defines moderation as “the action of making something less extreme, intense, or violent” (OUP 2010), which is a good starting point. In statistical terms, moderators of variables that alter the relation between two variables (MacKinnon 2008: 275), typically represented using interaction effects. The most important contribution of this thesis, therefore, is to have highlighted how social, cultural and economic factors at the micro-, meso-, and macro-levels, will all influence the day-to-day experience of work. Identifying those factors that provide a protective, buffering influence is a starting point for effective interventions.

I began this PhD trying to escape the ambiguities of macro-level theory. Job insecurity and work intensity were specific, identifiable trends that made coherent analysis possible. This focus helped me tolerate the imprecision of the macro-level (i.e. post-industrial theory). Progress is hard (if not impossible) when your core theoretical constructs are poorly defined and encompass nearly every aspect of society. Post-industrial theory, as argued earlier, suffers a tendency for technological determinism, discontinuous, all-or-nothing accounts of social change and is disconnected from micro-level realities. In response, this thesis has highlighted both the enduring significance of ‘old social risks’ and the diversification (i.e. moderation) of experiences and outcomes. As Edgerton highlights in The Shock of the Old (2007), the history of social change is less about the novel exceptions than the mundane; less about new technologies than the application of existing ones in new social contexts (p. 212). There have undoubtedly been important changes in the organisation of work over the last 30 years, and perhaps some of these are linked to technological advances. But what matters for individual health and happiness remains largely unchanged. As Edgerton argues:

> History is changed when we put into it the technology that counts: not only the famous spectacular technologies but the low and ubiquitous ones (p. 212).

In the same way, our accounts of post-industrialisation change when we emphasise the experiences that count: not the ‘creative class’, ‘timeless time’ or the ‘space of flows’, but the mundane reality of insecure work, excessive job demands, low pay, inadequate training, unsupportive
supervisors and little hope of progression. The dazzle of post-industrial theory is a distraction from the actual mechanisms of social change.

9.5 The methodological challenges of individualisation

This section develops the theme of moderation, reflecting on the methodological challenges posed by a diversification of labour market experiences and outcomes. Introduced in chapter 3, Beck’s notion of individualisation states that conventional determinants of social stratification (such as class or education) are increasingly unreliable as predictors of social disadvantage as individuals are exposed to a more diverse and contextualised set of risks, such that individual experiences and outcomes are self-created. As this thesis has shown, work-based stressors consistently predict poor health, but the strength of this relationship varies. Chapters 5 and 6 highlighted how outcomes are filtered by national context, while chapter 7 emphasised the role of individual attributes (e.g. control, occupation) and organisational setting (e.g. workplace relations). Across Europe, there may have been a general destandardisation or intensification of work, but if outcomes are contingent on a particular configuration of individual and environmental variables, the emphasis on collective trends seems misplaced.

This diversity is problematic when it comes to designing and targeting social interventions, since policy-makers can no longer rely on broad tendencies affecting large groups of individuals. However, it is equally problematic from a methodological standpoint. Whereas earlier analytical chapters focused on a single moderating factor, the notion of individualisation suggests that outcomes are moderated, simultaneously, by multiple factors at the micro-, meso- and macro-levels. In this way, Beck’s thesis shares much with what Urry (2005b) describes as the ‘complexity turn’ in the social sciences:

*The sense of contingent openness and multiple futures, of the unpredictability of outcomes in time-space [...] of diverse and non-linear changes in relationships, households and persons across huge distances in time and space (p. 52).*

Importantly, an admission of complexity does not imply “complete anarchic randomness” but instead there is an ‘orderly disorder’ (p. 52) within such systems. Complexity perspectives emphasise strong
interactions within a system, often with “the absence of a central hierarchical structure that ‘governs’ and produces outcomes” (ibid.).

This approach has much to contribute to the study of post-industrial society. The experience of work has undoubtedly changed, but the cumulative impact multiple moderating factors produces a diversity of outcomes. The focus, in earlier chapters, on a single moderating factor, appears superficial. The consequences of job insecurity and job stress will to depend on the simultaneous influence of family arrangements, economic conditions, labour market policies, job resources and any number of variables relating to cultural norms, the political atmosphere and welfare institutions. Such complexity was glimpsed in preceding chapters. Chapter 6 showed how the interaction between perceived insecurity and labour market policy was itself dependent on individual attributes, such as age or occupation. Chapter 8 highlighted cross-national variation in the interaction between job demands and resources, hinting at any number of unobserved contextual variables.

