<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>Unemployment inflows and outflows in the UK: a micro economometric analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author(s)</strong></td>
<td>Pierse, Tom</td>
</tr>
<tr>
<td><strong>Publication Date</strong></td>
<td>2016-06-09</td>
</tr>
<tr>
<td><strong>Item record</strong></td>
<td><a href="http://hdl.handle.net/10379/5902">http://hdl.handle.net/10379/5902</a></td>
</tr>
</tbody>
</table>

Some rights reserved. For more information, please see the item record link above.
Unemployment Inflows and Outflows in the UK: A Micro Economometric Analysis

Author: Thomas Pierse
Supervisor: Prof John McHale

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in the

J.E. Cairnes School of Business and Economics

June 2016
# Contents

Contents

List of Figures

List of Tables

Declaration of Authorship

Acknowledgements

Abbreviations

Abstract

1 Introduction

1.1 Introduction

1.2 Cross Country Comparisons Approach

1.2.1 Consensus

1.3 Microeconomic Approach to Labour Market Economics

1.3.1 Data

1.3.2 Inflows and Outflows

1.3.3 Inflows

1.3.4 Outflows

1.4 Thesis Contributions

1.5 Thesis Outputs

1.5.1 Thesis Publications and Working Papers

1.5.2 Thesis Presentations

2 Balance Sheet Effects on Firm Adjustment

2.1 Introduction

2.2 Related Literature and Hypothesis

2.2.1 Hypothesis

2.3 Econometric Model

2.4 Data

2.5 Regression Analysis

2.6 Robustness
## Contents

2.7 Conclusion .......................................................... 44

3 Unions and Involuntary Job Separations .......................... 46
  3.1 Introduction ....................................................... 47
  3.2 Related Literature and Hypotheses ............................... 48
    3.2.1 Unions and Redundancies .................................. 49
      3.2.1.1 Unions and the wage-employment bargain ............ 49
      3.2.1.2 Unions and the allocation of redundancies .......... 50
      3.2.1.3 Unions and the incidence of voluntary redundancies . 51
    3.2.2 Unions and Temporary Job Endings .......................... 52
    3.2.3 Unions and Dismissals ..................................... 53
    3.2.4 Hypotheses ................................................ 54
  3.3 Data and Empirical Methodology .................................. 55
  3.4 Econometric Specifications and Robustness ...................... 60
  3.5 Results ........................................................ 63
    3.5.1 Unions effects on Redundancy Rates ....................... 63
    3.5.2 Unions and Temporary Job Endings .......................... 67
    3.5.3 Unions and Dismissals ..................................... 69
    3.5.4 Limitations ................................................ 69
  3.6 Discussion ...................................................... 70
  3.7 Conclusion ....................................................... 72

4 Localised Unemployment in the UK .................................. 74
  4.1 Introduction ....................................................... 75
  4.2 Related Literature and Hypotheses ............................... 79
  4.3 Method .......................................................... 82
  4.4 Data ............................................................ 84
  4.5 Results ........................................................ 88
    4.6 Robustness ..................................................... 92
      4.6.1 Proportional Hazards ..................................... 92
      4.6.2 Spell Length Clustering ................................... 92
      4.6.3 Unobserved Heterogeneity ................................ 92
      4.6.4 Comparison between BHPS and NOMIS data ............... 93
      4.6.5 Disconnected from the Labour Market ..................... 94
  4.7 Policy Implications .............................................. 96
  4.8 Conclusion ....................................................... 97

5 Conclusion .......................................................... 100
  5.1 Introduction ....................................................... 100
  5.2 Empirical Findings and Future Directions ....................... 101
    5.2.1 Firm Adjustment and Leverage .............................. 101
    5.2.2 Redundancies and Union Membership ....................... 103
    5.2.3 Unemployment Durations and Geography .................... 104
  5.3 Conclusion ....................................................... 106

A Redundacies Simulation Code ...................................... 107
List of Figures

1.1 Revenue Change Distribution ........................................ 2
2.1 Distribution of Operating Margins .................................. 24
3.1 Average Partial Effect of Union Membership ....................... 67
3.2 Cyclical Changes in Involuntary Job Endings ....................... 68
4.1 Average Unemployment Duration by Local Authority District .... 75
4.2 Local Authority District Claimant Count Rates ................... 78
4.3 Unemployment Rate by Local Authority District .................. 83
4.4 Kaplan Meier Plot of Unemployment Spells by Area ............... 86
4.5 BHPS Residence Based Unemployment Rates ....................... 93
4.6 Nomis Residence Based Unemployment Rates ...................... 94
4.7 Nomis Claimant Count Rates by Area for Spells Under 3 years ... 95
# List of Tables

2.1 Descriptive Statistics split by Net Debt Ratio group .................. 34  
2.2 Basic linear relationships ................................................. 37  
2.3 OLS models for firms with falling revenue. Change in operating costs . 38  
2.4 OLS models for firms with falling revenue. Change in employment. .... 39  
2.5 Fixed effects model for a subgroup of the dataset .................. 42  
2.6 OLS models for subgroup of dataset .................................. 43  

3.1 Union Membership Descriptive Statistics ............................... 56  
3.2 Involuntary Job Separation Rates ........................................ 58  
3.3 Average Partial Effects of Random Effects Probit Models ............. 65  
3.4 Involuntary Separations by Tenure Group ............................... 65  
3.5 Coefficient Estimates ..................................................... 66  

4.1 Descriptive Statistics by Local Authority District Group ............. 87  
4.2 Cox PH Model Results .................................................... 90  
4.3 Cox PH Model: Sub Samples .............................................. 91
Declaration of Authorship

I, Thomas Pierse, declare that this thesis, submitted to the National University of Ireland, Galway for the degree of Doctor of Philosophy (Ph.D.) has not been previously submitted as an exercise for a degree at this or any other University. This thesis has been composed by me and is based on my own work.

Signed:

________________________________________

Date:

________________________________________
Acknowledgements

First and foremost, I would like to thank John McHale, who was the best supervisor I could have wished for throughout this thesis. John’s advice, patience and insights were invaluable in directing me towards publishing papers. I would like to thank Caroline Crawford for her support and careful proof reading.

From the Department of Economics and the Hardiman Building, I would like to express my sincere thanks to all the people who provided friendship, guidance and generously gave their time and effort throughout this process. I would like to thank Stephen O’Neill, Stephen Hynes, John Cullinan, Brendan Walsh, Danny Norton, Patrick Gilespie, Jason Harold, Sharon Walsh and Cian McMahon.
# Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>APE</td>
<td>Average Partial Effect</td>
</tr>
<tr>
<td>EBIT</td>
<td>Earnings Before Interest Tax</td>
</tr>
<tr>
<td>EBITDA</td>
<td>Earnings Before Interest Tax, Depreciation and Amortisation</td>
</tr>
<tr>
<td>LAD</td>
<td>UK Local Authority District</td>
</tr>
<tr>
<td>LFS</td>
<td>Labour Force Survey</td>
</tr>
<tr>
<td>LSDV</td>
<td>Least Squares Dummy Variable</td>
</tr>
<tr>
<td>Union Mem</td>
<td>Member of a workplace union</td>
</tr>
<tr>
<td>Union Non Mem</td>
<td>There is a workplace union but the individual is not a member</td>
</tr>
<tr>
<td>Union Non Rec</td>
<td>The firm does not recognise a union</td>
</tr>
</tbody>
</table>
Abstract

Dept of Economics
Cairns School of Business and Law

Doctor of Philosophy

Unemployment Inflows and Outflows in the UK: A Micro Econometric Analysis

by Thomas Pierse

The unemployment rate is a function of both the inflows to unemployment and the outflows from unemployment. Understanding the unemployment rate requires an understanding of the flows that drive the rate. This thesis contributes to the literature by using microeconomic data to look carefully at a selection of factors that affect the heterogeneity of flows into and out of unemployment. In particular, I examine (i) how balance sheet factors affect decisions to reduce employment and other operating costs following a revenue shock; (ii) how unionisation affects redundancies and other involuntary job endings with particular attention to the interaction between unionisation and tenure; and (iii) how local labour demand conditions affects the duration of individual unemployment spells. I find that (i) the state of a firms balance sheet is not related to how it cuts employment numbers and operating costs; (ii) unionised firms have lower redundancy rates for low tenure employees; and (iii) unemployment durations are not affected by a lack of local labour demand.
Chapter 1

Introduction

1.1 Introduction

The unemployment rate varies across countries, regions, groups and time periods. Differences in unemployment rates are driven by differences in inflows and outflows from unemployment. In this thesis I use microeconomic datasets to investigate heterogeneity in UK labour market flows.

Of particular interest is how firms adjust to negative shocks. Darvas (2012) shows the variation in movements in aggregate productivity during the 2008/2009 recession. Most countries had experienced the typical fall in productivity that has been observed during previous recessions. However there was a large spread in productivity changes. What are the factors that determine the extent and speed at which firms adjust when faced with weakened trading conditions?

I start by looking at the process that generates the need for constant labour market adjustment. This is a financial process in which revenue and costs are adjusted to maximise profits. Figure 1.1 shows the distribution of changes in firm revenue for 2007 to 2010. A large number of firms need to adjust to declines in revenue every year; this number increases during a recession. I then go on to look at redundancies and
other involuntary job endings directly using individual panel survey data. I look at the process by which firms reduce staff numbers, asking not just how many people get made redundant, but who in the firm is laid off. Finally, I look at the outflows from unemployment: the heterogeneity in the length of time it takes people to return to employment.

![Revenue change distribution 2007-2010](image)

**Figure 1.1**: Revenue change distribution 2007-2010. The median revenue growth in the 2007-2008 period is 4%. This declines to -3% in the 2009-2010 period.

The flows between unemployment, inactivity and employment are large. 1.3% of the working-age population change status from employment to unemployment every quarter and 28% of the unemployed return to employment (Gomes, 2012). Inflows into unemployment are mainly due to redundancies (ibid). Outflows from unemployment
are driven by firms hiring decisions and how workers search for jobs. Understanding the unemployment rate requires an understanding of the flows that drive the rate. In contrast to looking at the unemployment rate (the stock of unemployed), looking at flows into and out of unemployment allows for more specific hypotheses to be presented and tested.

In this thesis I contribute to the literature by using large microeconomic datasets to examine a number of variables that may affect labour market flows. Using microeconomic panel data allows for a more credible estimation of the effects of a particular variable and a more detailed examination of the mechanism through which a variable operates. The specific mechanisms by which variables work are often not well specified. The thesis is part of a larger literature seeking to demonstrate, empirically with microeconomic data, which variables are important in determining labour market flows for firms and individuals.

There are a wide range of factors which could alter labour market flows. Identifying which variables are the most economically significant is important for understanding the functioning of the labour market and for implementing effective policy. If a policy is based on a microeconomic story, then a necessary, but not sufficient, condition for the policy to have an effect is that there is a microeconomic relationship between the relevant variables.

In this chapter I review the various methods that have been used to quantitatively investigate the functioning of the labour market. These include cross country comparisons, comparisons across time and microeconomic comparisons. The chapter summaries the key findings of the empirical literature on the determinants of the unemployment rate and the micro literature on labour market flows.

Chapter 2 looks at employment and cost adjustments using firm financial data. This constant process of reallocation of resources both within and between firms is what generates the large labour market flows that we observe. Specifically, this chapter asks if
firms under financial pressure cut employment and costs more than other firms. Chapter 3 looks at redundancies and involuntary job endings from the individuals perspective using panel survey data. The process though which firms reduce their labour input is examined. Specifically, I look at the relationship between involuntary job endings and union membership. In Chapter 4 I look at the return to employment for the unemployed. I ask whether it takes longer to get a job if you live in a neighbourhood that has high unemployment. A key goal is to distinguish between a lack of local labour demand (geographic isolation) and some form of social isolation.

1.2 Cross Country Comparisons Approach

On its own, theory is of limited use in trying to establish the effects of employment institutions and other variables on labour market outcomes. There are generally reasonable theoretical grounds for thinking that a variable could do any number of things (Freeman, 2007). A goal of the empirical literature on labour markets is to identify which variables are the most important and what effect they have on aggregate outcomes. There are a number of possible approaches to empirically demonstrating the effect of specific institutions or variables. Each have their strengths and weaknesses and each can play a role in unravelling what variables are important.

The main empirical method used to understand unemployment has been the cross country comparison approach. Much of the literature of the early 1990s was motivated by the observation that unemployment in Europe was consistently higher than in the US. The dominant theoretical framework in this literature is the concept of the natural rate of unemployment (Blanchard, 2005); the long run unemployment rate is elevated if rigidities in the labour market prevent costs from adjusting to economic shocks.

A typical approach to testing the theory is to compare unemployment rates across OECD countries (Nickell, 1997; Blanchard and Wolfers, 2000; Belot and van Ours, 2001;
Nickell et al., 2005; Layard et al., 2005). Five year averages are used to dampen out the business cycle (Blanchard and Wolfers, 2000). The main advantage of this approach is that it can summarise the effect of a whole range of variables that are generally correlated to each other. The main problem with this method is that there is not enough information in the data to differentiate between various hypotheses (Bean, 1994). The number of countries is small, there are few time periods and the number of explanatory variables is large; the models are frequently overfitted (Bell and Blanchflower, 2010).

The unemployment rate is driven by relatively large flows into and out of unemployment. Differences in the unemployment rate between groups or time periods can be driven by either inflows or outflows, with potentially very different mechanisms at play. The method also suffers from a number of related difficulties. There are issues with the comparability of data across time and countries (Sorrentino, 2000). The OECD’s standardised unemployment rate series goes back to 1980 for nine countries. In addition, some employment institutions are difficult to define and compare across countries. For example, converting employment protection legislation into a numerical index leaves a lot of room for subjectivity (Eichhorst et al., 2008). This method would be most useful if you knew already which variables were important. However, we do not yet know which variables are important and in what contexts. We do not know which mixtures of institutions can be combined to produce the same effects, as argued in the varieties of capitalism literature (Hall and Soskice, 2001).

Within country time series analysis of aggregate outcomes have also been carried out to try and demonstrate the effect of changes in policy within a country (Card and Krueger, 1995). This dramatically reduces the number of variables that could be driving the unemployment rate as many of the variables change little over time (Easterly, 2005). The main difficulty with the method is that it needs to be assumed that any change that is identified between two time periods can be attributed to the policy change rather than changes in macroeconomic or other conditions. Cassino and Thornton (2002) look
at the 1960–98 period in the UK when the labour market was regulated and then deregulated. They find that it is difficult to find robust structural variables to explain the movements in the unemployment rate.

1.2.1 Consensus

Despite these methodological problems, consensus built in the 1990s and early 2000’s that labour market rigidities were at the heart of high unemployment rates in some European countries (OECD, 1994; Bassanini and Duval, 2006). While labour market rigidities are often not specifically defined, they generally refer to protective labour market institutions, such as unemployment benefits, unions or employment protection legislation (Nickell et al., 2005). However, as better data became available and more attention was paid to statistical assumptions, researchers have struggled to demonstrate the large effects of protective labour market institutions (Howell et al., 2007; Baccaro and Rei, 2005). Blanchard (2005) similarly highlights the weakness in the empirical support for the view that employment institutions are the cause of cross country differences in unemployment. He still argues that it is clear that employment institutions are behind cross country differences in European unemployment but that it is not clear which institutions are important and how they interact. However, if you cannot say which variables are important then all you can say is that there are persistent cross country differences which cannot be attributed to a specific cause.

Typical explanations for the cross country differences in European unemployment are that the effects of economic shocks are prolonged by protective labour market institutions (Bean, 1994; Blanchard and Wolfers, 2000; Stockhammer et al., 2014). To test these hypotheses, cross country regressions with aggregate data have been used to show the relationship between unemployment and employment institutions. Variables used to model labour market institutions include: replacement rates, union densities, % of GDP spent on active labour market policies and benefit durations. Variables used to
model economic shocks include: total factor productivity growth, capital accumulation (ratio of gross fixed capital formation to the capital stock) and house price bubbles (% employed in construction).

While the literature on cross country comparisons is inconclusive, some correlations have been shown to be stronger than others. Baccaro and Rei (2005) provide a comprehensive range of tests of institutional variables. The most consistent relationship identified in Baccaro and Rei (2005) is between union density and unemployment. The effects of replacement rates and benefit durations are not significant in Baccaro and Rei (2005) although others have found them to be important (Bassanini and Duval, 2006; Nickell, 1998). Employment protection legislation has not been shown to be strongly related to employment outcomes (Eichhorst et al., 2010; Bassanini and Duval, 2006; Baccaro and Rei, 2005). Economic coordination has also been show to be related to lower unemployment in a number of studies (Flaig and Rottmann, 2013). It is also worth noting that correlations between labour institutions and other important outcomes, such as the income distribution, have also been shown (Freeman, 2007). Countries with protective labour market policies tend to have tighter income distributions.

Macroeconometric studies of growth more generally have had equally little success in identifying what the important variables are in determining growth (Easterly and Easterly, 2001). Durlauf et al. (2005) document over 140 variables that have been investigated and have been found to be important in at least some studies.

The degree of consensus that was achieved in the economics literature in the 1990s illustrates the problem of strong priors. The influential Job Study (OECD, 1994) is a prominent example. Based on limited empirical evidence they took a strong position on how governments should reform their labour markets. IMF (2003) provides similarly strong policy directions. Manning and Strøm (1998) summarise the situation in relation to unemployment benefits: “the strength of the evidence linking the generosity of the benefit system is not as strong as we would like and our belief in such a link derives
more from the theory than from the evidence”. The certainty of the early 1990s and the uncertainty of the last decade in the literature on OECD unemployment is mirrored in the literature on developmental economics. The universal policy response to crises that was advocated in the 1990s has become more circumspect (Rodrik, 2006).

While the literature focuses on cross country differences in unemployment benefits and employment protection legislation, there is a potentially long list of possible features of national labour markets which are altering firm or individual behaviour resulting in higher unemployment. It is not clear how these variables affect individual and firm behaviour and how they can be compared across countries. Institutional fads have been a persistent problem in the literature. Because it is not clear what employment institutions do, whenever a country has a low unemployment rate its economic model is advocated. The Irish economic model was in favour up until 2008. Prior to that the Danish and German models were in vogue at various times.

The differences in unemployment rates within countries are substantial. Aggregate comparisons have also been made between regions (Blanchard et al., 1992). Jimeno and Bentolila (1998) argue that regional unemployment rates are very persistent in Spain; this is attributed to low levels of migration and persistence in participation rates. Understanding regional differences in unemployment is particularly important in light of separation debates in the UK and Spain. The geographic aspects of unemployment are discussed in detail in Chapter 4.

1.3 Microeconomic Approach to Labour Market Economics

Microeconomic data has the potential to complement the empirical work that uses aggregate data. In the main body of this thesis I look at the effects of unions, geography and financial constraints on individual and firm behaviour. In this section I outline the approach employed by researchers using microeconomic data and some of their findings.
Of primary interest are the different rates at which individuals find jobs and quit jobs and the differences in how firms create jobs and carry out redundancies.

Using microeconomic data allows the researcher to compare the behaviour of individuals and firms. The main advantage of this approach is that it vastly increases the data that is available. Microeconomic studies are suited to identifying the effects of variables where there is contrast between observations. The three variables that are the focus of this thesis, union membership, where a person lives and the strength of a firms balance sheet can be cleanly defined and comparison can be made between individuals. Other factors, such as the macroeconomic situation, can be controlled for.

One difficulty with this method is that while microeconomic relations can be established this does not allow us to infer that aggregate outcomes are being affected. The presence of microeconomic differences is a necessary but not sufficient condition for explaining differences in aggregate outcomes (Imbens and Lynch, 2006). It is a necessary condition if macroeconomic stories are based on microeconomic behaviour. For example, if someone was to argue that unemployment in the last recession increased less in countries with high employment protection (EPL), different levels of EPL across firms sizes might be used to ascertain the effect of employment protection. However, it is not sufficient to show a microeconomic relationship to argue that this relationship is altering the aggregate outcome. For example, do ALMP increase the outflow rates from unemployment or do they allow people who receive training to jump the queue in finding a job? The first mechanism will reduce the unemployment rate, the second mechanism will not.

Microeconomic comparisons can be more problematic for some variables than others. The macroeconomic growth literature generally focuses on environmental variables, such as property rights, political stability and foreign direct investment. There is often insufficient contrast to establish the effects of these variables using microeconomic data.
A third difficulty is that firm growth is highly idiosyncratic (Coad and Hötzl, 2012). Changes in production technology and product preferences require a constant expansion and closure of production units. This low signal to noise ratio makes it more difficult to identify the systematically important variables in firm behaviour.

1.3.1 Data

The quality of data available to researchers has been steadily improving. Data on worker flows is based on longitudinal data (Elsby et al., 2011). While large panel datasets for individuals and firms have been available in the US for many years, it is only in the last decade that equivalent European data with long time series have become available. The availability of long time series is important as some of the key variables of interest are relatively rare, for example redundancies. In addition the statistical models, such as models for binary outcomes, require large amounts of data. The availability of these rich data sets allows for more specific questions to be asked.

There are a range of different types of micro data that are suited to different research questions. In Chapter 3 and Chapter 4 of this thesis I use the British Household Panel Survey (BHPS). This is a longitudinal panel survey of c.5,500 households from 1990 to 2008. Similar panel surveys are available for a number of countries: Germany (SOEP), Australia (HILDA), US (PSID), Canada (SLID) and Italy (SHIW). These data sets allow researchers to account for a wide range of explanatory variables and adjust for time-invariant unobserved heterogeneity. The surveys are designed to be representative of the national population. These surveys can be useful in comparing effects across countries. For example, in Chapter 3 the effects of unions on redundancies in the UK is compared to that in Germany.

The second type of data used in this thesis is firm financial data. In Chapter 2, UK data from 2004 to 2013 is sourced from the Bureau van Dijk FAME database. This data consists of all of the publicly available financial records from Companies House. The
data contain both listed and unlisted firms. This type of data is very useful for demonstrating the process through which redundancies are generated. Firms are constantly competing and adjusting to changes in demand, preferences and production methods. Anderson (2009) highlights some of the pitfalls in using nominal accounting data to infer management behaviour. A key issue for some research questions is that changes in volumes cannot be differentiated from changes in prices. This is less of an issue for the research question posed in Chapter 2 as I am looking at the firms response to a negative shock irrespective of whether the shock came though prices or volumes.

Job turnover datasets have also been collected. The Job Openings and Labor Turnover Survey (JOLTS) contains data on employment, job openings, hires, quits, lay-offs and discharges, and other separations collected from a sample of US establishments. The JOLTS data is particularly useful in showing the relationship between quits, lay-off and overall firm growth (Davis et al., 2006). The comprehensive Business Employment Dynamics (BED) dataset includes firms that enter and exit and shows much higher labour market flows. This highlights a weakness in financial accounts data which do not lend themselves to analysing firm births and deaths.

Matched firm-employee data, such as the WERS survey in the UK are available in a range of countries (Jensen, 2010). WERS collects information from managers, employee representatives and employees themselves. The use of matched data allows the researcher to provide equal emphasis to both firm and individual behaviour. In contrast, research conducted with either firm or individual data frequently has little information on the other (Hamermesh, 2008). However, many of these datasets are not publicly available and can only be accessed from secure sites. In some cases these datasets are not well suited to the research question. For example, in Chapter 3 I look at the relationship between redundancies and union membership. The WERS data only records the individual characteristics of the people who stayed at the firm whereas the BHSP provides data on people who had been made redundant.
1.3.2 Inflows and Outflows

A focus of the literature on labour market flows has been whether the changes in the unemployment rate over time are driven by changes in inflow rates or outflow rates. Elsby et al. (2011) argue that changes in the unemployment rate are, to a large extent, driven by changes in the inflow rate into unemployment; this could be explained by an increase in redundancies and a falling or stable hiring rate. Shimer (2012) and Hall et al. (2006) on the other hand, argue that the inflow rate is relatively constant and that there is a change in the outflow rate around recessions. Possible behaviour changes would be a reduction in people’s search intensity or a fall in the hiring rate.

1.3.3 Inflows

While all outcomes examined in this thesis are the result of interactions between firm and individual behaviour, I categorise effects in terms of inflow variables and outflow variables. In this section I look at some of the variables that are most commonly discussed in the literature. There are two main aspects to looking at heterogeneity in inflows into unemployment. The first is the size of the shock: do firms react differently to different sized shocks? Secondly do different types of firms adjust their inputs in different ways for a given economic shock?

In Chapter 2 the importance of the size of an economic shock, defined as a fall in revenue, is demonstrated. The change in revenue is the largest covariate of changes in employment and operating costs. The literature on growth distributions, reviewed by Coad (2007), finds that revenue and employment growth distributions are similar across countries. The size of the adjustment required is also important in how a firm adjusts its employment. Small adjustments can be achieved through natural attrition (quits) whereas large adjustments require involuntary job endings. The literature on downsizing, discussed in detail in Chapter 3, shows that firms have a number of options
available to them to reduce staff numbers. These include voluntary and compulsory redundancies, voluntary retirements, temporary lay-offs and quits.

The importance of firm size has been shown for a range of different aspects of labour market flows. The literature on firm size distributions points towards larger firms having a smaller standard deviation in the distribution of revenue growth (Bottazzi and Secchi, 2003). This would partially account for the lower redundancy rates that are observed in large firms (Coad and Höhlz, 2012). A decline in one division of the business can be compensated for by an expansion in another division with the result that internal transfers can be used instead of redundancies (Eichhorst et al., 2008). However, as demonstrated in Chapter 2, larger firms are slower to cut costs even after controlling for the change in revenue.

Firms in different sectors are expected to behave differently. A highly mechanised manufacturing business might be expected to increase and reduce employment numbers in a different way to an employment intensive services or construction business. The sector that a business occupies may be only a very crude indicator of its production technology. There is a large distribution of firm characteristics within sectors; summary statistics by sector show a wide spread in financial characteristics, such as operating margins and fixed asset ratios within sectors.

While the effects of size and sector can be observed by contrasting firms, the effect of Employment Protection Legislation (EPL), and a range of other country-level variables, is more difficult to identify. Using firm level data, the effects of EPL can be identified by using the within country differences in EPL; many countries have a lower level of employment protection for the employees of small businesses (Gal et al., 2013). Both aggregate country comparisons and firm level comparisons indicate that cross country differences in EPL are not playing a dominant role.

For many years it has been assumed that nominal wage rigidities play an important role in driving unemployment. Recent data indicates that nominal wages are more flexible
than was previously thought in the UK (Elsby et al., 2014). The historic macroeco-
nomic literature frequently assumed that real wages were non cyclical. However, micro
empirical studies have demonstrated the cyclicality of real wages in a number of coun-
tries (Doris et al., 2013; Dickens et al., 2007; Schmitt-Grohé and Uribe, 2013; Martins
et al., 2012; Carneiro et al., 2014). Minimum wages provide a floor to nominal wage
adjustments and are typically expected to reduce employment. Stewart (2004) looks at
the effect of an introduction of a minimum wage in the UK in 1999. He finds no nega-
tive effects on employment probabilities from either the introduction, or the subsequent
increase in the minimum wage.

In Chapter 2 the effect of financial constraints on a firms adjustment to a negative shock
is examined. There is a large literature that looks at the relationship between financial
constraints and investments, reviewed by (Stein, 2003). The typical regression looks at
the relationship between investment of different kinds and contemporaneous cash flow
(ibid). The positive relationship between investment and cash flow is often interpreted
as evidence that financially constrained firms cut investments more than other firms.
The difficulty with this interpretation is that cash flow is not a direct measure of access
to finance; the relationship between cash flow and investment has also been observed
for firms that have cash balances.

The role that unions play in altering how a firm adjusts is explored in detail in Chapter
3. It is widely believed that the presence of a union in a firm would reduce redundancies
and be more beneficial for senior employees (Frank and Malcomson, 1994). However,
there is little empirical support for this one way or another. A number of studies have
looked at the relationship between union recognition and firm closure with mixed find-
ings (Bryson and Dale-Olsen, 2008; Machin, 1995; Bryson, 2004; Addison and Belfield,
2004). Unions wage premiums have been explored in great detail in the US and the
UK. In the UK union wage premiums have been shown to be in decline but are still
at an economically meaningful level (Bryson et al., 2010). A wide range of studies
have observed lower quit rates in unionised firms (Booth and Francesconi, 2001; Batt et al., 2002; Delery et al., 2000; Wooden and Baker, 1994), this result is repeated in the analysis in Chapter 3.

1.3.4 Outflows

In this section I review some of the micro empirical literature on the outflows from unemployment. The aggregate outflows may be strongly determined by changes in the general demand for labour, a process that is not well understood. In this section I focus on the covariates of unemployment durations. These are the type of variables that are expected to increase the natural rate of unemployment.

The replacement rate is frequently used as a mechanism to describe the economic incentives that the unemployed face to return to work. The higher the replacement rate the greater the incentive the unemployed person has to find a job quickly. This is the cornerstone of much of the literature on unemployment search intensity. Both the taxation system and the level and duration of unemployment benefits feed into the replacement rate. It is not clear at what level the replacement rate is important (Callan et al., 2012).

The effect of different unemployment benefit systems has been explored using micro data in a range of countries (Fredriksson and Holmlund, 2006). Studies of the duration of unemployment have generally only found small effects of changes in the levels of unemployment benefits. Stronger effects have been shown for the duration of unemployment benefits. The difficulty with many of these studies is that while there is a spike in people leaving official unemployment when their benefits expire there is not an equivalent spike in the return to employment at this point (CARD et al., 2007); many people leave unemployment for inactivity.
People who are long term unemployed have lower exit rates from unemployment (Aru- lampalam et al., 2000). One explanation for this is negative duration dependence: that people become disconnected, demotivated, or lose skills if they are not in employment for a long time. Duration dependence has been widely investigated using microeconomic datasets. The challenge is in differentiating between true negative duration and unobserved heterogeneity. Negative duration dependence is closely related to the concept of hysteresis in the macroeconomic literature. \( ? \) uses aggregate local authority district unemployment rate data to show the strong relationship between short term and lagged long term unemployment. This suggests that long and short term unemployment are not separate problems.

A large literature has been developed on the effectiveness of Active Labour Market Policies (ALMP); Card et al. (2010) outline the international experience. Consistent with earlier studies they find that job search assistance and mentoring has been found to be a highly effective form of ALMP (Kluve et al., 2007; Heckman et al., 1999). Classroom or on-the-job training are more effective in the medium run than the short run. Subsidised public sector employment programs have the least impact. In general they find that longer term evaluations produce more positive results than short term evaluations. A number of outcome variables can be used to assess the effectiveness of ALMP. The exit rate from unemployment and the probability of employment at a future date are the most common methods. Card et al. (2010) find that the measure of outcome is important. Studies based on time in registered unemployment show more positive short-term results than studies based on employment or earnings.

There is little evidence to suggest there is a leisure value to unemployment (Powdthavee, 2012; Freeman and Schettkat, 2002). A central issue, often not addressed in the economics literature, is that there are a range of motivations to get work. In addition to the economic incentives to work, recognition is viewed as an important motivation to seek employment (Fukuyama, 1992). The importance of social norms in labour market
outcomes have been emphasised by a number of authors (Clark, 2003; Burda et al., 2007).

1.4 Thesis Contributions

The main contribution of this thesis is to develop the empirical support for key selected microeconomic relations that may be affecting aggregate outcomes.

In Chapter 2 I look at the effect of weak balance sheets on firms cost and employment cuts. Firm financial data is sourced from the FAME database of UK and Irish firms from 2004 to 2013. When confronted with a reduction in demand, firms face a trade off between maintaining human capital in the firm and financial viability. It was expected that firms with weak balance sheets would be more aggressive in cost cutting whereas firm with financial capacity would be slower to cut costs and potentially damage relationships/investments. There are a number of reasons for looking at cost cutting in general as well as changes in employment numbers. Firstly, looking at cost cutting gets directly at a firm’s motivation to cut cost: to improve the firm’s profitability. Firms have a number of options for reducing costs, other than reducing employment numbers, including reducing outsourced functions, such as advertising and R&D. Using a bundle of costs provides a bigger econometric target to try and find the effect of weak balance sheets on cost-cutting behaviour. Secondly, overall operating costs are a more accurate measure of inputs than employee numbers due to measurement issues. I find that the cost-cutting behaviour of firms that have week balance sheets does not differ from other firms. All firms are quick to cut cost and employment in response to a drop in revenue. The firms historic profit rate and change in revenue are the key drivers of changes in costs.

In Chapter 3 I look at how unions affect redundancies, temporary job endings and dismissals, using the the British Household Panel Survey from 1990 to 2008. The chapter
Chapter 1. *Introduction*

looks at how many people get made redundant and which employees get selected for redundancies. A binary outcome is modelled: whether a person was made redundant or not in the past year. Explanatory variables, including union membership and tenure are taken from the previous years survey. I look at the interaction of union membership and tenure to establish if union members have lower redundancy rates and if lower redundancy rates are more pronounced in union members with long tenure. In addition to looking at redundancies, Chapter 2 also looks at how temporary job endings and dismissals are affected by unions. The rationale for looking at temporary job endings is that they consist of a large portion of involuntary job endings. Dismissals are included, even though they are relatively rare, as it is believed that unions would reduce dismissals. The findings of this chapter suggest that the relationship between unions and involuntary job endings is more subtle than the seniority-rule model suggests.

In Chapter 4 I look at the effect of geography on an individual’s unemployment duration, using the British Household Panel Survey from 1990 to 2008. There is a large variation in the unemployment rate across the UK’s c.400 local authority districts, particularly in the recessionary period of the early nineties. The question I ask is, to what extent does where a person lives determine the length of time they are unemployed, a neighbourhood effect, and to what extent can this be attributed to a lack of local jobs? There are good reasons to believe that unemployment may be highly localised: people are slow to move and do not travel very far to work, particularly those most likely to have longer spells of unemployment (Benito and Oswald, 2000). The method employed in this chapter is a cox proportional hazards model of individual unemployment spells. The local authority district where a person lives is used as an explanatory variable for the length of their unemployment spell. A key issue in the literature on neighbourhood effects is in differentiating between the different types of neighbourhood effect. From a policy perspective it is of little value to know that there are neighbourhood effects without having an idea of the specific causal mechanisms. The goal of this chapter is to identify the extent to which shortages of local labour demand are causing longer spells
of unemployment. Alternatively, neighbourhood effects could be driven by a range of social effects such as peer effects or employer discrimination. This chapter tackles these issues by looking at the neighbourhood effects of different cohorts of the population. I find that spatial isolation at a local authority district level is not economically important. Regional differences in unemployment durations are evident however, consistent with differences in labour demand between regions.

Although these findings relate to specific channels affecting labour market flows in a single country, I believe that it is only through an empirically grounded understanding of core mechanisms that researchers will be able to make progress on understanding the institutions/policy determinants of labour market performance. I thus hope that this thesis contributes to the emerging micro focused literature on comparative labour markets.

1.5 Thesis Outputs

There have been a number of outputs from this thesis in the form of both academic publications and presentations. Chapter 3 has been published in the Human Resource Management Journal, a four star international journal. Chapter 2 has been submitted to Economica and Chapter 4 has been submitted to Regional Studies.

1.5.1 Thesis Publications and Working Papers


Pierse, T and McHale, J “Balance Sheet Effects on Firm Adjustment”.

Pierse, T and McHale, J “Localised Unemployment in the UK”.

19
1.5.2 Thesis Presentations


Chapter 2

Balance Sheet Effects on Firm Adjustment

Abstract

There is an extensive literature on the relationship between financial constraints and investment. Avoiding cutting certain costs, such as the number of employees, in the face of a revenue shock, can be viewed as an investment in human capital. This chapter examines the effect of a firm’s balance sheet on how it reduces costs when faced with a fall in revenue. We find that measures of balance sheet weakness are not related to increased cost cutting or larger reductions in employees. How firms cut their costs and labour input is predominantly related to the historic profitability of the business and the change in revenue.
2.1 Introduction

In this chapter we show that the strength of a firm’s balance sheet is not related to the extent to which it cuts costs when faced with a negative revenue shock. The degree to which a firm cuts its costs is primarily driven by the change in revenue and the profit rate last year; firms that were very profitable in the previous year cut their costs less than loss making firms.

How firms adjust to a deterioration in the market conditions in which they operate is particularly important during recessions. More cost cutting will lead to a greater drop in aggregate wages and employment. A slower aggregate adjustment would be beneficial for macroeconomic stability. If banks and other providers of finance restrict access to credit to firms with viable investment projects because they have weak balance sheets, then this could exacerbate recessions and hinder growth when there is an increase in demand.

When a firm experiences a negative revenue shock it faces the decision of what expenditures to cut. There is a large body of literature that argues that financial constraints affect firms’ investment behaviour (Stein, 2003; Hubbard, 1998). A firm’s operating costs, all the costs between the gross and operating profit, contain a range of items that could be viewed by the firm as quasi investment costs. These include employment costs, loss making divisions and R&D costs. All of these contain large amounts of firm specific human capital that will be permanently lost. Employees may be difficult to replace and retrain due to the skills, know-how and relationships that they have built. Similarly, loss making divisions may be difficult to restart once shut down. Knowledge gained from R&D projects cannot be fully written down and will be lost if there is a sudden reduction in a large number of staff. Advertising costs may also be cut which may reduce the firm’s long run revenue growth. If a firm has a weak balance sheet, it may choose to cut these costs more aggressively. This may be because it cannot raise
sufficient funds at an acceptable price, the firm is financially constrained, or it may be
due to a fear of bankruptcy.

In this chapter we use UK firm accounting data from 2004 to 2013 to estimate the
effect of weak balance sheets on firm cost-cutting behaviour. Of primary interest is the
effect of weak balance sheets on aggregate employment. However, we use both changes
in operating costs and changes in employment numbers as dependent variables. There
are a number of advantages to looking at operating costs. The motivation for firms to
reduce employment numbers is to reduce operating costs. If balance sheet weakness is a
reason for cutting employment numbers more, then this should be visible across a range
of costs. Looking at total operating costs provides a larger econometric target; it should
be easier to see the effect of weak balance sheets on total operating costs as different
firms adjust in different ways. In addition, many firms adjust their employment due to
outsourcing (insourcing). By using operating costs rather than employment numbers,
the issue of outsourcing is circumvented.

There is no one metric that captures the strength of a firm’s balance sheet completely.
A number of measures of bank indebtedness and liquidity are used as explanatory
variables. These include the working capital ratio\(^1\) and the ratio of bank debt to cash
flow.

The historic profit rate is also used as an explanatory variable. This is an important con-
trol as loss making firms display all of the characteristics that are typically attributed
to financially constrained firms: low growth, low investment and greater reductions in
employment. Figure 2.1 shows the distribution of operating margins for firms that were
loss making last year; firms quickly move to restore their business to profitability.