**Methodological nationalism**

This thesis has highlighted national context at the expense of regional or local factors. This tendency for country-level analysis, found throughout the comparative welfare literature, is labelled by Beck (2007a) as ‘methodological nationalism’. This is the “assumption that nation/state/society is the natural social and political form of the modern world” (Wimmer and Schiller 2002: 302), or as Beck defines it, “the unreflective, supposed congruence between political and socio-economic status” (Beck 2007b: 688). Social phenomena, such as the proliferation of labour market risks, transcend established geographic and political boundaries, and researchers adopting a position of methodological nationalism are “unable to see border crossing interactions, interconnectedness and intercommunication” (Beck 2006: chapter 1).

Methodological nationalism in the social sciences is a problem of data, theory and method. Too often, the emphasis on national differences is a theoretical and methodological convenience. On the one hand, welfare policy is organised at the national level and so it makes sense that the comparative policy literature is located here. However, policy is just one form of contextual influence and local conditions will remain important. Cross-national survey data is, for reasons of administration and funding, organised nationally. Moreover, it is rare that adequate samples are provided for lower-level geography, such as regions, districts or electoral units. Where it is provided, sample sizes for regional data usually preclude
the analysis of heterogeneity (e.g. interaction effects). The 2006 ESS, for example, provides as few as 20 or 30 cases for some Spanish regions, and regional samples of 50-100 are common. Usability is another problem. As I found during this PhD, it is often difficult to accurately link regional data with contextual information. Regional identifiers in the 2006 ESS, for example, were either missing or inconsistent, with NUTS 2 available for approximately half the countries, but only NUTS 1 or 3 for many others. Often, due to changes in administrative boundaries, it is simply not possible to link survey and contextual sources.

Methodological responses to complexity

An acknowledgement of complexity and the rejection of methodological nationalism calls for stronger theoretical foundations connecting micro- and macro-level processes. Methodological innovations are equally necessary. The complex interactions, multiple futures and diverse outcomes inherent to complexity analysis are beyond the reach of many conventional quantitative techniques such as regression analysis with interaction terms. It is entirely plausible that more complex interactions exist encompassing influences at individual, family, local, regional, national and supra-national levels. The introduction of temporal variation only complicates things further. As previous chapters show, for any given individual, their experience of social change may depend on personal factors (e.g. personality, past experiences), household circumstances (e.g. dependent children, breadwinner status), the local environment (e.g. support from extended family/friends), their workplace (e.g. job control, supervisor support) and the industry, region and country in which they live and work (e.g. unemployment rates, economic growth, welfare generosity or national culture).

Conventional methods are a simplification that, for the most part, we (as social scientists) tolerate in order to get work done. Historically, we have relied on survey data, which captures a subset of cooperative individuals in a particular mood, on a particular day, at a particular time. We overlook inter-relationships between variables, and examine a narrow set of independent and dependent variables. We study individuals-within-countries because we lack data at lower geographic levels. Truly, the maxim “all models are wrong” (Box 1976: 792) cannot be overstated. Parsimonious explanations of social life should be admired, but only if they acknowledge the underlying complexities. To adopt the language of critical realism, we may operate at the ‘empirical’ so long as we do not forget the ‘real’.
The limited ability of contemporary quantitative methods to address complexity does not invalidate existing research, but rather, suggests several avenues for development, both in terms of data and method. Most comparative surveys provide small national samples (e.g. N < 1500) that prevent analysis of complex interactions and within-sample heterogeneity. The situation for region- or district-level data is even worse. At the same time, larger samples are prohibitively expensive, particularly in a period of austerity and spending cuts. Most tellingly, the Office for National Statistics recently completed a consultation on the future replacement of the census in England and Wales (ONS 2013) – either with an online census or with increased use of administrative data. Face-to-face surveys will remain a key resource, but their contribution to the analysis of complexity is limited, particularly from a cross-national perspective (see Savage and Burrows 2007).

Two alternatives, which have grown in popularity in recent years, are administrative data and data linkage. The former refers to data that are collected routinely for administrative (rather than research) purposes. Examples in the UK include the GP Patient Register dataset (Department of Health) the Child Benefit and Tax Credit Claimants datasets (HMRC), the Citizens Advice administrative dataset and the Destination of Leavers dataset (Higher Education Statistics Agency). Data linkage is the process by which these datasets are linked, either to each other, to survey data or to contextual information. The UK lags behind some other European countries (in particular Sweden, Finland and the Netherlands) in the application and utilisation of administrative data. The 2001 Dutch Virtual Census, for example, links administrative and survey data to provide detailed demographic and labour market information for 16 million people living in the Netherlands (see Nordholt et al. 2004)².

Methodologically, there are several techniques that, while no panacea, are arguably better suited to the analysis of complexity. Computer simulation and agent-based models (ABM) are computer models designed to simulate aspects of social behaviour, such as interactions between individuals and their environment (Gilbert 2004). Agents are “self-contained programs that can control their own actions based on their perceptions of their operating environment” (p. 172). A multi-agent model

²See Herzog et al. (2007) or Christen (2012) for an overview of data linkage and Wallgren and Wallgren (2007) for an introduction to administrative data.
is thus one that consists of multiple ‘agents’ interacting within a virtual environment. By defining different types of agent, their attributes and rules governing their interactions, simulation models offer an alternative approach to addressing the complexity of multiple interactions (for example, between agents and their environments and between multiple hierarchical levels).

Another alternative to variable-oriented research is case-centred analysis, which focuses on “cases as configurations of characteristics” rather than on the relationships between abstracted variables (Kent 2008: 9). Popularised by Ragin (1987; 1997; 2000; 2008), case-oriented methods such as qualitative comparative analysis (QCA) and fuzzy-set analysis (fsQCA) seek to identify the particular configurations of characteristics that are ‘necessary’ or ‘sufficient’ for a given outcome. By analysing the simultaneous interaction of multiple individual attributes, fsQCA is arguably better equipped to handle complexity than regression-based techniques, which consider a limited set of variables and even fewer interactions. Although historically QCA has been applied to small samples (e.g. 10 to 60) larger sample sizes are certainly possible. Cooper (2005), for example, uses QCA to analyse 17,000 children in the National Child Development Study (NCDS), while Miethe et al. (2004) apply QCA to 440,000 homicide reports collected in the USA between 1976 and 1998.

While highlighting potential alternatives, it would be negligent to overstate the limitations of existing approaches (which, after all, this thesis is built upon). New methods will complement, rather than replace, existing ones. A diversity of outcomes must be reflected in a plurality of methods.

9.6 Conclusion

This thesis has highlighted the lasting ties between poor working conditions and ill health. More importantly, however, it has demonstrated how outcomes can vary based on micro- and macro-level circumstances. It matters who you are and where you live – whether in northern or southern Europe, and whether welfare institutions provide an adequate safety net. Your place of work matters too – whether you receive support from your manager, have control over your work or belong to a trade union. This chapter problematised the empirical focus, in earlier chapters, on a single moderating factor. Following Beck’s notion of individualisation, the simultaneous influence of multiple moderating factors suggests a diversity of outcomes. This complexity calls for new methodological techniques.
Multilevel models enable researchers to mirror the hierarchical clustering of individuals within administrative clusters. Simulation techniques and configurational analysis (Rihoux and Ragin 2008) embrace the complexity of multiple simultaneous interactions between individuals and their environment. While the empirical tools exist, the theoretical frameworks are less developed. As this thesis found, there is inadequate substantive crossover between micro- and macro-levels. The separation in chapter 2 between ‘big picture’ and ‘small picture’ narratives is a false dichotomy, since these processes will overlap. Future research, to foster explanations that more faithfully reflect the multilevel nature of societal change, should seek to bridge this theoretical divide.
10 Concluding Remarks

This thesis advocates a more holistic approach to the study of post-industrial society that synthesises micro- and macro-level perspectives. The contributions have been twofold. On a practical level, it expands the existing literatures on job insecurity and work intensity by analysing different moderating factors (e.g. family or LMP) using innovative methods (e.g. mixture regression and multilevel SEM) applied to under-used datasets (e.g. the EWCS and WERS). More methodologically, it makes an argument for a multilevel approach to research that locates individual outcomes within a broader framework of contextual influences. The five analytical chapters demonstrate the value of this approach. Avoiding the ambiguity of post-industrial theory, the analyses focus on two experiences endemic to 21st century employment: job insecurity and job stress. While these trends are reliably linked with poor mental and physical well-being, the severity of such outcomes varies across and within European countries. Bad jobs are invariably harmful, but context matters.