Campello et al. (2010) surveyed US, European and Japanese firms in 2008 and found
that financially constrained firms planned to cut employment, technology spending and
capital expenditure more than firms that did not report themselves as being financially

\(^1\) Also known as the acid test ratio.
Figure 2.1: Distribution of operating margins for firms that were loss making last year. Firms that were loss making last year, the left hand side distribution, move towards profitability in the following year. The median operating margin for the full dataset is 3%.

A range of papers have used financial statement data to argue that firms with weak balance sheets will reduce their employment more that other firms (Hanka, 1998; Calomiris et al., 1994; Sharpe, 1994). A key omission from this body of work is the importance of profitability in driving firms to adjust.

This chapter makes a number of contributions to the literature. The first is to show that once the firm’s previous year’s profitability is controlled for, the firm’s cost adjustment is not affected by the state of its balance sheet. Previous investigations of constrained. A key advantage of this approach is that you can ask the firms directly if they are financially constrained. However, for a policy response to be appropriate you would need to understand why firms are financially constrained. They could be financially constrained for a range of reasons including: a poor trading history, over indebtedness or credit supply shortages.
the employment effects of debt have looked at the relationship between employment changes and debt levels. A key contribution of this chapter is to look at the relationship between changes in operating costs and debt in addition to looking at the relationship between employment and debt. We argue that this provides a better picture of the overall cost-cutting behaviour of high debt firms. A range of balance sheet measures are used; none show a robust relationship with larger cost or employment reductions. Much of the previous work on the effects of financial constraints used US data, has focused on large firms and the manufacturing sector. This chapter uses a wide sample of UK firms.
2.2 Related Literature and Hypothesis

Human capital is increasing being viewed as a key driver of organisational performance (Crook et al., 2011; Shaw et al., 2013). The long term value of the firm depends less on tangible resources and more on intangible ones, particularly human resources (Stiles and Kulvisacchana, 2003). The resource base view of the firm argues that competitive advantage depends on the hard-to-imitate combination of human resources that reside within an organisation as well as traditional factors such as natural resources, technology, or economies of scale (ibid). In Chapter 3 the potential importance of human capital is illustrated by the strong relationship between redundancies and the length of time a person is working at the firm. When confronted with a negative shock, firms face the difficult task of adjusting their costs, of which employment costs are the largest component. Maximising firm value requires a balance between maintaining the financial viability of the firm and retaining sufficient human capital for future growth.

The employment effects of debt have been explored by a number of authors with US data (Hanka, 1998; Calomiris et al., 1994; Sharpe, 1994). High debt has been associated with more frequent employment reductions, increased usage of part-time employment and lower wages (Hanka, 1998). Calomiris et al. (1994) and Sharpe (1994) look at the relationship between employment and high debt controlling for changes in revenue, akin to the response heterogeneity investigated here. Hanka looks at the relationship between the decline in employment in year t+1 to the debt level in year t. He does not control for changes in revenue with a view to estimating the combined effect of leverage on growth and employment adjustment. In contrast, in this chapter we look only at the effects of debt on cost adjustments not on revenue growth.

A number of papers have looked at changes in the employment numbers recorded in financial accounts while conditioning on changes in revenue (Gal et al., 2013; Calomiris et al., 1994; Sharpe, 1994). A difficulty with this is that employment numbers are reported as the average across the previous period. This is a crude measure of the
amount of labour utilised in a period; this is another reason for looking at operating costs as well as employment numbers.

The presence of lumpiness in employment adjustments has been argued by a number of authors (Varejão and Portugal, 2007; Caballero et al., 1997). Varejão and Portugal (2007) uses a linked database with firm level job flows and worker flows to investigate the lumpiness of the employment adjustment process. They find that most firms do not adjust their level of employment each quarter. While they argue that this is a clear indication of lumpiness in the employment adjustment process they do not condition employment flows on changes in revenue. Insourcing and outsourcing of functions will also generate a certain amount of lumpiness in employment adjustments. Given that most firms have stable revenue it is not surprising that they do not adjust their staffing levels. Caballero et al. (1997) find that firms tend to adjust their employment level either fully or not at all. If this is the case, if debt is to have an effect on how firms reduce their labour input, then it is most likely to show up in firms who experience a medium or low revenue shock; firms who experience a large fall in revenue will cut costs where firms with a small reduction in revenue will not make any cost adjustments.

The expectation is that firms with declining revenue will cut their costs more if they have a high level of debt. It is not expected that the operating costs of firms that are expanding would be affected by the firms debt level; the firm will need to take on any costs required to operate the business irrespective of the state of its balance sheet. For this reason the focus of the chapter is on firms that have had a fall in revenue.

Studies that look directly at the relationship between financial constraints and revenue growth have had mixed findings (Bottazzi and Secchi, 2014; Fagiolo and Luzzi, 2006; Becchetti and Trovato, 2002; Musso and Schiavo, 2008). A tentative finding of the firm-growth literature is that small firms have more volatile revenues (Bottazzi and Secchi, 2003). This is important as small firms are often viewed as being financially constrained due to information asymmetries. An alternative interpretation is that small firms are
more financially constrained due to more frequent negative revenue shocks which lead to a decline in profitability.

A common finding in the literature on financial constraints is that there is a positive relationship between contemporaneous investment and cash flow (Stein, 2003). This is typically interpreted as financial constraints causing reduced investment. Theoretical models for this relationship are typically based on the idea of information asymmetries between lenders and borrowers and agency problems. Kaplan and Zingales (1995) point out that a relationship between cash flow and investment can exist in firms with large cash balances which is not consistent with the idea that the firm is financially constrained. The econometric framework used by Fazzari et al. (1987) has been widely adopted:

\[
\left( \frac{I}{K} \right)_{it} = \left( \frac{C}{K} \right)_{it} + \left( \frac{X}{K} \right)_{it}
\]

where \( I \) is the capital expenditure, \( K \) is the book value of fixed assets, \( C \) is the cash flow and \( X \) is a vector of explanatory variables. A key difficulty in this literature has been in the interpretation of the cash flow variable as a measure of financial constraint (Kaplan and Zingales, 1995; Gomes, 2001). In this chapter, I interpret the cash-flow (Earnings Before Interest Tax and Depreciation), normalised by turnover, as the profit rate. The rationale for this is that the profitability of the business is believed to be the driver of firm decision making and is a key metric by which the firms management are measured. Campello et al. (2010) report that as many firms that are financially constrained are reported to be profitable as those that are not constrained. However, this appears to contrast with the higher cash burn of financially constrained firms also reported in that paper.

High debt firms have been shown to divest assets more often (Campello et al., 2010; Winker, 1999; Kovenock and Phillips, 1995; Ofek, 1993). From a cyclical employment
point of view it is not clear that this is important. If a firm sells a division including its assets and employees, what would be important from an aggregate employment point of view is how the new owners adjust their cost base.

The chapter also relates to the accounting literature on sticky costs; i.e. costs that cannot easily be reduced by firms (Anderson et al., 2003; Banker and Byzalov, 2014; Weiss, 2010; Calleja et al., 2006). The presence of sticky costs is typically estimated by comparing the changes in costs for firms with increasing and decreasing revenue respectively. Anderson et al. (2003) find that costs increase by 0.55% per 1% increase in revenue but decrease by 0.35% for every 1% decrease in revenue. They interpret this as the result of deliberate short-run managerial actions. However, Anderson and Lanen (2007) find that the relationship between movements in revenue and movements in costs varies across subgroups of the their dataset, concluding there is no single “sticky cost” behaviour.

2.2.1 Hypothesis

The hypothesis investigated here is that firms with high debt levels are quicker to cut costs in the face of a decline in the demand for its goods. We present two related situations in which a firm would decide to cut or not to cut costs. The first refers to large firms that may have loss making divisions. One option is to shut down the whole line of business, which will cut revenue and cut costs even more. The difficulty for the manager of the firm is that this line of business may have been profitable in the past and an upturn in demand would return the business to profitability. The second situation is where a firm has operating costs that are not strictly required for the short run operation of the business. These costs may include excess staff costs, R&D costs and advertising costs. All of these costs represent investments with uncertain outcomes. If the firm is financially constrained or concerned about bankruptcy due to its weak
Chapter 2. *Balance Sheet Effects on Firm Adjustment*

balance sheet, then it may cut non essential costs. However, a firm with easy access to cheap financing may take a longer term view and continue to invest.

### 2.3 Econometric Model

The econometric model is based on contemporaneous adjustments in costs and revenue that are moderated by individual characteristics, such as the strength of its balance sheet, and time effects. This allows for the hypothesis that cost cutting is related to the firm’s balance sheet to be tested. Because there is no one number that can encapsulate a balance sheet, a range of variables are tested in separate regressions. The balance sheet measures and other firm characteristics, taken from the previous year’s accounts, are interacted with the change in sales variable. OLS models with clustered robust standard errors are used:

\[
\Delta \text{Cost}_{it} = \alpha + \Delta \text{revenue}_{it} \ast (\beta_2 \text{Sect}_i + \beta_3 S_{z_{it-1}} + \beta_4 D_{t_{it-1}} + \beta_1 T_m) \\
+ \beta_5 \text{Marg}_{it-1} + \epsilon_{it},
\]  

(2)

where $\Delta \text{Cost}_{it}$ is the change in operating costs between period $t-1$ and period $t$, $\Delta \text{revenue}_{it}$ is similarly the change in revenue, $T_m$ is the period, $\text{Sect}$ is a the sector variable of 26 sectors, the size variable, $S_z$, is categorical and refers to the number of people employed in the previous year, the $\text{Marg}$ variable refers to the operating margin the previous year and $\epsilon_{it}$ is the error term.

In the model, changes in costs are driven by changes in revenue. Using annual data these changes happen contemporaneously to a large extent. For firms experiencing a decline in revenue, changes in costs are expected to lag changes in revenue. If firms have good visibility on their revenue, then cost may be changed simultaneously with
Chapter 2. Balance Sheet Effects on Firm Adjustment

revenue. If changes in revenue come as a surprise, then it will take longer to adjust the cost base.

2.4 Data

The data are sourced from FAME, a firm-level data set collected by the Bureau van Dijk (BvD) for the UK and Ireland. The inclusion of unlisted firms allows for a much more representative sample of firms to be included compared to data sets that only include publicly quoted firms.

The data set comprises 11,490 firms with at least five years of observations from 2005 to 2013. An advantage of using firm-level data is that it allows for the investigation of asymmetric responses to positive and negative output shocks; cross country differences in aggregate employment elasticities could be driven by the behaviour of expanding firms as well as shrinking firms. The data are particularly suited to asking firm specific questions as we do here: balance sheet strength is a firm-level variable not a plant-level variable.

Subsidiary companies and observations with missing data were omitted. Firms are excluded that have operating margins greater than 50% and less than -75%. This is to restrict the sample to trading business rather than investment or R&D businesses. The financial sector is excluded as the financial accounts of these companies can be more difficult to interpret.

Both the change in operating costs in a given year and the change in revenue in the same year are calculated using the methodology proposed by Davis and Hatiwager (1990), which restricts the change to the -2 to 2 range. In contrast to looking at %, changes this method allows for large changes in the variables. The method is similar to looking at log differences.

\[^2\text{See Davis et al. (1996) for a discussion on calculated growth rates.}\]
Chapter 2. Balance Sheet Effects on Firm Adjustment

\[ \Delta \text{Cost}_t = \frac{\text{Cost}_t - \text{Cost}_{t-1}}{0.5(\text{Cost}_t + \text{Cost}_{t-1})} \]  \hspace{1cm} (3)

The state of a firm’s balance sheet can be measured in a number of ways. Rajan and Zingales (1995) suggests that the measure used should depend on the question being asked. In this chapter, we investigate if pressure from creditors is resulting in firms cutting costs that they would not otherwise cut. Typically the most powerful creditor that a firm has is the bank that holds its debt. The most common method for measuring bank debt is to compare the book value of bank debts to total assets (Calomiris et al., 1994; Hanka, 1998; Sharpe, 1994) or the debt to equity ratio for publicly quoted firms. The difficulty with these measures is that they do not provide a good indication of whether the firm is at an elevated risk of default in the near future. They may also overstate the amount of leverage due to accounts payable that are for transaction purposes. Rajan and Zingales (1995) uses the ratio of the interest payments to operating cash flow (EBITDA) as a measure of default risk. The ratio of debt to EBITDA, in the previous year, is presented in the tables as it is the most common measure used in banking covenants (Citron et al., 1997). However, the results are not sensitive to the balance sheet measure used.

Balance sheet weakness can also be in the form of a lack of liquidity. Profitable business that are unable to convert profit into cash flow will experience difficulties. To capture liquidity constraints, two standard measures of liquidity are used as covariates of cost adjustments: the current ratio (current assets over current liabilities) and the working capital ratio (current assets minus stock over current liabilities).

A categorical variable is constructed for the operating margin in the previous year. The idea behind this variable is to capture the operating state of the business last year. The imperative of a loss making business will be to return the business to profitability. A high margin business that experiences a fall in revenue may have fewer incentives to reduce costs.
A number of other variables are also included in the regression. A variable is included for productivity, as in Kama and Weiss (2013), and asset intensity, as in Banker and Byzalov (2014). The two are related in some cases. For example a property holding company will have very high rental income and very few staff. In this case the productivity and the capital intensity will be very high. Alternatively a consultancy firm might have very high output per person and very low capital intensity. The sector of a firm is included to capture sector-specific cost structures that are not being captured by asset intensity or productivity. The size of the firm in the previous year, measured by the number of employees, is also included.

Table 2.1 shows the descriptive statistics split by net debt ratio group for firms that have experienced a fall in revenue. All of the balance sheet measures are correlated. High debt firms by the Net Debt to EBITDA ratio have more long term debt and a high debt to fixed asset ratio. They also have poorer liquidity by both working capital and current ratio measures. While the net debt ratio and the working and current ratios are correlated by definition the other measures need not be. The main differences between high and low debt firms are differences in gross and operating margins in the previous year and differences in the amount of fixed assets. High-debt firms have lower gross and operating margins and higher fixed assets. This is consistent with previous research on firm indebtedness (Rajan and Zingales, 1995).

There is no difference in the first two moments of the distribution of changes in revenue between high and low-debt firms. However, firms that were loss making in the previous period display larger falls in revenue. High-debt firms show slightly elevated changes in operating costs and employment numbers compared to low debt firms. Loss making firms make the largest cuts to all costs.
Chapter 2. *Balance Sheet Effects on Firm Adjustment*

**Table 2.1:** Descriptive statistics split by net debt ratio group. The net debt ratio is defined as bank debt minus cash over EBITDA. Low debt is categorised as a net debt of 0 to 1.5 times EBITDA. Medium debt is 1.5 to 3.5 times. High debt is greater than 3.5 times. The LT variable is the long term debt ratio: long term debt over EBITDA.

<table>
<thead>
<tr>
<th>Net Debt Level Group</th>
<th>Net Cash</th>
<th>Low Debt</th>
<th>Med Debt</th>
<th>High Debt</th>
<th>Loss Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obs</td>
<td>8,082</td>
<td>5,314</td>
<td>4,610</td>
<td>6,090</td>
<td>3,859</td>
</tr>
<tr>
<td>Unique</td>
<td>3,387</td>
<td>3,760</td>
<td>2,327</td>
<td>3,287</td>
<td>3,091</td>
</tr>
<tr>
<td>d.Sales (Median)</td>
<td>-0.09</td>
<td>-0.08</td>
<td>-0.08</td>
<td>-0.09</td>
<td>-0.12</td>
</tr>
<tr>
<td>d.Cost (Median)</td>
<td>-0.08</td>
<td>-0.07</td>
<td>-0.07</td>
<td>-0.08</td>
<td>-0.16</td>
</tr>
<tr>
<td>d.Operating Cost (Median)</td>
<td>-0.03</td>
<td>-0.02</td>
<td>-0.03</td>
<td>-0.05</td>
<td>-0.14</td>
</tr>
<tr>
<td>d.Employed (Median)</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-0.03</td>
<td>-0.05</td>
<td>-0.09</td>
</tr>
<tr>
<td>High Debt (LT)</td>
<td>0.01</td>
<td>0.00</td>
<td>0.02</td>
<td>0.37</td>
<td>0.00</td>
</tr>
<tr>
<td>Loss Making (LT)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Low Debt (LT)</td>
<td>0.98</td>
<td>0.95</td>
<td>0.68</td>
<td>0.48</td>
<td>0.00</td>
</tr>
<tr>
<td>Med Debt (LT)</td>
<td>0.01</td>
<td>0.05</td>
<td>0.30</td>
<td>0.15</td>
<td>0.00</td>
</tr>
</tbody>
</table>

| Net Debt to Total Assets | 0.14 | 0.08 | 0.26 | 0.44 | 0.28 |

<table>
<thead>
<tr>
<th>Working Capital Ratio Group</th>
<th>0-0.9</th>
<th>0.9-1.5</th>
<th>1.5-+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Debt to Total Assets</td>
<td>0.10</td>
<td>0.33</td>
<td>0.53</td>
</tr>
<tr>
<td>Debtors Days (Median)</td>
<td>0.13</td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td>Sales (Median)</td>
<td>14,338</td>
<td>18,082</td>
<td>19,744</td>
</tr>
<tr>
<td>Employed (Median)</td>
<td>86</td>
<td>106</td>
<td>120</td>
</tr>
<tr>
<td>Operating Margin (Median)</td>
<td>0.05</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Gross Margin (Median)</td>
<td>0.28</td>
<td>0.25</td>
<td>0.24</td>
</tr>
<tr>
<td>Productivity (Median)</td>
<td>175.30</td>
<td>165.19</td>
<td>163.73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fixed Assets / Turnover</th>
<th>0-0.07</th>
<th>0.07-1.5</th>
<th>1.5+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Debt to Total Assets</td>
<td>0.48</td>
<td>0.51</td>
<td>0.02</td>
</tr>
<tr>
<td>Debtors Days (Median)</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>Sales (Median)</td>
<td>14,338</td>
<td>18,082</td>
<td>19,744</td>
</tr>
<tr>
<td>Employed (Median)</td>
<td>86</td>
<td>106</td>
<td>120</td>
</tr>
<tr>
<td>Operating Margin (Median)</td>
<td>0.05</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Gross Margin (Median)</td>
<td>0.28</td>
<td>0.25</td>
<td>0.24</td>
</tr>
<tr>
<td>Productivity (Median)</td>
<td>175.30</td>
<td>165.19</td>
<td>163.73</td>
</tr>
</tbody>
</table>
2.5 Regression Analysis

To differentiate between firms' cost-cutting behaviour, a forcing variable is required to account for the trading situation of the business. Two options are the change in revenue and the change in gross profit. We use the change in revenue but both provide similar results. Table 2.2 presents the basic correlations between changes in revenue and gross profit and changes in costs, for all firms, and for the subgroup of firms that have experienced a decline in revenue. The first column shows the very high correlation between changes in revenue and changes in total costs, defined as operating costs plus purchases. The second column shows that while purchases move one for one with changes in revenue, the relationship is not as strong as the relationship between revenue and total costs. The advantage of using revenue as the forcing variable is that it does not directly change with a change in purchasing costs. An increase in the cost of sales would result in a reduction in the gross profit but no change in the amount of required operating costs. Of primary interest is how operating costs adjust to changes in market conditions. Column 3 and 4 show the relatively weak relationships between changes in operating costs and change in revenue and gross profit.

Table 2.3 shows the results of OLS regressions using various balance-sheet measures separately. The results do not show a robust relationship between balance-sheet weakness and cost or employment adjustments. The balance-sheet measures are insignificant, in the opposite direction, or not consistent across categories. While it may be valid to interact some of the balance sheet measures, such as the working-capital ratio and the long-term debt ratio, as these variables are correlated it would be expected that they would show the expected results individually as well as jointly.

The dominant explanatory variable for the change in costs is the change in revenue. The coefficients on the revenue variable is c.0.7 for both the operating costs and employment models. This is consistent with the sticky-costs literature; firms are slow to reduce their operating costs.
The margins variable is highly significant in all models. Irrespective of how the model is set up, the margins variable shows mean reversion in operating margins for both profitable and loss making businesses. Firms that are heavily loss making reduce their costs more than firms with a normal operating margin (0-5%); firms that have high margins reduce their costs less.

Previous investigations of the effects of financial constraints have normalised cash flow by dividing by fixed assets. In this chapter we normalise the cash flow by dividing by turnover which gives the operating profit margin. This provides a better predictor of changes in costs than the balance sheet normalised cash flow. The operating margin is an important omitted variable as surviving firms that are loss making tend to cut their costs more than firms with the median operating margin. High-margin businesses are slower to adjust costs and/or face increased competition which results in a contraction in their margins.
Table 2.2: Basic linear relationships. OLS models showing the relationships between the main candidates for dependant and independent variables. The top panel shows the full dataset while the bottom panel shows the subgroup of firms that have experienced a decline in revenue. The dependent variables are \( d\text{Cost} \): change in operating costs and purchases combined, \( d\text{Pur} \): change in purchases, \( d\text{Ocost} \): change in operating costs and \( d\text{Emp} \): change in employment. The independent variables are \( d\text{Revenue} \): the change in revenue and \( d\text{Gprof} \): the change in gross profit. Coefficients with standard errors in brackets. Note: \(*p<0.05; **p<0.01; ***p<0.001.\)

<table>
<thead>
<tr>
<th>Expansion and Contraction. Dependent variable:</th>
<th>dCosts</th>
<th>dPur</th>
<th>dOcost</th>
<th>dOcost</th>
<th>dEmp</th>
<th>dEcost</th>
</tr>
</thead>
<tbody>
<tr>
<td>dRevenue</td>
<td>0.930*** (0.001)</td>
<td>1.000*** (0.002)</td>
<td>0.550*** (0.003)</td>
<td>0.400*** (0.002)</td>
<td>0.550*** (0.002)</td>
<td></td>
</tr>
<tr>
<td>dGprof</td>
<td>0.420*** (0.003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.002*** (0.0003)</td>
<td>-0.002*** (0.0005)</td>
<td>0.009*** (0.001)</td>
<td>0.016*** (0.001)</td>
<td>-0.005*** (0.001)</td>
<td>0.014*** (0.001)</td>
</tr>
<tr>
<td>Observations</td>
<td>73,672</td>
<td>73,672</td>
<td>73,672</td>
<td>73,672</td>
<td>73,672</td>
<td>73,672</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.900</td>
<td>0.770</td>
<td>0.220</td>
<td>0.220</td>
<td>0.230</td>
<td>0.350</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contraction Only. Dependent variable:</th>
<th>dCost</th>
<th>dPur</th>
<th>dOcost</th>
<th>dOcost</th>
<th>dEmp</th>
<th>dEcost</th>
</tr>
</thead>
<tbody>
<tr>
<td>dRevenue</td>
<td>0.940*** (0.002)</td>
<td>1.100*** (0.004)</td>
<td>0.520*** (0.007)</td>
<td>0.370*** (0.005)</td>
<td>0.510*** (0.005)</td>
<td></td>
</tr>
<tr>
<td>dGprof</td>
<td>0.330*** (0.005)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>27,955</td>
<td>27,955</td>
<td>27,955</td>
<td>27,955</td>
<td>27,955</td>
<td>27,955</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.830</td>
<td>0.680</td>
<td>0.130</td>
<td>0.130</td>
<td>0.140</td>
<td>0.220</td>
</tr>
</tbody>
</table>
Table 2.3: OLS models for firms with falling revenue. The dependent variable is the change in operating costs. The moderating variable is the change in revenue. The model is: \( \Delta \text{Cost} = \Delta \text{sales} \times \text{debt} + \Delta \text{sales} \times X + \text{margin}_{t-1} \). The table shows the same model with four different measures of balance sheet strength; models with a long term debt ratio and current ratio were also run with the same results. Operating margins divided into a categorical variable with a base of 0 to 5%. \textit{Fixed Assets} are the log of fixed assets, \textit{Size} is the log of the number employed last year, \textit{Productivity} is the log of productivity last year. Coefficients with standard errors in brackets. Sector and year variables included in all model.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in sales</td>
<td>0.670***</td>
<td>0.660***</td>
<td>0.670***</td>
<td>0.640***</td>
</tr>
<tr>
<td>Operating Margin %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20</td>
<td>-0.290***</td>
<td>-0.280***</td>
<td>-0.290***</td>
<td>-0.290***</td>
</tr>
<tr>
<td>20 to 5</td>
<td>-0.120***</td>
<td>-0.110***</td>
<td>-0.120***</td>
<td>-0.120***</td>
</tr>
<tr>
<td>5 to 0</td>
<td>-0.054***</td>
<td>-0.047***</td>
<td>-0.054***</td>
<td>-0.053***</td>
</tr>
<tr>
<td>5 to 10</td>
<td>0.019***</td>
<td>0.018***</td>
<td>0.019***</td>
<td>0.019***</td>
</tr>
<tr>
<td>10 to 20</td>
<td>0.040***</td>
<td>0.039***</td>
<td>0.040***</td>
<td>0.040***</td>
</tr>
<tr>
<td>20 +</td>
<td>0.066***</td>
<td>0.066***</td>
<td>0.066***</td>
<td>0.067***</td>
</tr>
<tr>
<td>Sales Debt Interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss Making</td>
<td>0.075*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Debt</td>
<td>0.013</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med Debt</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Cash</td>
<td>-0.020</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt over Book Assets</td>
<td></td>
<td></td>
<td></td>
<td>0.006</td>
</tr>
<tr>
<td>Working Capital Ratio 0-0.9</td>
<td></td>
<td></td>
<td></td>
<td>0.043</td>
</tr>
<tr>
<td>Working Capital Ratio 1.5+</td>
<td></td>
<td></td>
<td></td>
<td>0.035</td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>-0.005</td>
<td>-0.005</td>
<td>-0.005</td>
<td>-0.005</td>
</tr>
<tr>
<td>Size</td>
<td>0.058***</td>
<td>0.057***</td>
<td>0.058***</td>
<td>0.058***</td>
</tr>
<tr>
<td>Productivity</td>
<td>-0.049***</td>
<td>-0.048***</td>
<td>-0.049***</td>
<td>-0.048***</td>
</tr>
<tr>
<td>Stock</td>
<td>-0.130**</td>
<td>-0.150**</td>
<td>-0.140**</td>
<td>-0.150**</td>
</tr>
<tr>
<td>Observations</td>
<td>27,941</td>
<td>27,941</td>
<td>27,941</td>
<td>27,941</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.220</td>
<td>0.221</td>
<td>0.220</td>
<td>0.221</td>
</tr>
</tbody>
</table>
Table 2.4: OLS models for firms with falling revenue. The dependent variable is the change in employment numbers. The moderating variable is the change in revenue. The model is: $\Delta Employees = \Delta sales = \Delta sales \times debt + \Delta sales \times X + margin_{t-1}$. The model is run with four measures of balance sheet strength. Operating margins divided into a categorical variable with a base of 0 to 5%. Fixed Assets are the log of fixed assets, Size is the log of the number employed last year, Productivity is the log of productivity last year. Coefficients with standard errors in brackets. Sector and year variables included in all model.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Revenue</td>
<td>0.590*** (0.085)</td>
<td>0.580*** (0.088)</td>
<td>0.580*** (0.085)</td>
<td>0.590*** (0.089)</td>
</tr>
<tr>
<td>Operating Margin %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20</td>
<td>-0.095*** (0.012)</td>
<td>-0.086*** (0.012)</td>
<td>-0.093*** (0.012)</td>
<td>-0.095*** (0.012)</td>
</tr>
<tr>
<td>20 to 5</td>
<td>-0.059*** (0.005)</td>
<td>-0.050*** (0.006)</td>
<td>-0.057*** (0.005)</td>
<td>-0.059*** (0.005)</td>
</tr>
<tr>
<td>5 to 0</td>
<td>-0.036*** (0.003)</td>
<td>-0.031*** (0.004)</td>
<td>-0.036*** (0.003)</td>
<td>-0.036*** (0.003)</td>
</tr>
<tr>
<td>5 to 10</td>
<td>0.011*** (0.003)</td>
<td>0.010*** (0.003)</td>
<td>0.011*** (0.003)</td>
<td>0.011*** (0.003)</td>
</tr>
<tr>
<td>10 to 20</td>
<td>0.018*** (0.003)</td>
<td>0.015*** (0.003)</td>
<td>0.017*** (0.003)</td>
<td>0.017*** (0.003)</td>
</tr>
<tr>
<td>20 +</td>
<td>0.025*** (0.005)</td>
<td>0.023*** (0.005)</td>
<td>0.025*** (0.005)</td>
<td>0.025*** (0.005)</td>
</tr>
<tr>
<td>Sales Debt Interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Debt</td>
<td></td>
<td>0.048 (0.027)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss Making</td>
<td></td>
<td>0.065* (0.030)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med Debt</td>
<td></td>
<td>0.025 (0.032)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Cash</td>
<td></td>
<td>-0.021 (0.025)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt over Book Assets</td>
<td></td>
<td></td>
<td>0.024* (0.010)</td>
<td></td>
</tr>
<tr>
<td>Working Capital Ratio 0-0.9</td>
<td></td>
<td></td>
<td></td>
<td>0.009 (0.021)</td>
</tr>
<tr>
<td>Working Capital Ratio 1.5+</td>
<td></td>
<td></td>
<td></td>
<td>-0.0004 (0.021)</td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>-0.020*** (0.006)</td>
<td>-0.020*** (0.006)</td>
<td>-0.020*** (0.006)</td>
<td>-0.020*** (0.006)</td>
</tr>
<tr>
<td>Size</td>
<td>0.093*** (0.008)</td>
<td>0.092*** (0.008)</td>
<td>0.094*** (0.008)</td>
<td>0.093*** (0.008)</td>
</tr>
<tr>
<td>Productivity</td>
<td>-0.120*** (0.012)</td>
<td>-0.120*** (0.012)</td>
<td>-0.120*** (0.012)</td>
<td>-0.120*** (0.012)</td>
</tr>
<tr>
<td>Stock</td>
<td>0.025 (0.045)</td>
<td>-0.006 (0.047)</td>
<td>0.016 (0.045)</td>
<td>0.019 (0.046)</td>
</tr>
<tr>
<td>Observations</td>
<td>27,941</td>
<td>27,941</td>
<td>27,941</td>
<td>27,941</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.251</td>
<td>0.252</td>
<td>0.251</td>
<td>0.251</td>
</tr>
</tbody>
</table>
2.6 Robustness

The results in the previous section show that the relationship between the previous year’s balance sheet and the change in costs or employment numbers is small and statistically insignificant. Endogeneity in the form of omitted variable bias may be present in this situation if there is a negativity correlated omitted variable. One possible candidate is the firm’s technology. Capital intensive firms may have high debt and little capacity to adjust operating costs or employment in the event of a fall in demand. Using the sector of a firm or the level of the firm’s fixed assets may not sufficiently control for this. A firm’s sector contains a wide range of firm types with different adjustment technologies. The level of fixed assets on a firm’s balance sheet may be a function of the amount of property the firm owns rather than a measure of its operating cost flexibility.

Controlling for time-invariant, unobserved heterogeneity using a standard fixed-effects model is problematic as the unobserved effect is interacted with the change in sales. A simple, if cumbersome, method of overcoming this is to use a least squares dummy variable (LSDV) approach:

\[
\Delta Cost_{it} = \alpha + \Delta \text{revenue}_{it} \times (\beta_3 Sz_{it-1} + \beta_4 D_{it-1} + \beta_1 Tm_i + \beta_i * IDS) \\
+ \beta_5 Marg_{it-1} + \beta_6 Resid_{it-1} + \epsilon_{it}
\]  

(4)

where \( IDS \) is a vector of dummy variables for each firm. This allows for the fixed effects to be estimated. Table 2.5 shows the results of the least squares dummy variable regressions, which is carried out on a subgroup of the main dataset. The subgroup consists of firms that had a fall in sales this period but had an increase in sales last period. The reason for using a subgroup is that while the effect of the firms technology may be symmetric around sales the effect of debt is expected primarily when the firm is shrinking; for this reason it would not be appropriate to run a fixed effects model.
using the full dataset. Using only firms that grew last year reduces the risk of serial
correlation biasing the results. A difficulty in the implementation of this approach is
that the model is sensitive to the base firm and the effects of a change in sales get
confounded with the individual effects. The results of the fixed effects models do not
show significant effects for the balance sheet variables.

A second possible source of endogeneity is if expectations of revenue differ systemati-
cally from realised revenue and if expectations are related to the level of debt held by
the firm and cost adjustments. For example, if a firm decides to increase its debt level
at t-1 due to high growth expectations and these growth expectations do not materi-
alise, then the debt variable would be picking up the revenue growth expectations. The
evidence to support the idea of serial correlation in sales growth is not strong (Coad,
2010). To control for possible revenue growth expectations, models were run with the
previous year’s revenue growth included. The results are robust to this change.

Another concern is that the results are driven by extreme observations. Firms with
very high and low operating margins are adjusting to extreme events. To test for this,
Table 2.6 shows the results of pooled OLS regressions using a subset of the data. The
subset includes firms that had the modal operating margin in the previous year. The
reason for choosing this group is that it focuses on trading businesses in competitive
markets. No significant results for any of the balance sheet measures are shown.

An important consideration is the level of time aggregation. The results show that
many firms have not fully adjusted their cost base by the end of the year. The different
amounts of adjustment allow for the testing of the effects of debt. However, looking at
the relationship between operating costs and revenue on a quarterly basis would also
be useful as the differences between firms would be more pronounced.

Standard errors are corrected for heteroskedasticity. There is little heteroskedasticity in
the error terms. The variance in the error term is slightly elevated for large adjustments.
While not surprising this need not have been the case. If firms decisions were more
heterogeneous at low adjustment levels then the variance would be elevated in the centre of the distribution. An alternative approach would be to use a quantile regression. This would be particularly useful if the relationship between costs and revenue varied substantially across revenue change quantiles. However, this is not the case for firms that are shrinking. While the elasticity of costs to revenue is higher for expanding firms than contracting firms, there is little difference across quantiles: the elasticity is similar for a large contraction and a small contraction observations.

**Table 2.5:** Fixed effects models for a subgroup of dataset - Least Squares Dummy Variable approach to fixed effects. The subgroup consists of firms that had a fall in sales but had an increase in sales last period. Dependent variables are the change in operating costs (1) and change in employment (2). No significant effects of firm debt are shown. Coefficients with standard errors in brackets.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Debt</td>
<td>-0.00 (0.02)</td>
<td>-0.01 (0.01)</td>
</tr>
<tr>
<td>Loss Making</td>
<td>-0.01 (0.04)</td>
<td>-0.01 (0.03)</td>
</tr>
<tr>
<td>Med Debt</td>
<td>-0.01 (0.02)</td>
<td>-0.01 (0.01)</td>
</tr>
<tr>
<td>Net Cash</td>
<td>-0.01 (0.02)</td>
<td>-0.00 (0.01)</td>
</tr>
<tr>
<td>lt20</td>
<td>-0.46 (0.09)</td>
<td>-0.09 (0.03)</td>
</tr>
<tr>
<td>20 to 5</td>
<td>-0.16 (0.04)</td>
<td>-0.04 (0.03)</td>
</tr>
<tr>
<td>5 to 0</td>
<td>-0.05 (0.02)</td>
<td>-0.04 (0.01)</td>
</tr>
<tr>
<td>5 to 10</td>
<td>0.02 (0.01)</td>
<td>0.00 (0.01)</td>
</tr>
<tr>
<td>10 to 20</td>
<td>0.05 (0.02)</td>
<td>0.00 (0.01)</td>
</tr>
<tr>
<td>20 +</td>
<td>0.12 (0.03)</td>
<td>0.00 (0.02)</td>
</tr>
<tr>
<td>Sales*Debt Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Debt</td>
<td>0.14 (0.14)</td>
<td>0.12 (0.12)</td>
</tr>
<tr>
<td>Loss Making</td>
<td>0.25 (0.19)</td>
<td>-0.02 (0.14)</td>
</tr>
<tr>
<td>Med Debt</td>
<td>0.13 (0.15)</td>
<td>-0.07 (0.11)</td>
</tr>
<tr>
<td>Net Cash</td>
<td>-0.08 (0.14)</td>
<td>-0.16 (0.09)</td>
</tr>
<tr>
<td>Size</td>
<td>0.22 (0.11)</td>
<td>0.64 (0.12)</td>
</tr>
<tr>
<td>Year</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

42
Table 2.6: OLS models for subgroup of dataset - firms with operating margins between 0 and 5 % last year who experienced a fall in revenue between the current and last year. Dependent variable: Change in Operating Costs (Column 1 and 2) and Change in Employment (Column 3 and 4). Coefficients with standard errors in brackets.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in sales</td>
<td>0.880 (0.120)</td>
<td>0.860 (0.120)</td>
<td>0.350 (0.120)</td>
<td>0.330 (0.130)</td>
</tr>
<tr>
<td>High Debt</td>
<td>0.043 (0.043)</td>
<td>0.061 (0.037)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med Debt</td>
<td>0.021 (0.045)</td>
<td></td>
<td>0.049 (0.044)</td>
<td></td>
</tr>
<tr>
<td>Net Cash</td>
<td>0.00000 (0.040)</td>
<td></td>
<td>0.002 (0.037)</td>
<td></td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>-0.014 (0.009)</td>
<td>-0.014 (0.009)</td>
<td>-0.032 (0.007)</td>
<td>-0.032 (0.007)</td>
</tr>
<tr>
<td>Size</td>
<td>0.035 (0.012)</td>
<td>0.034 (0.012)</td>
<td>0.100 (0.012)</td>
<td>0.100 (0.012)</td>
</tr>
<tr>
<td>Productivity</td>
<td>-0.073 (0.013)</td>
<td>-0.072 (0.013)</td>
<td>-0.100 (0.017)</td>
<td>-0.100 (0.017)</td>
</tr>
<tr>
<td>Stock</td>
<td>-0.039 (0.082)</td>
<td>-0.069 (0.085)</td>
<td>0.048 (0.054)</td>
<td>0.008 (0.056)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.012 (0.003)</td>
<td>0.012 (0.003)</td>
<td>-0.001 (0.002)</td>
<td>-0.001 (0.002)</td>
</tr>
<tr>
<td>Observations</td>
<td>11,694</td>
<td>11,694</td>
<td>11,694</td>
<td>11,694</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.149</td>
<td>0.149</td>
<td>0.191</td>
<td>0.192</td>
</tr>
</tbody>
</table>
2.7 Conclusion

In this chapter we make a contribution to the extensive literature on balance sheet effects and financial constraints. The hypothesis tested is that firms with weak balance sheets will cut costs and employment more aggressively when faced with a fall in revenue than firms that are in a strong financial position. The motivation for the chapter is to identify if corporate debt is potentially an important determinant of cross country differences in productivity changes during recessionary periods.

We look primarily at the relationship between changes in operating costs, all the costs between the gross and operating margins, and changes in sales. None of the measures of balance sheet weakness we looked at showed a robust relationship with cost-cutting behaviour. Firms with a net cash position cut their costs in the same way as firms that were highly indebted.