Each analytical chapter tackled a different moderator in turn, highlighting the role of (a) family arrangements, (b) economic climate, (c) labour market policies, (d) job resources and (e) national characteristics such as trade union density or culture. The key empirical findings can be summarised in two points. Firstly, job insecurity and job stress were consistently associated with reduced well-being. This finding held across multiple countries, years and surveys and is consistent with existing evidence. Secondly, and more importantly, these relationships were shown to depend on a range of individual and contextual moderators.

Some moderating factors were more important than others. Equally, many buffers of the stress-strain relationship were shown to vary cross-nationally or were contingent on the operationalisation of insecurity, intensity or well-being. Chapter 4, for example, found family context to have little bearing on the relationship between job insecurity and depression. At other times, the moderating influence of a contextual variable was itself dependent on further individual-level moderators, as in chapter 6. Labour market policies buffer job insecurity, but they play
a more important role for those who are most vulnerable in the labour market. Such ‘moderated-moderation’ effects exist even when the source of subsequent moderation is unclear. Chapter 8 showed the link between job demands and perceived risk of stress to vary by country, but further research is required to disaggregate this variation.

The academic impact of this thesis therefore takes two forms. On the one hand, it presents small, incremental extensions to the existing literatures on job insecurity and work intensity by addressing new methods, new data sources, new moderating variables or by testing established theories in new contexts. On the other, it calls for a methodological and theoretical synthesis of micro- and macro-level perspectives. In doing so, it maps out some possibilities for future research.

**Figure 10.1:** The PhD, visualised

This thesis makes a number of substantive and methodological contributions that have been disseminated at seminars, conferences and in working papers and journal articles. Several findings have relevance for policy. Chapter 5 showed that when economic conditions are worse, feelings of job insecurity are not only more prevalent, but more harmful too. Additional support should therefore be made available in hard times (e.g. during periods of recession). Chapter 6 suggested that generous labour market policies benefit not only the unemployed, but also current employees who worry about job loss. Chapter 8 underlined the need for cultural sensitivity when tackling issues of job stress and job strain.

Despite the relevance of these findings for policy, the subsequent impacts are less certain, since policy interventions tend to be a function of both evidence and ideology. To highlight one example, chapter 6 recommended an increase in the generosity of unemployment benefits, which would not only raise the living standards of the unemployed, but would weaken the link between insecure work and life satisfaction. This coincides with recent findings showing that unemployment benefits do little to reduce the impact of unemployment on subjective well-being.
(Eichhorn 2013), and as such, provide no motivation to remain unemployed. Combined, these findings make a compelling argument for more generous unemployment benefits, and yet, such a move would be at odds with the prevailing political climate. Public opinion, political rhetoric and policy support for the unemployed have all become more punitive and critical in recent years (e.g. Park et al. 2012). This hardening of attitudes is wholly incompatible with calls for greater generosity.

This thesis is subject to several limitations, mainly due to time and space constraints that forced the omission of several topics. The analyses are regrettably cross-sectional and ignorant of the temporal ordering of events, precluding thornier issues of causality (e.g. Pearl 2000). The focus on Western Europe, while methodologically justified, is also unfortunate. Issues of job quality are equally, if not more, relevant in less-developed regions such as China, India and South America. As chapter 8 showed, theories developed in Western Europe cannot be straightforwardly applied in other cultural contexts. Many omissions are attributable to data availability. Further disaggregation by gender, ethnicity and age (to name but a few) is essential, but such comparisons are often limited by small within-country sample sizes. Similarly, while the micro- and macro-levels have been discussed at length, the meso-level is suspiciously absent. Intra-country differences, relating to the region, industry or organisation are equally relevant.