In contrast to much of the literature on financial constraints we control for the previous year’s accounting profit rate as opposed to the cash flow normalised by the fixed assets. These two variables are closely related but lend themselves to different interpretations of the cost adjustment process. Loss making firms that survive need to cut their costs. Firms with high margins face increased competition. Once controls are included for the profitability of the firm, there is no robust relationship between any of the measures of balance sheet strength and changes in operating costs; firms with a net cash position cut their costs in the same way as firms with high levels of debt.

Loss making firms display many of the characteristics of what is expected of financially constrained firms. They invest less, they have a lower growth rate and they cut their costs more for a given fall in revenue. The cost-cutting behaviour is partially a reflection of the survivor-ship bias in the sample. Loss making firms that do not cut costs go out of business. Lower rates of investment may be explained by management time being focused on repairing the existing business rather than seeking expansion opportunities.
Chapter 2. *Balance Sheet Effects on Firm Adjustment*

Highly profitable firms costs are less sensitive to a fall in revenue irrespective of their balance sheet position.
Chapter 3

Unions and Involuntary Job Separations

Abstract

In contrast to the extensive literature on the effects of unions on wages, productivity and voluntary job endings, the effect of unions on involuntary job endings has received relatively little attention. This chapter demonstrates how unions alter involuntary job separation (redundancies, temporary job endings and dismissals) rates at different tenure levels using the British Household Panel Survey data from 1991 to 2008. A novel finding is that being a union member reduces a person’s redundancy probability at low tenure levels, relative to an employee of a non-unionised firm, but has no significant effect at high tenure levels. Union membership and union recognition are not related to different rates of temporary job endings.
3.1 Introduction

The effects of unions on wages, productivity and voluntary job endings have been extensively explored. How unions affect involuntary job endings is not evident from the existing literature. While unionised firms have been shown to have lower employment growth rates, (Addison and Belfield, 2004; Bryson, 2004; Blanchflower et al., 1991) this does not necessarily mean higher rates of involuntary job endings (White and Bryson, 2013). However, job security is an important attribute of a job for employees (Bryson et al., 2009; Heery and Abbott, 2002) and is one of the potential benefits of union membership. We approach the issue from the perspective of the individual worker. We ask whether unions reduce involuntary job separations and what forms of separation unions are most effective in providing protection against.

17 years of the British Household Panel Survey (BHPS) are used to show the individual effects of unions on involuntary job separations (dismissals, temporary job endings and redundancies). This allows the effects of unions to be disentangled from other covariates such as tenure and type of employment contract. It has been previously shown that the determinants of voluntary and involuntary job endings differ significantly (Booth and Francesconi, 2001). We develop this idea by showing the differences between dismissals, temporary job endings and redundancies. We look at all three types of involuntary separation, which are closely related, with a view to capturing the overall effect of unions on involuntary job separations. The data are based on individual surveys, so job separations are based on how the person interpreted their job separation. In addition, while we define dismissals, temporary job endings and redundancies as involuntary job separations, this is mainly to distinguish them from quits. In reality both temporary job endings and redundancies can be voluntary.

The first contribution of this chapter is to show how unions alter the redundancy decisions of firms. We find weak indication that unions change how many people get made redundant, and stronger evidence that they alter who gets made redundant. Unions
reduce the redundancy probability of low-tenure staff while having no effect on long-
tenure staff. This is the opposite of what we expected at the outset, which was that
unions would seek to enforce seniority rules. The results can potentially be explained
by unions generally reducing the amount of redundancies and inducing firms to ad-
just employment with voluntary redundancy packages, which favour long-tenure staff,
rather than through a “last-in-first-out” method. This would be a return to seniority,
but of a different kind to what is normally described. The second contribution is to
show that temporary employees who work in unionised firms do not face higher separa-
tion rates compared to temporary employees in non-unionised firms. That is, firms do
not compensate for the presence of a union by using temporary employees as a buffer.
The third contribution is to demonstrate that dismissals are rare and predominantly
happen to low-tenure staff. While we find that there is no relationship between union
membership and dismissal rates, care must be taken in interpreting these results due
to the relatively small number of dismissals. Overall, the chapter highlights the com-
monalities and differences between the different modes of involuntary job separation
by examining the characteristics of the individuals who are separated.

3.2 Related Literature and Hypotheses

Involuntary job endings occur in a range of situations, from a single staff member to
a plant or firm closure. Employers have a range of options available to them to reduce
staffing levels (Cascio, 2009; Cully et al., 1999). How firms adjust and who they select to
exit the firm will depend on the scale and type of the adjustment required. Many firms
only require small adjustments, which can be achieved by natural attrition, temporary
job endings, or dismissal in the case of individual specific issues.

The well-established negative relationship between union membership and quits (Booth
and Francesconi, 2001; Batt et al., 2002; Delery et al., 2000; Wooden and Baker, 1994)
means that unionised firms who wish to make a small employment adjustment will not be able to rely on natural attrition to the same extent as non-unionised firms.

3.2.1 Unions and Redundancies

3.2.1.1 Unions and the wage-employment bargain

Unions face a trade-off when bargaining over wages and employment (Gahan, 2002; Clark and Oswald, 1993). Unionisation could result in increasing the probability of firm closure through higher wages resulting in a smaller buffer in the event of unexpected shocks. In the UK and other countries a union wage premium for private sector employees has been well documented (Blanchflower and Bryson, 2010; Booth, 1995; Andrews et al., 1998; Bratsberg and Ragan, 2002; Freeman and Medoff, 1979; Goerke and Pannenberg, 2004). Higher wages in a competitive market with no productivity difference would result in unionised firms being more vulnerable to external shocks. The wage premium has fallen in recent years (Bryson et al., 2010), but is still at an economically significant level (5% higher). The effects of unions on firm closures have been difficult to establish empirically. A number of studies show no effect of unions on firm closures (Bryson and Dale-Olsen, 2008; Machin, 1995); while other researchers have found that unionised plants had increased closure rates (Bryson, 2004; Addison and Belfield, 2004).

The main mechanism through which unions are expected to alter firm decisions is through collective bargaining at the firm level (Bryson et al., 2010). Unions could increase the cost of removing staff through threats of industrial action or facilitate adjustment in line with theories of union-voice (Freeman and Medoff, 1984). The ability of unions to bargain with firms depends on the union density in the firm (Bryson et al., 2010). There is a mechanistic, albeit imprecise, positive relationship between
individual union membership and union density at an employee’s workplace. A negative relationship between individual union membership and redundancy rates can be explained in terms of an omitted variable of union density at the employee’s firm. There are two alternative interpretations of the relationship between union membership and redundancies. The first is that union membership provides a private good. A union might provide legal representation only to the unionised workers in a firm. This is most applicable in the cases where an individual is being made redundant, rather than a large portion of the firm’s staff, similar to a dismissal situation. While this may be playing a role most redundancies occur in cases where significant portions of the workforce are made redundant (Varejão and Portugal, 2007; Davis et al., 2006). The second alternative interpretation is that there are other omitted variables which are related to union membership and redundancy. Endogeneity issues are discussed in section 3.4.

3.2.1.2 Unions and the allocation of redundancies

 Various criteria can be used by firms in selecting staff to be made redundant: “skills, qualifications and aptitude, standard of work and/or performance, attendance and disciplinary record” are recommended by a UK government website\(^1\). It is illegal to discriminate against an employee on prejudicial grounds, such as age, religion or sex, or on their membership of a union. For both firms and employees the costs and benefits of redundancies vary by tenure. Management surveys have found that the “last-in-first-out” rule is commonly used in the UK (Millward, 1992; Booth, 1987), even though this is not a regulatory requirement. Secondly employment rights change with tenure for both temporary and permanent employees. Finally, firm specific human capital is likely to be related to tenure (Lazear, 2003).

There is considerable international variation in the use of seniority rules (Golden, 1997). In the UK, the use of the “last-in-first-out” rule expanded in the ‘60s and ‘70s and has

\(^1\)https://www.gov.uk/staff-redundant/overview.
been used extensively by both union and non-union firms (Disney and Gospel, 1989). In contrast to the US, where seniority rules were more established, the use of the “last-in-first-out” rule in the UK was typically by informal understanding rather than written agreement (ibid). It is widely held that unions would enforce seniority rules in redundancy situations (Freeman and Medoff, 1984; Frank and Malcomson, 1994; Díaz-Vázquez and Snower, 2003; Hirsch, 2008). The empirical basis for this is surveys of firm practices (Booth, 1987; Abraham and Medoff, 1984) rather than employee outcomes. However the presence of seniority rules, even when written into collective bargaining agreements, does not necessarily mean that this is what happens in practice (Turnbull, 1988).

3.2.1.3 Unions and the incidence of voluntary redundancies

A number of studies have found that voluntary redundancies are more common in unionised firms (Casey and Wood, 1994; Booth, 1987; Daniel and Stilgoe, 1978) as is bargaining over redundancy (Booth and McCulloch, 1999). Firms are frequently reluctant to engage in redundancies due to the range of negative effects that redundancies have been shown to have on the remaining staff (Maertz et al., 2010; Cascio, 2009; Cameron, 1994), which can be influenced by perceptions of fairness (Hubbard and Purcell, 2001; Mishra and Spreitzer, 1998; Davy et al., 1991). Voluntary redundancies are a common method of mitigating the negative productivity effects on remaining staff (Booth, 1987). Voluntary retirements are used in a similar fashion although they are less common (Teague and Roche, 2014).

Unions do not oppose job losses if they are voluntary (Turnbull and Wass, 2000). Union job guarantees are associated to lower compulsory redundancies, but not necessarily redundancies in general (Bryson et al., 2009). While voluntary redundancy programs involve costs in excess of statutory redundancy pay, they have the advantage for the firm of being able to target, to some extent, who leaves the firm. Seniority based pay
Chapter 3. Unions and Involuntary Job Separations

scales, which have been demonstrated in unionised firms with formal pay scales (Booth and Frank, 1996), will result in an increased incentive for firms to remove more senior staff (Huck et al., 2011).

Comparable studies that use individual panel data to investigate involuntary job separations typically pool redundancies, temporary job endings and dismissals (Goerke and Pannenberg, 2011; Booth and Francesconi, 2001; Wilkins and Wooden, 2011). Goerke and Pannenberg (2011) looked at the effect of unions on redundancies and dismissals combined using German SOEP data. They showed that the redundancy probability for unionised employees is 1.4% points lower than non-unionised employees. The interaction effect of tenure and union membership or the effect of unionisation on temporary employees were not explored. Booth and Francesconi (2001) and Wilkins and Wooden (2011) both look at the issue of gender and involuntary job separations using the BHPS and Australian panel data sets respectively, neither finds a significant effect of union membership.

An alternative approach to using individual data would be to use data from surveys of firms and employees such as the WERS datasets. The WERS survey of firms provides additional information on firms such as age, union density and multi-unionism; however, no information is available on the staff who have left the firm. White and Bryson (2013) use the 1998 survey to show the effect of unions on workplace job cuts; comprising attrition, labour redeployment and redundancies. They find that firms with very high union densities are more likely to make workplace job cuts.

3.2.2 Unions and Temporary Job Endings

Unions have shown an increased interest in representing non-standard employment types (Heery et al., 2004). Temporary job endings comprise a large portion of involuntary separations (27%). We interpret temporary job endings as being employer initiated. While this is problematic, it is supported to a certain extent by the high
rate of quits in temporary jobs – temporary job endings are not viewed as a substitute for quits. Temporary employment is used in a range of situations (Booth et al., 2002): these include short duration jobs such as seasonal work or IT contracts, probationary periods (Holmlund and Storrie, 2002; Houseman et al., 2003) and replacements for staff on leave. Employers might also hold a buffer stock of temporary employees to facilitate easier adjustment in the event of a negative demand shock (Booth et al., 2002).

The employment rights of low tenure (less than one year) temporary and permanent employees do not differ dramatically in the UK. However, the rate of temporary job endings differs substantially from that of redundancies. One option a unionised firm might pursue is to compensate for the presence of a union by adjusting through temporary employees. This would result in higher temporary job ending rates for people who work in unionised firms. In a recent study of Irish HR managers, Teague and Roche (2014) find that reducing the number of temporary employees is a relatively minor adjustment mechanism. Alternatively, if unions bargain for reduced usage of temporary contracts (Heery and Abbott, 2002) then the importance of unions could be understated due to the large difference in involuntary separation rates between permanent and temporary staff. It’s not clear to what extent this is happening. Using the BHPS, Francesconi and Garcia-Serrano (2004) find no relationship between union recognition where an individual works and employment contract type (temporary vs permanent) for men and a strong relationship for women.

### 3.2.3 Unions and Dismissals

Dismissals can occur in situations ranging from arbitrary management decisions to new staff who are not suited to the position. Dismissals are relatively rare compared to redundancies and temporary job endings; comprising just 10% of involuntary job separations. This may be due to under-reporting or uncertainty on the part of the
interviewee as to whether they had been made redundant or had been dismissed. Dismissals are not dissimilar to temporary jobs that end after a probationary period, with both having a high incidence for low-tenure and young employees.

In one of the few studies on the individual determinants of dismissals, Campbell (1997) using US data, finds that education and gender are the main determinants on being dismissed with union membership insignificant. In the US, unfair dismissal clauses are written into detailed collective bargaining agreements, in the UK collective agreements are less formal (Disney and Gospel, 1989; Brown et al., 2009). A number of studies have shown, using various waves of WERS data, that firms with high union density have lower dismissal rates (Antcliff and Saundry, 2009; Knight and Latreille, 2000; Cully et al., 1999). One interpretation of this is that firms with high union density are more reluctant to dismiss employees due to fear of worsening industrial relations. Alternatively strong and effective trade unions might facilitate resolution of disputes (Antcliff and Saundry, 2009), or trade unions could provide information and representation which reduces incidence of unfair dismissal. This function of trade a union has the potential to be an excludable good in comparison to wage negotiations (Booth and Bryan, 2004) and redundancy effects which benefit both union members and non-members in firms that recognise a union.

3.2.4 Hypotheses

The first hypothesis tested in this chapter is that unions reduce the number of redundancies and protect seniority when a firm is reducing its labour force. The second hypothesis is that unionised firms compensate for higher redundancy costs of core staff by using temporary staff as a buffer and thus increasing the temporary job ending rate in unionised firms. The third hypothesis is that unions reduce the number of dismissals.
Chapter 3. Unions and Involuntary Job Separations

3.3 Data and Empirical Methodology

The data used are from the British Household Panel Survey (BHPS). The survey commenced in September 1991 when c.10,000 nationally representative households were interviewed. Each of these people has been re-interviewed annually since then. All 18 waves of the BHPS are used in this study. The last round of interviews was in late 2008\(^2\). Data from the additional samples for Welsh, Scottish, Northern Irish and ECHP are included in the data set but are excluded from the attrition weighted regressions.

The data are restructured so that each year’s individual response file is linked to the following year’s job history records. This allows a job separation to be linked to information about the job. The individual response file contains personal characteristics such as union membership, type of employment contract, tenure and job satisfaction.

The job history file contains a list of jobs that the person occupied in the previous year and reasons why each job ended. The question asked is: “Would you look at this card please and tell me which of the statements on the card best describes why you stopped doing that job?”. Responses are: “Promoted, Left for better job, Made redundant, Dismissed or sacked, Temporary job ended, Took retirement, Stopped health reasons, Left to have baby, Children/home care, Care of other person, Other reason, Missing or wild, Inapplicable, Refused, Don’t know”\(^3\). In cases where multiple job separations occurred since the last interview only the first separation is considered. This is because union membership and recognition are only available in the previous wave of the survey.

The final sample comprises people who had full interviews in two consecutive surveys and were in some form of employment at the time of the first survey. A broad definition of employment is used; all observations in full-time or part-time employment are included in the dataset. The dataset therefore includes a cohort who is only marginally

---

\(^2\)Understanding Society took over from the BHPS in 2009. Unfortunately the union membership and redundancy questions were not asked in the first wave. The union and redundancy questions were asked in the second wave in 2010 / 2011. The gap in the records means that the procedure for linking employer and employee data used in the chapter cannot be employed for the crisis period.

\(^3\)Job spells that are split by promotions are merged.
attached to the labour force who indicate their employment status as students, retired or other. The dataset is restricted to private sector employees. The rationale for looking at the private sector only is that redundancy rates in the public and private sectors are different (Morgan, 2000) and that the bargaining power of unions may vary substantially between public and private sectors. This results in an unbalanced sample of 67,830 observations for the 17 waves A to Q of which 13,417 are unique individuals. The total number of involuntary separations is 2,373 recorded in waves B to R. Table 1 and Table 2 show summary statistics.

Table 3.1: Summary Statistics (Unweighted).

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>No Rec¹</th>
<th>Union Mem</th>
<th>Non Mem</th>
<th>Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obs</td>
<td>67,830</td>
<td>46,773</td>
<td>11,801</td>
<td>9,256</td>
<td>4,785</td>
</tr>
<tr>
<td>Unique ID²</td>
<td>13,417</td>
<td>11,052</td>
<td>3,240</td>
<td>3,678</td>
<td>3,209</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>36.57</td>
<td>35.98</td>
<td>39.9</td>
<td>35.29</td>
<td>28.86</td>
</tr>
<tr>
<td>Tenure (Years)</td>
<td>5.35</td>
<td>4.58</td>
<td>8.85</td>
<td>4.8</td>
<td>1.49</td>
</tr>
<tr>
<td>Male %</td>
<td>54.45</td>
<td>51.87</td>
<td>64.22</td>
<td>55.01</td>
<td>48.86</td>
</tr>
<tr>
<td>Permanent %</td>
<td>92.95</td>
<td>91.74</td>
<td>97.78</td>
<td>92.87</td>
<td>0</td>
</tr>
<tr>
<td>Manager %</td>
<td>33.9</td>
<td>34.61</td>
<td>31.12</td>
<td>33.88</td>
<td>9.34</td>
</tr>
<tr>
<td>Part Time %</td>
<td>22.82</td>
<td>25.92</td>
<td>12.46</td>
<td>20.37</td>
<td>52.62</td>
</tr>
<tr>
<td>Workplace Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small %</td>
<td>21.62</td>
<td>27.62</td>
<td>7.57</td>
<td>9.22</td>
<td>25.43</td>
</tr>
<tr>
<td>Small Med</td>
<td>17</td>
<td>20.57</td>
<td>8.57</td>
<td>9.73</td>
<td>19.85</td>
</tr>
<tr>
<td>Medium Small</td>
<td>25.29</td>
<td>26.76</td>
<td>21.36</td>
<td>22.84</td>
<td>24.87</td>
</tr>
<tr>
<td>Medium</td>
<td>22.91</td>
<td>17.64</td>
<td>35.82</td>
<td>33.08</td>
<td>18.58</td>
</tr>
<tr>
<td>Large</td>
<td>13.18</td>
<td>7.41</td>
<td>26.68</td>
<td>25.13</td>
<td>11.26</td>
</tr>
</tbody>
</table>

¹ No Rec: people who work in firms with no union recognition, Union Mem: union members, Union Non Mem: people who work in firms with union recognition but are not union members, Temp: Temporary employees.
² Unique ID: number of unique individuals in the pool.
³ Variables not shown are: Marriage status, Company Pension, Employment status, Occupation and Year.

A categorical union variable is constructed based on two union questions asked in the survey. The first question was: “Is there a trade union, or a similar body such as a staff association, recognised by your management for negotiating pay or conditions for

³Restricted to interviewees who identify themselves as working for a “private firm/company” from the question: “Which of the types of organisations on this card do you work for (in your main job)?”
⁴All employed interviewees were asked the union questions in the first, fourth and subsequent waves. In waves two and three only people who changed jobs were asked. The responses from wave one are linked forward for waves two and three under the assumption that there is little movement in union membership and recognition for those who do not change jobs.

56
Chapter 3. Unions and Involuntary Job Separations

the people doing your sort of job in your workplace?”. If they answered “yes” they were asked: “Are you a member of this trade union/ association?”. The three levels of the union variable comprise employees who work in firms that do not recognise unions, employees who are members of a union and employees who work for a firm that recognises union but are not members of a union.

The vector of explanatory variables used comprise of both individual characteristics and firm characteristics which broadly correspond with similar work (Goerke and Pannenberg, 2011; Booth and Francesconi, 2001). Table 1 shows the summary statistics split between the three union category levels and also for people on temporary contracts. Union members are older, have a much longer tenure, are more likely to be male and work full time. Union membership is clustered in larger firms and in the manufacturing sector. 37% of private sector union members work in the manufacturing sector with large numbers in the retail and financial sectors. The tenure variable is defined as the length of time with the current employer. The last column of Table 1 shows the summary statistics for temporary employees. Temporary employees are younger, have a very low-tenure, are more likely to be female, not managers and work part-time. While there are few unionised temporary contract workers there is a large cohort of temporary employees who work at unionised firms.

Table 2 shows the number of separations and separation rates. The average involuntary separation rate is 1.0% lower for union members compared to the no recognition group. Redundancies comprise 64% of involuntary separations, temporary job endings 27%.

---

6 It should be noted that the sequencing of the questions in the survey means that union members who work in a workplace with no union recognition are categorised as no recognition. We could as easily have used union recognition as a single dummy as a proxy for union density. The results for the redundancy regression are comparable taking this approach. We use the three way variable as it allows us to look at the non-union members as well as the union members.

7 We omitted Experience, Entry Cohort into the Labour market, Travel to Work Time, Overtime and London. We omitted Experience as it was not clear how this was calculated and how it differed from tenure and age. Similarly Entry Cohort is highly correlated with age. None of the other three were significant and are more relevant to quits than involuntary job endings.

8 Waves A to J use SIC80 codes, waves K to Q use SIC 92 codes, these are merged into 15 sectoral groups. Firms are split into five size groups 1 to 9 employees, 10 to 24 employees, 25 to 99 employees, 100 to 499 employees and 500 plus employees.

9 This differs from the tenure variable derived in the BHPS, which measures the length of time in the current job with a promotion counting as a new job.
Chapter 3. Unions and Involuntary Job Separations

Table 3.2: Separations – Numbers and rates.

<table>
<thead>
<tr>
<th></th>
<th>Total¹</th>
<th>No Rec</th>
<th>Union Mem</th>
<th>Non Mem</th>
<th>Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redundancies</td>
<td>1517</td>
<td>1083</td>
<td>246</td>
<td>188</td>
<td>111</td>
</tr>
<tr>
<td>Temporary</td>
<td>629</td>
<td>472</td>
<td>54</td>
<td>103</td>
<td>279</td>
</tr>
<tr>
<td>Dismissals</td>
<td>227</td>
<td>175</td>
<td>18</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>Total²</td>
<td>2,373</td>
<td>1,730</td>
<td>318</td>
<td>325</td>
<td>417</td>
</tr>
<tr>
<td>Rates %⁴</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redundancy</td>
<td>2.24</td>
<td>2.32</td>
<td>2.08(0.14)</td>
<td>2.03(0.11)</td>
<td>2.34(0.69)</td>
</tr>
<tr>
<td>Temporary</td>
<td>0.93</td>
<td>1.01</td>
<td>0.46(0.00)</td>
<td>1.11(0.36)</td>
<td>5.83(0.00)</td>
</tr>
<tr>
<td>Dismissals</td>
<td>0.33</td>
<td>0.37</td>
<td>0.15(0.00)</td>
<td>0.37(1.0)</td>
<td>0.54(0.15)</td>
</tr>
<tr>
<td>Total%</td>
<td>3.5</td>
<td>3.7</td>
<td>2.69(0.00)</td>
<td>3.51(0.46)</td>
<td>8.71(0.00)</td>
</tr>
</tbody>
</table>

¹ Total number of involuntary separations. (Max one per year)
² Consists of 2,012 unique individuals
³ Annual separation rates: separations over employees.
⁴ P values in brackets for difference between groups with No Rec as the base level.
⁵ P values for the difference between union member and non-member are 0.8/0.0/0.0/0.0 for redundancies/temporary job ends, dismissals and the total.
⁶ Union members and non-union members are contrasted with employees of firms that do not recognise unions.

and dismissals 9%. Redundancy rates are 0.2% lower for union members. Temporary job endings are lower for union members and higher for non-members. Temporary employees have a much higher total involuntary separation rate at 8.7%. They also have a higher quit rate which is important for how we interpret a temporary job ending. Dismissals are rare across the board but particularly so for union members. Redundancy rates broadly correspond with rates from Labour Force Survey data (Turnbull and Wass, 2000). WERS data provides job separation rates from the management's perspective. The WERS data splits job endings between quits, redundancies, dismissals and other (e.g., retirement), temporary job endings are not recorded. Dismissal rates in the BHPS, at 0.4%, are significantly lower than those recorded in the WERS surveys which are 1.5% (Cully et al., 1999). This might be due to under-reporting of dismissals in the BHPS or due to temporary job endings being classified as dismissals in the WERS.

Having been made redundant, dismissed or had a temporary job ended in the last year are the three binary dependent variables modelled in this chapter. Each of the models is
Chapter 3. *Unions and Involuntary Job Separations*

estimated with a random effects probit model. In addition to the observable factors that may affect a person’s separation probability, such as tenure and firm size, a number of unobservable factors may also be at play. For example, being made redundant may be related to a person being unmotivated, unproductive or unable to adapt to new work processes. These factors will result in a person being prone to multiple involuntary separations.

The main modelling approach used in this chapter is a random effects probit model. To account for any correlation between the observed and unobserved characteristics, Mundlak term are included in the model. Standard errors are clustered by individual.

The random effects model is specified as:

\[
Y_{it} = 1[X_{it}\beta + c_i + e_{it} > 0]
\]

Where \(X_{it}\) is a matrix of explanatory variables, \(\beta\) is a vector of coefficients and \(e_{it}\) is the error term for each observation. The unobserved time invariant heterogeneity can be expressed as \(c_i = \Psi + X_i\xi + a_i\). Where \(\Psi\) is a constant, \(X_i\) are the time averaged Mundlak terms and \(\xi\) the coefficients on the terms. \(a_i\) is the individual error term which is *Normal*(0, \(\sigma_a\)). An assumption of a basic random effects model is that the unobserved heterogeneity \(c_i\) is uncorrelated with the explanatory variables (Wooldridge, 2002). This assumption is relaxed by including Mundlak terms for three of the four time varying variables: pay, age and job satisfaction. This allows the unobserved heterogeneity to be correlated with these variables. This is particularly important in the case of job satisfaction as there is a strong negative correlation between separations and job satisfaction and also a negative relationship between union membership and job satisfaction. The unobserved effect estimated by the model is the correlation between the composite latent error, \(c_i\) and \(e_{it}\), across any two time periods. These unobserved effects are small but highly significant in all models. This is not surprising given that most individuals in the data set never experience an involuntary job separation. Appendix 1 provides
further details of econometric specifications used, robustness checks and discussion on why a standard fixed effects model is unsuited to the research question.

3.4 Econometric Specifications and Robustness

Missing data is accounted for in a number of ways. A “not applicable” response to union membership and union recognition questions is converted into a negative to both questions. Observations with no annual tenure data are removed from the dataset. Missing data from the remaining variables are generated using a multiple imputation algorithm. Multiple imputation generally reduces bias and increase efficiency relative to list wise deletion (Honaker and King, 2010).

The three way union variable is interacted with the tenure variable. The rationale for this is that separation probabilities were expected to differ across tenure. For probit models with interactions the marginal effect is the cross derivative of the expected value of the dependent variable (Norton et al, 2004):

$$\frac{\Delta F(u)}{\delta x_1} = (\beta_1 \beta_{12} x_1 + \beta_2 + X \beta) - \beta_1 N[\beta x_1 + X \beta],$$

For a continuous variable $x_1$, in this case employment tenure, interacted with a binary variable $x_2$, union membership, the marginal effect of the binary variable is the discrete difference (with respect to $x_2$) of the single derivative (with respect to $x_1$). Where $N$ is the standard normal probability density function, $X$ is a matrix of covariates with coefficients $\beta$.

Endogeneity in the form of omitted variable bias may be present if union membership is correlated with an unobservable personal characteristic such as low/high productivity. Alternatively the omitted variable could be a characteristic of the firm such as

\footnote{Using the AmeliaII package in R}
firm age, with old firms tending to grow more slowly than young firms (Coad, 2009). Another possibility is that there are anticipatory effects such that people join a union when they feel their jobs are in danger. Powdthavee (2011) finds evidence of a decline in job satisfaction before joining a union. We control for this by including job satisfaction in the previous year. The Mundlak term for job satisfaction is included to control for well-known negative relationship between union membership and job satisfaction. Excluding the Job Satisfaction variable from the regression does not alter the results. Endogeneity of union membership is tested using a bivariate probit model where both union membership and separation probabilities are simultaneously estimated. The bivariate model shows that the correlation between the two equations is low. This is indicative of endogeneity not being a large problem in the model.

A range of other similar models are employed to improve the robustness of the chapters findings. To address the issue of possible serial correlation in the error term a General Estimating Equations (GEE) model was run with an AR(1) correlation structure. This population averaged model provides the same results as the random effects model, both shown in Figure 1. The interpretation of subject specific models, such as the random effects model, and the population averaged model differ slightly. The population model estimates the probability of the average union employee being made redundant compared to the average non-union employee. The subject specific model estimates the effect of union membership on individual redundancy rates. As we are interested in the individual effects of unions the random effects model is more suited.

We account for potential attrition bias in the dataset by using a weighting vector in a pooled probit regression. The BHPS provides a variable to reweight each period to the 1991 sample so that the sample is representative of the overall population through time. The longitudinal individual response weight is used here. However the effect of this approach to attrition is to reduce the sample size from 67,830 to 36,246 as individuals from all booster waves and non-core individuals are excluded.

\[^{11}\text{See Uhrig (2008) for a full description of attrition in the BHPS.}\]
An unweighed pooled probit model was also run. The advantage of the pooled probit model is that it utilises all of the observed involuntary separations. For the likelihood to be correct in a pooled probit model it is necessary to assume that the data points are completely independent: $E(e_{it}; e_{is}) = 0$ for all $t \neq s$. If this assumption is violated then the likelihood may be incorrect. However even if the likelihood is not correct, it has been shown that the pooled probit estimates are consistent even though the specified error structure is not correct. The pooled probit (ML) has been shown to perform well when the error structure has been misspecified once a robust estimator is used for the variance covariance matrix of (Guilkey and Murphy, 1993). However the pooled probit model cannot be used to estimate the impact of time invariant unobserved heterogeneity or state dependence.

An alternative strategy to dealing with time invariant unobserved heterogeneity might be to use a fixed effects logit model. The fixed effects model relies on within group variance of both the dependent and independent variables. The main difficulty with the fixed effects logit model in this case, is that it is not suitable for estimating the effects of tenure. To illustrate the point we simulated a panel dataset with the basic features of the real data: union and non-recognition groups with different tenures and different redundancy rates across tenure. A 10% random transition rate between the two union groups each period is introduced to accommodate the fixed effects model. The fixed effects model generates results that differ significantly from the true values whereas the random effects logit and probit both perform well. Consistent with this, Goerke and Pannenberg (2011) show a positive relationship between redundancy and tenure with the fixed effects model and a negative relationship using a random effects model. They do not discuss the difference as they are not focused on tenure. The reason the fixed effects model does not work, in this case, is due to the mechanical relationship between redundancy and a person’s tenure in the following year. The fixed effects model selects only individuals in which there is at least one observed redundancy. Regression coefficients are created by differencing the observed and unobserved covariates (Cameron
Chapter 3. *Unions and Involuntary Job Separations*

and Trivedi, 2010). This results in a logit model with regressor $X_{i2} - X_{i1}$, where $X_{i1}$ is the matrix of regressor values at period 1. The differencing of the tenure variable is problematic due to the mechanical relationship between tenure and redundancy. The differenced tenure variable ranges from +1 to $-T_{t-1}$. That is, if you were made redundant last year you will have a large negative tenure value after differencing. It is not clear how to interpret the results of the model. For the same reason a Mundlak term for tenure is not included in the random effects model; Mundlak terms are included for age and job satisfaction.

Involuntary employment separations are relatively rare; most individuals in the data are never involved in an involuntary separation. The data consists of 2,373 observations of involuntary separations. Rare events bias is a problem for infrequent events particularly in small datasets. King and Zeng (2001) simulate the event frequency and population sizes at which rare event bias becomes a problem. Rare events bias is a function of the ratio of 1s to 0s in the dependent variable and the total number of observations. The large number of observations used in this study and relativity high frequency of events (for rare event studies) means that rare event bias is not a significant issue; particularly for the pooled probit model.

3.5 Results

3.5.1 Unions effects on Redundancy Rates

Figure 1 shows the marginal effects of union membership on redundancy probabilities at different levels of tenure. As robustness checks, both weighted and un-weighted pooled probit models are also run which show consistent but slightly larger effects for union membership. Population averaged models that adjust for serial autocorrelation and a basic probit model are also reported with similar results. The graph shows that union members have a lower redundancy probability relative to employees of firms with no
union recognition at low levels of tenure. The relationship between union membership and reduced redundancies is significant up to six years of tenure, after that there is no difference in separation probabilities. At one year of tenure, union members have a 0.6% lower separation probability compared to the no recognition group. While there is no significant effect at any level of tenure for the non-union members, the pattern of reduced redundancies at low levels of tenure is replicated. As discussed in Section 2, due to the strong relationship between individual union membership and high union densities we interpret these results as people who work in firms with high union density having reduced redundancy rates.

Table 3 shows the average partial effects for the three random effects probit models. The average partial effect of union membership is -0.3% for redundancies. Alternative specifications that did not include the interaction term with tenure showed union membership and union non-membership to be insignificant across all models, consistent with the results shown by Booth and Francesconi (2001). This is not surprising given the variation in effects across tenure. The results are not just a feature of a small number of observations at long-tenure. Table 4 shows the number of observed involuntary job separation by tenure with a large number of redundancies at long-tenure.

The period of observation saw a large change in legal framework within which unions and management operated with the implementation of EU Directives on union recognition, minimum wages and employment protection legislation (Dickens and Hall, 2009). There was also a significant decline in union densities in the UK, most of which occurred prior to, or in the early part of the period covered (Blanchflower and Bryson, 2008; Freeman and Pelletier, 1990; Disney et al., 1995). To check the robustness of our results against these changes, the dataset was split into two periods; 1991-2000 and 2000-2008. Both periods show significant union effects on redundancies similar to the pooled dataset.
Table 3.3: Average Partial Effects of Random Effects Probit Models – Unweighted Data Set.

<table>
<thead>
<tr>
<th></th>
<th>Total A.P.E. 1</th>
<th>No Rec A.P.E. s.e.</th>
<th>Union Mem A.P.E. s.e.</th>
<th>Non Mem A.P.E. s.e.</th>
<th>Temp A.P.E. s.e.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union Non Member</td>
<td>-0.17</td>
<td>0.16</td>
<td>0.09</td>
<td>0.09</td>
<td>0.06</td>
</tr>
<tr>
<td>Union Member</td>
<td>-0.37***</td>
<td>0.15</td>
<td>0.05</td>
<td>0.11</td>
<td>-0.06</td>
</tr>
<tr>
<td>Tenure 2</td>
<td>-0.1***</td>
<td>0.02</td>
<td>-0.18***</td>
<td>0.02</td>
<td>-0.08***</td>
</tr>
<tr>
<td>Temporary Contract 3</td>
<td>0.49</td>
<td>0.25</td>
<td>2.48***</td>
<td>0.28</td>
<td>-0.01</td>
</tr>
<tr>
<td>Job Satisfaction 4</td>
<td>-0.46***</td>
<td>0.05</td>
<td>-0.12***</td>
<td>0.03</td>
<td>-0.04</td>
</tr>
<tr>
<td>Part Time 5</td>
<td>-0.24</td>
<td>0.15</td>
<td>-0.09</td>
<td>0.08</td>
<td>-0.11</td>
</tr>
<tr>
<td>Age</td>
<td>0.14***</td>
<td>0.02</td>
<td>0.03*</td>
<td>0.01</td>
<td>0</td>
</tr>
<tr>
<td>Male</td>
<td>0.26</td>
<td>0.13</td>
<td>0.11</td>
<td>0.07</td>
<td>0.16**</td>
</tr>
<tr>
<td>Firm Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Med</td>
<td>-0.24</td>
<td>0.18</td>
<td>-0.14</td>
<td>0.08</td>
<td>-0.02</td>
</tr>
<tr>
<td>Medium Sm</td>
<td>-0.24</td>
<td>0.17</td>
<td>-0.07</td>
<td>0.08</td>
<td>-0.12</td>
</tr>
<tr>
<td>Medium</td>
<td>-0.44*</td>
<td>0.17</td>
<td>0.04</td>
<td>0.09</td>
<td>-0.1</td>
</tr>
<tr>
<td>Large</td>
<td>-0.78***</td>
<td>0.19</td>
<td>0.07</td>
<td>0.12</td>
<td>-0.22**</td>
</tr>
<tr>
<td>Educ2(low)</td>
<td>-0.16</td>
<td>0.18</td>
<td>0.17</td>
<td>0.11</td>
<td>-0.15</td>
</tr>
<tr>
<td>Educ3</td>
<td>-0.13</td>
<td>0.18</td>
<td>-0.1</td>
<td>0.09</td>
<td>-0.18*</td>
</tr>
<tr>
<td>Educ4</td>
<td>-0.34</td>
<td>0.2</td>
<td>-0.01</td>
<td>0.1</td>
<td>-0.29***</td>
</tr>
<tr>
<td>Educ5</td>
<td>-0.35</td>
<td>0.19</td>
<td>0.13</td>
<td>0.11</td>
<td>-0.16</td>
</tr>
<tr>
<td>Educ6</td>
<td>-0.78***</td>
<td>0.21</td>
<td>0.16</td>
<td>0.13</td>
<td>-0.31**</td>
</tr>
<tr>
<td>Mundlak terms 6</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year Dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sector Dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR Test 7</td>
<td>0.008</td>
<td>0.007</td>
<td>0.47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 APE and Standard Errors have been rescaled so that APE’s can be interpreted as the percentage point difference in separation probabilities. Union members and non-union members are contrasted with employees of firms that do not recognise unions. Union APE includes the interaction effect with tenure.
2 Length of time with employer. APE includes the effect of squared tenure term.
3 Temporary contract contrasted with permanent contract.
4 Job satisfaction is on a scale of 1 to 7 with seven being very satisfied.
5 Less than thirty hours a week. An employee can be both permanent and part-time.
6 Mundlak terms are included for time varying variables with the exception of tenure.
7 Likelihood-ratio test of full models and models with the tenure*union interaction.

Table 3.4: Number of Involuntary Separations by Tenure Group.