The thesis is overly reliant on a few simple measures of subjective well-being. Established indicators, such as life satisfaction, can be easily explained and are well covered by past studies. Although justifiable given the time and space available, much more can be done to capture the multi-dimensional nature of individual well-being. Similarly, the measurement of job insecurity and work intensity is less than ideal, and too often relies on a single indicator capturing a single dimension (e.g. cognitive insecurity).

On a personal level, I am increasingly dissatisfied with the reliance on quantitative methods. Fear and stress evoke emotional responses that are inadequately summarised by numeric indicators. Qualitative, first-hand accounts are arguably better placed to unpick the complexities described by Urry (2005a) and others, and provide personal narratives with which to flesh out the empirical analysis. Fears about job loss are widespread, and one does not have to travel far to hear complaints of stress, excessive workloads or inadequate support. The richness of individual stories is, in many ways, more compelling than the statistical evidence. I hope to redress this imbalance in future work.
It may have taken a long time to get here, but this PhD represents a starting point. It asserts an ontological and epistemological approach to social research that is the culmination of a decade of undergraduate and postgraduate training. The social sciences have always been in a state of flux, but the preceding chapters suggest several avenues for future development. Growing out of the post-industrial literature, this thesis has only served to underline the intransiency of social problems. Whatever characterises the next wave of social or economic development (i.e. post-post-industrial society), one can be reasonably confident that the scarcity and quality of work will remain of central importance.
Bibliography


MISSOC (2012) *Comparative Tables on Social Protection* (MISSOC), Paris: European Commission


Golsch, K. (2002) Globalization, labor market flexibility and job insecurity: A tale on Britain, Faculty of Sociology, University of Bielefeld, Bielefeld, Germany.

precarious? A comparison of the attitudes of workers in flexible and traditional

Workers’ Well-being and Behaviour: Evidence from the UK’, Department of


Mixed Models: The MCMCglmm R Package’, *Journal of Statistical Software*


P Hall and D Sockice (eds), *Varieties of Capitalism: The Institutional
1-68.


Press.


Publications.

Hasselhorn, H., Conway, P., Widerszal-Bazyl, M., Simon, M., Tackenberg, P.,
nurses’ consideration of leaving the profession-Results from the longitudinal


on: A review of recent research on the Job Demand-Control (-Support) model


Lollivier, S. and Rioux, L. (2006) ‘Do UI benefit levels or benefit duration have an impact on perceived job security?’, Paris: INSEE.


PSID (2013) Panel Study of Income Dynamics, Public Use Dataset, Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan,


measurement issues’, in J Quick and L Tetrick (eds), *Handbook of 
Occupational Health Psychology*, Washington, DC: American Psychological 
Association, pp. 123-42.

Zyphur, M. and Oswald, F. (2013) ‘Bayesian Estimation and Inference: A 
sagepub.com/content/early/2013/08/11/0149206313501200.abstract).
A Implementation details

A.1 Priors for Bayesian analysis

Bayesian inference and Markov chain Monte Carlo (MCMC) estimation are used in this thesis as a ‘drop-in’ replacement for frequentist estimation methods, such as maximum likelihood (ML) or weighted least squares (WLS). As such, un-informative priors are used throughout. Three software packages are used for MCMC estimation: MLwiN, Mplus 6.1 and the R package MCMCglmm. The priors for each are summarised in Table A.1. For MLwiN and Mplus the default priors are used, while for MCMCglmm the selection of priors has been guided by the literature, in particular, Gelman (2006), Brown and Draper (2006) and Browne (1998).

Table A.1: Priors for Bayesian analysis

<table>
<thead>
<tr>
<th>Source</th>
<th>Fixed parameters</th>
<th>Variance parameters</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asparouhov and</td>
<td>N(0, ∞)</td>
<td>IG(−1,0)</td>
<td>Muthén (2010)</td>
</tr>
<tr>
<td>Muthén (2010)</td>
<td>p(β) ∝ 1</td>
<td>IG(0.001, 0.001)</td>
<td>Browne (2009)</td>
</tr>
<tr>
<td>Hadfield (2010)</td>
<td>N(0, 1 × 10^{10})</td>
<td>W^{−1} (V = 1, ν = 0.002)</td>
<td></td>
</tr>
</tbody>
</table>

N = Normal  
IG = Inverse Gamma  
W^{−1} = Inverse Wishart

A.2 MCMC optimisations

Several techniques have been used to improve the speed up the MCMC iterations (i.e. improve the mixing of MCMC chains and increase the effective sample size). In MLwiN, structured MCMC and orthogonal parameterisation is used for continuous and binary outcomes, respectively. Structured MCMC (SMCMC) was developed by Sargent et al. (2000) to overcome the poor mixing that occurs due to posterior correlations.
Figure A.1: Comparison of SMCMC vs. standard Gibbs algorithms

between the residuals $u_j$ and intercept $\beta_0$ (see Browne 2009). Unlike the standard Gibbs sampling algorithm, which updates parameters in different blocks, SMCMC treats all fixed effects and residuals as a single block, that is updated in one step. Practically, SMCMC produces dramatic improvements in sampling efficiency (i.e. reducing the time it takes to achieve a given number of effective samples), as illustrated in Figure A.1.

Orthogonal parameterisation is a reparameterisation technique where a set of fixed effect variables in a model are replaced with alternative set of variables that “span the same parameter space but are orthogonal” (Browne 2009: 357). For a set of variables to be orthogonal, the product of any pair of predictor variables must be 0. In practice, this parameterisation produces similarly drastic improvements in sampling efficiency to those seen for SMCMC, but for categorical outcomes. For multilevel logistic models estimated in MCMCglmm, parameter expanded priors are used in conjunction with slice sampling methods (Damlen et al. 1999) to fix the residual variance at values greater than one. Fixing the residual variance to 10 and then re-scaling the estimates (to give results equivalent to a residual variance of 1) produces much better chain mixing and sampling efficiency (see Hadfield 2012 for details).
A.3 Survey weights

“Survey weighting is a mess”

— Gelman (2007: 153)

Most large social surveys provide weights to adjust for sample design, population size and selection probability and insist these must be applied in order to achieve accurate estimates (e.g. ESS 2011). However, while the application of survey weights for single-level models is straightforward, their incorporation into multilevel models more problematic (for an overview, see Pfeffermann et al. 1998; Asparouhov 2004; 2011), particularly when using Bayesian estimation. There are two approaches: design-based and model-based inference. Following Snijders and Bosker (2011), this thesis adopts the latter approach and includes in each model as many of design variables (variables upon which the sample design is based) as possible. As Snijders puts it:

*If the model is specified correctly given all the design variables, i.e., the residuals in the model are independent of the design variables, then the sample design can be ignored in the analysis (Snijders 2012: 222).*

In the context of multilevel regression, Gelman (2007) suggests that “the analysis should include, as ‘X variables,’ everything that affects sample selection of response” (p. 154).

A.4 Level-2 sample sizes for multilevel models

Most multilevel models in this thesis are clustered by country, with anywhere between 14 and 22 units at the upper level. This number is limited by (a) the countries available in the ESS or EWCS, (b) the exclusion of Eastern European countries and (c) the availability of reliable contextual data. Small level-2 sample sizes are problematic because they violate the large-N and random sample assumptions of maximum likelihood estimation. Past studies have suggested various rules-of-thumb for the number of clusters (level-2) and individuals (level-1) needed for accurate estimation. Snijders and Bosker (1999) suggest multilevel models should not be used with fewer than 10 clusters, while Kreft (1996) proposes a ‘30/30 rule’, requiring 30 clusters with at least 30 individuals per cluster.
Hox (1998) extends this, suggesting a minimum of 50/20 (50 groups with 20 respondents each) for models involving cross-level interactions.

While several chapters fall short of these requirements, there are reasons for optimism. First, past research has indicated that the problem is most acute when the number of individuals per cluster is small (Rodriguez and Goldman 1995; Austin 2010; Bell et al. 2010), which is not the case here. Second, there is evidence to suggest that using Bayesian estimation can avoid the bias associated with a small number of clusters (e.g. Raudenbush and Bryk 2002: 410). A simulation study by Asparouhov and Muthén (2010) shows that with fewer than 50 clusters Bayesian estimation provides better estimates and more accurate confidence intervals, compared to maximum likelihood estimators (p. 23).