<table>
<thead>
<tr>
<th>Tenure Group (Years)</th>
<th>0-0.5</th>
<th>0.5-1</th>
<th>1-1.5</th>
<th>1.5-2</th>
<th>2-2.5</th>
<th>2.5-5</th>
<th>5-15</th>
<th>15+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redundancies 1</td>
<td>319</td>
<td>186</td>
<td>129</td>
<td>84</td>
<td>76</td>
<td>230</td>
<td>354</td>
<td>139</td>
</tr>
<tr>
<td>Temporary Job Endings</td>
<td>353</td>
<td>103</td>
<td>44</td>
<td>23</td>
<td>21</td>
<td>42</td>
<td>35</td>
<td>8</td>
</tr>
<tr>
<td>Dismissals</td>
<td>92</td>
<td>48</td>
<td>22</td>
<td>14</td>
<td>6</td>
<td>26</td>
<td>14</td>
<td>5</td>
</tr>
</tbody>
</table>

1 Sufficient data is available for the probit models across the range of tenure for redundancies.
Table 3.5: Coefficient Estimates for Random Effects Probit Models – Unweighted Data Set.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Redundancies</th>
<th>Temp Job ²</th>
<th>Dismissals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef</td>
<td>s.e.</td>
<td>Coef</td>
</tr>
<tr>
<td>Union Non Mem ¹</td>
<td>-0.073</td>
<td>0.046</td>
<td>-0.02</td>
</tr>
<tr>
<td>Union Member</td>
<td>-0.171***</td>
<td>0.05</td>
<td>0.016</td>
</tr>
<tr>
<td>Tenure ³</td>
<td>-0.033***</td>
<td>0.005</td>
<td>-0.131***</td>
</tr>
<tr>
<td>Union Non Mem*Ten</td>
<td>0.006</td>
<td>0.006</td>
<td>0.044***</td>
</tr>
<tr>
<td>Union Mem*Ten</td>
<td>0.015***</td>
<td>0.004</td>
<td>0.014</td>
</tr>
<tr>
<td>Tenure Squared</td>
<td>0.001***</td>
<td>0.000</td>
<td>0.003***</td>
</tr>
<tr>
<td>Monthly Pay</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Age</td>
<td>0.037***</td>
<td>0.008</td>
<td>0.0219</td>
</tr>
<tr>
<td>Age Squared</td>
<td>-0.000</td>
<td>0.000</td>
<td>0</td>
</tr>
<tr>
<td>Job Satisfaction</td>
<td>-0.106***</td>
<td>0.010</td>
<td>-0.078***</td>
</tr>
<tr>
<td>Male</td>
<td>0.060</td>
<td>0.031</td>
<td>0.069</td>
</tr>
<tr>
<td>Temporary ⁴</td>
<td>0.104*</td>
<td>0.048</td>
<td>0.843***</td>
</tr>
<tr>
<td>Part Time ⁵</td>
<td>-0.058</td>
<td>0.037</td>
<td>-0.061</td>
</tr>
<tr>
<td>Firm Size: Small Med</td>
<td>-0.051</td>
<td>0.038</td>
<td>-0.101</td>
</tr>
<tr>
<td>Med Small</td>
<td>-0.051</td>
<td>0.035</td>
<td>-0.043</td>
</tr>
<tr>
<td>Medium</td>
<td>-0.096*</td>
<td>0.038</td>
<td>0.023</td>
</tr>
<tr>
<td>Large</td>
<td>-0.188***</td>
<td>0.047</td>
<td>0.041</td>
</tr>
<tr>
<td>Educ2 (low)</td>
<td>-0.035</td>
<td>0.039</td>
<td>0.107</td>
</tr>
<tr>
<td>Educ3</td>
<td>-0.028</td>
<td>0.039</td>
<td>-0.076</td>
</tr>
<tr>
<td>Educ4</td>
<td>-0.075</td>
<td>0.043</td>
<td>-0.004</td>
</tr>
<tr>
<td>Educ5</td>
<td>-0.078</td>
<td>0.042</td>
<td>0.084</td>
</tr>
<tr>
<td>Educ6</td>
<td>-0.193***</td>
<td>0.056</td>
<td>0.098</td>
</tr>
<tr>
<td>Mundlak terms ⁶</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year Dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sector Dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

¹ Union members and non-union members are contrasted with employees of firms that do not recognise unions.

² Temporary job endings were also looked at for temporary employees only with similar results.

³ Length of time with employer.

⁴ Temporary contract contrasted with permanent contract.

⁵ Less than thirty hours a week. An employee can be both permanent and part-time.

⁶ Job satisfaction is on a scale of 1 to 7 with seven being very satisfied.

⁷ Mundlak terms are included for time varying variables with the exception of tenure.

⁸ Variables not shown are: Marriage status, Company Pension, Employment status and Occupation.

⁹ ***p < 0.001, **p < 0.01, *p < 0.05
3.5.2 Unions and Temporary Job Endings

We find no significant relationship between union membership or union recognition and temporary job endings. The results presented in Table 3 are for the full dataset; reducing the data down to only the temporary employed provides the same result. This indicates that unionised firms do not use temporary employees as a buffer to compensate for reduced quit rates or the higher cost of redundancies. Neither are temporary employees of unionised firms afforded the same protections as permanent employees.
The results highlight the importance of temporary employment generally and the differences between temporary job endings and redundancies. When all involuntary job separations are pooled the variable with the largest average partial effect is the employment contract type: permanent vs temporary. Having a permanent contract reduces the separation probability by 4.4%. As expected, large firms, which would be expected to have greater internal flexibility, are less inclined to use redundancies, but there is no difference in temporary job endings. This points towards temporary employment being used for different purposes than permanent employment.

Figure 3.2: Cyclical changes in redundancies, dismissals and temporary job endings. The redundancy rate fell by 1.5% over the period while the rate of temporary job endings and dismissals is acyclical.

Figure 2 shows the average partial effects of each of the time dummy variables for
Chapter 3. Unions and Involuntary Job Separations

redundancies dismissals and temporary job endings. The two main macro economic features of this time period are a recession in the early ‘90s and a tight labour market prior to the recession in 2008. The last job histories are for late 2008 and do not fully capture the recession period. In contrast to redundancies temporary job endings are stable across time which again goes against the idea of temporary employment being used as a buffer.

3.5.3 Unions and Dismissals

The results do not show any significant effects of unions on dismissals. This is surprising. It was expected that unions would reduce the dismissal rate. This may be due to the relatively small amount of data on dismissals (227 observations). When dismissals and redundancies are pooled the average partial effect of union membership increases. Tenure is highly significant for dismissals. The median tenure of a person who has been dismissed is 0.6 years, compared to 0.3 for temporary job endings and 2.2 years for redundancies.

3.5.4 Limitations

One of the main limitations of the BHPS is that it is from the individuals’ perspective only. For the main dependent variable, when a person is asked why they left a job their response is their interpretation of the events. It is possible that what the individual describes as a redundancy would be described by the firm as a dismissal. In addition redundancies are not distinguished between voluntary or compulsory in the data and no information on whether extra statutory redundancy payments were paid is available. Similarly, we cannot tell why the firm is using temporary rather than permanent staff. From the outset some temporary jobs will have a high probability of ending on the specified date eg. summer jobs or a maternity leave, whereas others will depend on the employee and the firm’s performance. We treat unions as homogeneous; some unions
may be more effective than others. Another limitation is that a standard fixed effects model cannot be run due to the nature of the question being asked as we discuss in Appendix 1. The results we present and the possible explanation for these results are specific to the UK context. They may or may not be applicable to other institutional settings.

### 3.6 Discussion

We set out to demonstrate two commonly assumed relationships: that unions reduce redundancies and that unionised firms apply seniority rules in redundancy situations. The hypothesis that unions reduce redundancies overall is not strongly supported. Descriptive statistics in Table 2. show no difference between union member redundancy rates and non-recognition group redundancy rates. Probit models with no interaction term showed no effect of union membership on redundancy probabilities. However, when an interaction term with tenure is included the average partial effect of union membership is small and negative, that is there is a slight reduction in redundancy probabilities for union members. The effect of unions across tenure is the opposite of what was expected: union membership is related to a reduced probability of low tenure employees being made redundant and an increased probability (not statistically significant) of high tenure employees being made redundant. This can be explained by unions inducing voluntary redundancies for long tenure employees.

The average scale of the effect is relatively small; employees of non-unionised firms have an average redundancy probability of 2.3%. Union membership results in a 0.4 percentage point reduction in this rate. However this understates the importance of unions in redundancy situations. For low-tenure staff (1 year) a 0.7 percentage point reduction in redundancy rates is much more economically significant. In addition the effect of unions on redundancy pay is not observed here.
Chapter 3. *Unions and Involuntary Job Separations*

The scale of the union effect reported here is small relative to the scale of the union effect on quits (not reported). The average partial effect of union membership on quits is a 2 percentage point reduction. The fact that unionised firms have a lower quit rate than non-unionised firms suggests that unionised firms may have a greater requirement for involuntary separations, other things being equal. This will result in the effect of unions being understated here as the higher level of excess labour in unionised firms is unobserved.

The results we present relate only to external job flows and not to internal job reallocation within firms or quits. This contrasts with White and Bryson (2013) who used WERS data to show the effects of unions on attrition, labour redeployment and redundancies combined (within workplace job cuts). Their results show that unions increase within workplace job cuts for a small number of high union density firms. The two results are not incompatible as different components of workplace job cuts could be traded off against each other – i.e. labour redeployment traded for redundancies.

Separation rates are substantially higher for temporary employees. If unions enforce the use of permanent contracts of employment, then estimates of the effect of unions on redundancies are understated. However the results do not point toward temporary employment being widely used as a substitute for permanent employment. Temporary job-ending probabilities follow a different pattern to redundancies. They are not cyclical, are independent of firm size and are not altered by union recognition. This goes against the idea that temporary employees are used as a buffer but rather suggests that temporary jobs are different types of jobs. Interestingly, c. 30% of temporary job endings are by people who previously reported being on a permanent contract. This might be explained by people being let go after probation periods. In the UK, there is little difference between the employment protection of temporary and permanent contract employees with low tenure. The function of temporary contracts may be to manage an employee’s expectations rather than to avoid redundancy costs. The interpretation of
temporary job endings as an employer decision is supported by the high level of quits that is also shown for temporary employees.

The lack of significant effects of unions on dismissals should be treated with caution as the number of dismissals observed is low. While the redundancy rates observed in the BHPS broadly correspond to those in WERS the dismissal rates are substantially lower in the BHPS. It is not clear which survey is more representative as temporary job endings are not indicated in the WERS surveys. What is clear from the BHPS is that dismissals occur to low-tenure staff; 60% of dismissals are for staff employed for less than one year. This indicates that dismissals are driven by a mismatch between a firm and an employee which is recognised by the employer early on. This is important as it indicates that any reduction in dismissals as a result of union negotiation can be expected to reduce firm productivity.

3.7 Conclusion

In this chapter the effects of unions on redundancies, temporary job endings and dismissals probabilities are investigated. All three are related but distinct forms of exit from a firm. We show union membership has different effects on each. A key finding is that union membership is associated with lower rates of redundancies. Importantly, this effect is only observed at lower levels of tenure. While this goes against the standard assumption of seniority rules, it is consistent with an alternative kind of return to seniority: voluntary redundancies of long tenure staff.

We do not find that union membership or recognition alter an individual’s temporary job ending probability. Our main finding in relation to temporary job endings is that they follow a different pattern from redundancies. Redundancies are more cyclical, more concentrated in certain sectors such as construction or manufacturing, and are much less likely in larger firms than smaller firms. Temporary jobs have none of these
Chapter 3. *Unions and Involuntary Job Separations*

characteristics. Tenure and job satisfaction appear to be the main variables determining temporary job endings. Most such endings occur after a very short period in a job (four months), which compares to two years for redundancies.

The dismissal rate observed in the BHPS is low compared to both redundancy and temporary job ending rates. Dismissals are highly concentrated among low-tenure employees. This suggests that dismissals are largely a result of individuals not progressing on from probationary periods. However, there is significant potential for under-reporting of dismissals due to stigma or in the event that redundancy was paid to avoid an unfair dismissals claim. While we find no indication that unions influence dismissal decisions, care must be taken in interpreting these results due to the small number of dismissals reported.

Firm and personal characteristics play important roles in determining involuntary employment separations. Tenure, job satisfaction, employment contract type, firm size and sector are the most important predictors of redundancies. These results highlight the value of using micro economic data to investigate employment institutions whose effects are subtle and heterogeneous.

As the chapter makes a number of advances in identifying the effects of unions on job separations, the findings should be of interest to human-resource managers operating in both union and non-union environments. The chapter therefore has potential implications not only for understanding the effects of unionisation, but also for the particular challenges of retention and motivation in various types of firm. More specifically, the findings provide new information on the likely effects of unionisation on the stability of the employment relationship in different settings. In particular, new light is shed on the way that union effects on separations vary by tenure and the apparent lack of impact on the incidence of temporary job endings.
Chapter 4

Localised Unemployment in the UK

Abstract

The average duration of unemployment varies substantially between local authority districts in the UK. Possible explanations include simple composition effects and various neighbourhood effects, including variations in local labour demand. This chapter contributes to the literature by combining individual data from the BHPS and neighbourhood data from the LFS. Cohorts of the unemployed are compared to distinguish between different types of neighbourhood effects. While a neighbourhood effect is present after controlling for individual characteristics, it is due to very young labour market participants. We argue that this is inconsistent with an explanation based on variation in local labour demand. The observed relationship between neighbourhood and unemployment duration is more consistent with social rather than geographic isolation. Regional differences in unemployment durations are demonstrated.
4.1 Introduction

There is a large spread in the average duration of unemployment between UK local authority districts. Figure 4.1 shows the distribution of average unemployment durations for the 406 Local Authority Districts (LADs) for September of each year. The average duration in all LADs increased through the recession in the early 1990s and fell sharply in the latter part of the decade. However, areas of high unemployment durations and high unemployment rates remained high across the business cycle. The geographical pattern of unemployment is shown in Figure 4.2 for September of 1993, the peak of national unemployment. Many of the areas of highest unemployment are located in urban centres such as London, Glasgow and Birmingham.

![Figure 4.1: Average unemployment duration estimate by Local Authority District. Northern Ireland data included after 1995.](image)

In this chapter we investigate the hypothesis that areas of high unemployment have a shortage of local labour demand by looking at differences in individual unemployment durations. More specifically, we look at how an individual’s unemployment duration depends on observed characteristics, unobserved characteristics and neighbourhood effects. Neighbourhood effects is used here as an umbrella term to refer to the combined
effect of a local labour demand shortage and other spatial effects. The empirical challenge is to differentiate between unobserved characteristics and the various types of neighbourhood effects.

Differences in unemployment durations across local authority districts can be partially explained by observed characteristics. Due to the selection process that occurs in the housing market, people with certain characteristics choose to live in parts of a city or region with high(low) accommodation costs. This results in an uneven distribution in observed characteristics. In addition, there is potentially a range of unobserved characteristics such as addiction or poor social skills that would result in a person being less employable and choosing to live in an area of low cost accommodation (Hay and Bauld, 2010). Discouraged workers, who have a very low hazard rate from unemployment, may also be clustered in areas of high unemployment.

For neighbourhood effects the line of causality runs the other direction: living in a certain area causes longer spells on unemployment. A lack of local labour demand is one special case of the neighbourhood effect. The hypothesis that a lack of local labour demand is a cause of longer spells of unemployment is based on the observation that people do not travel very far to work and are slow to move between areas. Other possible mechanisms are that living in an area of high unemployment insulates people from the social pressure to work, or that employers are biased against people who live in certain areas (Clark, 2003; Holloway and Mulherin, 2004). Alternatively, many jobs are found through social networks, so that living in an area with fewer employed will reduce a person’s chance of finding a job (Hellerstein et al., 2014; Topa and Zenou, 2014).

To differentiate between these types of neighbourhood effects a number of sub groups of the unemployed are examined using two different geographic identifiers: the region and the local authority district. Neighbourhood effects for people of different age groups are examined, as different mechanisms are expected to apply to each group (Ellen and Turner, 1997). Using multiple geographic identifiers allows for improved links with
causal mechanisms for neighbourhood effects. The local authority district is the focus of this chapter as this is the smallest unit of geography that could represent a person’s employment search field.

A number of contributions to the literature are made. The first is to show that there are no neighbourhood effects for most unemployment spells. The second contribution is to show that to the extent that there are neighbourhood effects they are concentrated among the very young. We argue that this is not consistent with a local labour demand shortage as the older cohort, particularly those with weak employment characteristics, would also be affected. The chapter also demonstrates significant regional differences: Northern Ireland, Wales and Scotland all have longer unemployment durations. This is consistent with regional differences in labour demand.
Chapter 4. *Localised Unemployment in the UK*

Figure 4.2: Local Authority District Claimant Count Rates for September 1993. The claimant count rate expresses the number of claimants as a percentage of the workforce jobs plus claimants. Areas of high unemployment are located in the large cities. Source: Nomis. Contains National Statistics data © Crown copyright and database right 2015. Contains Ordnance Survey data © Crown copyright and database right 2015.
4.2 Related Literature and Hypotheses

The hypothesis that a lack of local labour demand is a cause of longer spells of unemployment has a long history going back, at least, to Kain (1968). While many US studies support the hypothesis (Ihlanfeldt and Sjoquist, 1998), there are significant identification issues, particularly relating to endogeneity of location choices. Many of the empirical studies have used either aggregate local area data or micro-level data without local area information (ibid). US research on the topic is typically cast along racial grounds due to strong segregation into black and white areas in US cities. This does not appear to be the case in the UK where internal migration patterns are similar for whites and non-whites (Champion, 2005). The idea of a localised mismatch between jobs and job seekers is supported by the average commute times of 21 minutes in the UK (Benito and Oswald, 2000). However, the effect of living in an area that is removed from employment need not apply to all its residents. People with higher wages or access to a car may have broader employment search fields (Morrison, 2005; Dawkins et al., 2015). While unemployment durations have been looked at by a number of authors using the BHSP (Böheim and Taylor, 2002), none have focused on area effects.

There are a number of causal explanations, other than spatial isolation, for a neighbourhood effect (Buck, 2001). Other causal mechanisms for a neighbourhood effect come under the category of social isolation. The length of time it takes to exit unemployment may depend on the availability of information on jobs, stigma effects or social norms. Many people find jobs though people they know (Damm, 2014; Böheim and Taylor, 2001; Montgomery, 1994), so having lived for a long time in an area with high unemployment might be expected to reduce a person’s job-finding rate. Stigma effects relate to employer discrimination due to the area in which you live (Atkinson, 2001). Stigma effects can be expected to vary depending on employers subjective views of a district. If the incentive to become employed is strongly influenced by social norms then high rates of unemployment in particular areas would be self perpetuating (Clark,
Chapter 4. *Localised Unemployment in the UK*

2003; Stutzer and Lalive, 2004). For adults the impact of living in an area is expected to come through differences in services, information and opportunities rather than directly shaping world view or behaviour (Ellen and Turner, 1997).

The neighbourhood effect has been explored in a range of contexts including employment, educational attainment, criminal involvement and teen sexual activity (Lupton, 2003). Many studies have found a small but significant effect (Cheshire, 2007; Durlauf, 2004). Using Canadian housing project data, Oreopoulos (2003) finds that neighbourhood has little effect on a youth’s eventual earnings. However, he finds that family differences play a large role; that is, siblings earnings are correlated. Also, Bolster et al. (2007) looks at the income growth trajectories for people from different neighbourhoods. Using a ten year panel, they find that there is little association between where people live and their subsequent income growth.

In identifying the neighbourhood effect it is critical to use an appropriate unit of geography (Lupton, 2003). If the geographical area identified is too small this may result in biased estimates due to spatial autocorrelation. The neighbourhood effect depends not just on the area where the person lives but also on the areas near by. Using a geographical area that is too large will result in over aggregation; the effect will not be detected due to a lack of contrast. In the case of the local labour demand deficit hypothesis a medium level geographic identifier such as the local authority district or the larger Travel to Work Areas (TTWAs) is most appropriate. The LAD is preferred as it identifies the smallest area through which the spatial segmentation of the labour market could credibly be working. Using an even smaller geographic area, such as ward-level deprivation, would be more suited to investigating social causes of unemployment duration such as stigma effects or information networks.

The alternative explanations for differences in unemployment durations are differences in observed and unobserved individual characteristics: people with weaker labour market prospects self-select into areas of low-cost housing and high unemployment. The
observed characteristics that have been shown to have strong effects on unemployment durations in the UK are education, age, council housing and spouses employment status (Böheim and Taylor, 2002). Self-selection into areas of low-cost housing may also be driven by unobserved characteristics such as low productivity that are not captured by observed characteristics (Lupton, 2003; Harding, 2003).

There is a cohort of extremely long-term unemployed who have very low hazard rates from unemployment (Machin and Manning, 1999). Declining job finding rates for people with longer spells of unemployment is called negative-duration dependence in the microeconomics literature and related to hysteresis in the macroeconomics literature. The presence of negative-duration dependence has been widely investigated, with mixed results (Kroft et al., 2013). The difficulty is in differentiating between unobserved heterogeneity and true duration dependence. From the point of view of identifying neighbourhood effects, what is important is whether there is a cohort of long-term unemployed, that are effectively disconnected from the labour market, who are causing the high rates of localised unemployment. One approach to this issue is to compare the amount of long and short-term unemployed in each local area. ? uses local unemployment rates in the UK to argue that local unemployment is driven by shortages in job opportunities. He includes a lag in the long-term unemployment when comparing it to short-term unemployment rates (Machin and Manning, 1999). However, the presence of a strong relationship between long-term and short-term unemployment is not a clear indication of shortages in labour demand in certain areas, rather it rules out long-term unemployment as the reason for high localised unemployment rates.

In this chapter we test the hypothesis that a lack of local labour demand results in people who live in local authority districts with high unemployment having longer spells of unemployment.
4.3 Method

A Cox proportional-hazards model is used to investigate whether some areas have longer spells of unemployment that cannot be explained by observed covariates. The model is multiplicative; the effect of living in an area of high unemployment is a multiple of an individual’s baseline hazard rate from unemployment:

\[ h(t, X) = h_0(t) \exp(\beta Z), \]

where \( h(t,X) \) is the hazard rate at time \( t \) from unemployment, \( h_0(t) \) is the baseline hazard, \( \beta \) is a vector of coefficients and \( Z \) is the matrix of covariates, including a recession dummy and the LAD unemployment index variable.

An index of LAD unemployment is created so as to classify the type of area a person lives in. The rationale for this is to distinguish between time effects, the effect of becoming unemployed in a recession, and area effects. Figure 4.3 shows the unemployment rate distribution by LAD. One property of the LAD unemployment rate series is that areas of high unemployment remain high across the business cycle. This property is used to create a constant index of unemployment density. An alternative approach would be to rank each LAD by the unemployment rate for each period and to find each LADs average ranking for the whole period. The average ranking and the index methods create very similar rankings of unemployment rates.

The index of LAD unemployment density is estimated using the LAD claimant count rate from 1991 to 2008\(^1\). The index is generated by a simple OLS factor-variable regression to estimate the fixed effects of each LAD. This allows the neighbourhood effect

\(^1\)NOMIS provides three different types of unemployment rates: Residence-based proportions, Workplace-based rates and Economically active-based rates. Residence-based proportions are used here as data is available from 1992 for LADs. Residence-based proportions are based on the Proportion of population aged 16-64.
Figure 4.3: Unemployment Rate by Local Authority District. Unemployment rates are persistently high (low) in the same areas.

to be distinguished from the regional or cyclical effects. Each LAD’s expected unemployment rate is a multiple of the average unemployment rate: $U.Rate_{it} = \alpha + \theta_i \times MeanURate_t$. This results in an index of relative unemployment density for the LADs. The advantage of this approach is that the causes of persistently high unemployment in certain areas do not need to be specified. The assumption that is required is that these factors are constant across time. Using a constant local effect is consistent with the literature on self-selection in the housing market: areas of low-cost housing remain low (Meen, 2006). The $\theta$s range from 0.4 to 2.5. This means that an area with a $\theta$ of 2.5 can be expected to have an unemployment rate of 2.5 times the national average across the business cycle. This variable is categorised by residential population for use in the Cox regression for ease of interpretation. The rationale for aggregating the index of LAD unemployment density is that it makes the results easier to interpret and it allows for the representativeness of the BHPS data to be checked with the LFS (see Section 6.).

The business cycle, which is a time effect, is represented by a dummy variable for spells
that began in the recessionary years at the start of the observation period. The results are not sensitive to how the business cycle is specified.

### 4.4 Data

The microdata used is from the British Household Panel Survey (BHPS). The survey commenced in September 1991 when c.5,500 nationally representative households were interviewed. Each of these households, and households into which original members of the survey have moved, are reinterviewed annually. All eighteen waves of the BHPS are used in this study; the last round of interviews were in late 2008. Data from the additional samples for Welsh, Scottish, Northern Irish and ECHP are included in the data set. To account for the non representativeness of the sample due to attrition and the additional samples, the BHPS is aggregated and compared with unemployment statistics from the Labour Force Survey (see Section 6). Individual records from the BHPS are linked with the Local Authority District index discussed in Section 3. The claimant count rate expresses the number of claimants as a percentage of workforce jobs plus claimants\(^2\). While this differs from the unemployment rate, it is the best available proxy for local labour market conditions.

The job history file in the BHPS records the transitions between employment statuses. The file gives the start date of a spell, the type of spell and the reason for exiting that spell. Unemployment is defined as a spell in which the person identifies themselves as being unemployed. Unemployment spell durations are identified for people who transition into both employment and inactivity.

Böheim and Taylor (2000) show that spells that end in economic inactivity are longer than spells that end in employment. Excluding those who transition into inactivity does

\(^2\) "Workforce jobs are the sum of employee jobs, self-employment jobs, HM Forces, and government-supported trainees." (http://www.nomisweb.co.uk)
Chapter 4. *Localised Unemployment in the UK*

not alter the results. Spells that have been censored due to attrition are also considerably longer than the average. All unemployment spells that start prior to September 1990 are discarded. Many of these spells had been ongoing for years; including them in the analysis would have complicated the time effects variable. Duplicate spells are removed and overlapping spells are merged. This results in an unbalanced sample of 7,998 spells starting in September 1990 and extending to December 2008.

The covariates of unemployment duration, including the LAD where a person lives, are taken from the individual response file prior to the unemployment spell. This does not rule out that a person moved to find a job.

Figure 4.4 shows the plot of the Kaplan Meier estimator for areas of low, medium and high unemployment. The plots show the proportion of unemployment spells still ongoing for people who lived in a particular area prior to the commencement of their unemployment spell. This demonstrates that differences in outflows are at least part of the reason for differences in the unemployment rate. The horizontal lines show the crossover points for long-term unemployment at 12 months. Spells from the high and low areas of unemployment have a 22% and 14% chance of becoming long-term unemployed respectively.

Table 4.1 shows the descriptive statistics for the pooled data. The data includes multiple spells for each individual. Most of the variables included in the model are standard and self explanatory such as age, gender, education and spouse’s employment status. A number of extra variables have also been included. Council housing has been included as a binary variable. Previous studies have included housing as a categorical variable with levels such as renting, owned on a mortgage or council housing. Initial models showed that council housing was the only significant category so the other options were dropped in the final analysis. The health constraint variable is determined from the question in the survey: “For work you can do, how much does your health limit the amount of work you can do?” A separate binary variable was included for previous
part-time employment. Strand (2011) demonstrates the effect a mother’s education can have on a person’s school achievement. To account for unobserved educational achievement a binary variable has been included for mothers who have lower levels of education.

Missing data are replaced using a imputation procedure. Using imputation rather than list-wise deletion is particularly important in this situation as removing observations with missing data results in a reduction in the aggregate difference between the distributions of unemployment durations for areas of high and low unemployment.

Figure 4.4: KM plot of the distribution of unemployment spells by area of high medium and low unemployment. Green lines mark the low and medium/high survival rates at twelve months.
Table 4.1: Descriptive Statistics. Local Authority Districts have been split up into areas of consistently low, medium and high unemployment across the business cycle. See Section 3 of the main text.

<table>
<thead>
<tr>
<th>Areas by Unemployment Rate</th>
<th>Low</th>
<th>Middle</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obs</td>
<td>2,414</td>
<td>2,900</td>
<td>2,684</td>
</tr>
<tr>
<td>Unique ID</td>
<td>1,575</td>
<td>1,935</td>
<td>1,781</td>
</tr>
<tr>
<td>Unem Duration:mean (months)</td>
<td>7.26</td>
<td>9.24</td>
<td>10.36</td>
</tr>
<tr>
<td>Unem Duration:median (months)</td>
<td>3.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Age(Years)</td>
<td>31.15</td>
<td>31.11</td>
<td>30.86</td>
</tr>
<tr>
<td>Male %</td>
<td>58.62</td>
<td>59.48</td>
<td>58.87</td>
</tr>
<tr>
<td>Car Available</td>
<td>57.37</td>
<td>49.48</td>
<td>44.60</td>
</tr>
<tr>
<td>Health Constraint</td>
<td>4.56</td>
<td>5.10</td>
<td>4.84</td>
</tr>
<tr>
<td>Council House</td>
<td>23.90</td>
<td>28.31</td>
<td>29.84</td>
</tr>
<tr>
<td>Spouse’s Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA 1</td>
<td>52.65</td>
<td>52.52</td>
<td>56.26</td>
</tr>
<tr>
<td>Not Empl</td>
<td>33.76</td>
<td>31.28</td>
<td>28.99</td>
</tr>
<tr>
<td>Empl</td>
<td>13.59</td>
<td>16.21</td>
<td>14.75</td>
</tr>
<tr>
<td>Edu1 (low)</td>
<td>29.04</td>
<td>34.17</td>
<td>32.19</td>
</tr>
<tr>
<td>Edu2</td>
<td>22.70</td>
<td>22.10</td>
<td>19.45</td>
</tr>
<tr>
<td>Edu3</td>
<td>19.68</td>
<td>18.86</td>
<td>18.67</td>
</tr>
<tr>
<td>Edu4</td>
<td>28.58</td>
<td>24.86</td>
<td>29.69</td>
</tr>
<tr>
<td>Exit mode from Unemployment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attrition</td>
<td>6.34</td>
<td>8.66</td>
<td>10.17</td>
</tr>
<tr>
<td>Employed</td>
<td>86.08</td>
<td>82.24</td>
<td>77.61</td>
</tr>
<tr>
<td>Education</td>
<td>3.52</td>
<td>4.21</td>
<td>6.45</td>
</tr>
<tr>
<td>Other</td>
<td>4.06</td>
<td>4.90</td>
<td>5.77</td>
</tr>
<tr>
<td>Previous Activity Dummies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-Time</td>
<td>13.42</td>
<td>13.28</td>
<td>11.59</td>
</tr>
<tr>
<td>Temporary</td>
<td>18.52</td>
<td>16.97</td>
<td>18.82</td>
</tr>
<tr>
<td>Student</td>
<td>4.47</td>
<td>3.79</td>
<td>6.26</td>
</tr>
<tr>
<td>Inactive</td>
<td>4.52</td>
<td>4.97</td>
<td>5.51</td>
</tr>
</tbody>
</table>

1 Spouses employment status
4.5 Results

Table 4.2 presents results from a set of Cox proportional-hazards models. Column (1) includes the LAD variable on its own. Positive coefficients imply a higher hazard rate from unemployment and a decrease in the duration of unemployment. Exit rates in areas of low unemployment are 20% lower than in areas of high unemployment. Little difference is shown in any of the models between areas of high and medium unemployment; the under sampling of the unemployed in areas of high unemployment in the BHPS is discussed in Section 6.

Column (2) is the main model. The model is stratified across age, region and gender so that the model satisfies the proportional-hazards assumption. Geographic effects are largely captured by regional dummies. The neighbourhood effect is reduced by including a range of covariates, but still remains significant. Column (3) includes all of the covariates without stratification. While this model violates the proportional-hazards assumption this has little effect on the size or significance of the covariates. All of the covariates act in the expected direction.

There is little value in knowing that there is an neighbourhood effect without have some idea what it means (Lupton, 2003). A neighbourhood effect could have multiple causes: spatial mismatch, unobserved heterogeneity, differences in educational opportunities, social network, social pressure to have a job or employer bias. There are a number of reasons to look at young people separately. Young people are more susceptible to peer effects (Ellen and Turner, 1997). Many young people will return to education with differential access across the income spectrum. Young people do not self-select into the area they live to the same extent as older cohorts: 49% of 20- to 24-year-olds live in the family home (ONS, 2014).

Table 4.3 shows the results for the young and old cohorts separately. The area effect is not significant for the older group while it is highly significant for the younger group.
Dividing the sample into young and old groups is useful as it allows for the number of possible causal mechanisms behind the neighbourhood effect to be narrowed.

The most promising explanations for differences in youth unemployment durations across LADs are differences in educational opportunities and social networks. Young people with financial backing from their parents are more likely to be able to access educational opportunities sooner than those who cannot afford to pay for them.

If jobs are spatially removed it might be expected that people on lower incomes would be more affected by geographic isolation. However, the evidence does not suggest this is the case. People with low education or people who live in council houses show an equal neighbourhood effect to those with high education or not in a council house.

Another possible explanation is unobserved heterogeneity. For this to be the case the young cohort would have to have more unobserved heterogeneity than the older group. However, this is not satisfactory in the case of young people as they have not self-selected into the area; they were born there or moved there because of their parents characteristics.

A number of cohorts have lower rates of car access including the young and people living in council housing. Having access to a car is economically and statistically significant. However, including or excluding the car access variable does not alter the LAD results. Other covariates of longer unemployment durations that have previously been shown to be important are also reproduced. Being male, having lower education and living in a council housing are all related to lower hazard rates into employment. A spouse being employed is related to shorter spells of unemployment.
Table 4.2: Cox PH model: full sample. Dependent variable: hazard rates from unemployment. Column (1) shows how people who live in areas of low unemployment have higher hazard rates into employment. Column (2) is stratified across region and age. Small but significant neighbourhood effects are still shown. Column (3) is the unstratified model which shows similar results. Coefficients with standard errors in brackets.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recession</td>
<td>−0.234***</td>
<td>−0.245***</td>
<td></td>
</tr>
<tr>
<td>Low Unem</td>
<td>0.223*** (0.030)</td>
<td>0.097** (0.032)</td>
<td>0.089** (0.031)</td>
</tr>
<tr>
<td>Med Unem</td>
<td>0.056* (0.028)</td>
<td>0.037 (0.030)</td>
<td>0.042 (0.029)</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>−0.583*** (0.066)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wales</td>
<td>−0.406 *** (0.049)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scotland</td>
<td>−0.248 *** (0.045)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North West</td>
<td>−0.192 *** (0.051)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Midlands</td>
<td>−0.129 * (0.054)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Midlands</td>
<td>−0.109 * (0.052)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North East</td>
<td>−0.024 (0.069)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yorkshire and the Humber</td>
<td>−0.099 (0.054)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East of England</td>
<td>0.001 (0.054)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>London</td>
<td>0.002 (0.055)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South West</td>
<td>0.019 (0.054)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 21-35</td>
<td>−0.250*** (0.033)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 35+</td>
<td>−0.604*** (0.039)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edu2</td>
<td>0.163*** (0.034)</td>
<td>0.153*** (0.034)</td>
<td></td>
</tr>
<tr>
<td>Edu3</td>
<td>0.178*** (0.036)</td>
<td>0.166*** (0.036)</td>
<td></td>
</tr>
<tr>
<td>Edu4</td>
<td>0.264*** (0.034)</td>
<td>0.259*** (0.033)</td>
<td></td>
</tr>
<tr>
<td>Spouse Empl</td>
<td>0.240*** (0.030)</td>
<td>0.233*** (0.030)</td>
<td></td>
</tr>
<tr>
<td>Spouse Not Empl</td>
<td>0.096* (0.040)</td>
<td>0.096* (0.040)</td>
<td></td>
</tr>
<tr>
<td>Council House</td>
<td>−0.330*** (0.030)</td>
<td>−0.339*** (0.030)</td>
<td></td>
</tr>
<tr>
<td>Temp</td>
<td>0.362*** (0.030)</td>
<td>0.373*** (0.030)</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>−0.200*** (0.058)</td>
<td>−0.193*** (0.057)</td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>−0.206*** (0.039)</td>
<td>−0.200*** (0.039)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>−0.059* (0.025)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother Educ</td>
<td>0.016 (0.029)</td>
<td>0.009 (0.029)</td>
<td></td>
</tr>
<tr>
<td>Car Access</td>
<td>0.260*** (0.027)</td>
<td>0.251*** (0.027)</td>
<td></td>
</tr>
</tbody>
</table>

Observations: 7,998 7,998 7,998

1 *p<0.05; **p<0.01; ***p<0.001
2 Omitted variables are South of England, Age 16-21, Edu1(low), No Spouse
3 Model (2) is stratified across region and age categories
Table 4.3: Cox PH model: sub samples. Dependent variable: hazard rates from unemployment. The sample is split between young and old. Column (1) shows that there are no significant neighbourhood effects on unemployment duration for the older cohort which comprise the majority of the sample. Column (2) shows that there is a strong relationship between unemployment duration and local unemployment in the younger cohort. Coefficients with standard errors in brackets.

<table>
<thead>
<tr>
<th></th>
<th>Over 21</th>
<th>21 and Under</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Recession</td>
<td>$-0.274^{***}$ (0.036)</td>
<td>$-0.220^{***}$ (0.067)</td>
</tr>
<tr>
<td>Low Unem</td>
<td>0.053 (0.037)</td>
<td>0.194* (0.064)</td>
</tr>
<tr>
<td>Med Unem</td>
<td>0.037 (0.035)</td>
<td>0.052 (0.060)</td>
</tr>
<tr>
<td>Age</td>
<td>$-0.020^{***}$ (0.001)</td>
<td>$-0.084^{***}$ (0.018)</td>
</tr>
<tr>
<td>Spouse Empl</td>
<td>0.285*** (0.033)</td>
<td>0.094 (0.094)</td>
</tr>
<tr>
<td>Spouse Not Empl</td>
<td>0.165*** (0.044)</td>
<td>$-0.007$ (0.113)</td>
</tr>
<tr>
<td>Council House</td>
<td>$-0.393^{***}$ (0.036)</td>
<td>$-0.217^{***}$ (0.057)</td>
</tr>
<tr>
<td>Temp</td>
<td>0.370*** (0.036)</td>
<td>0.347*** (0.060)</td>
</tr>
<tr>
<td>Health</td>
<td>$-0.194^{**}$ (0.064)</td>
<td>$-0.070$ (0.139)</td>
</tr>
<tr>
<td>Child</td>
<td>$-0.198^{***}$ (0.045)</td>
<td>$-0.316^{***}$ (0.086)</td>
</tr>
<tr>
<td>Mother Educ</td>
<td>0.032 (0.033)</td>
<td>0.054 (0.074)</td>
</tr>
<tr>
<td>Car Access</td>
<td>0.271*** (0.031)</td>
<td>0.325*** (0.060)</td>
</tr>
<tr>
<td>Observations</td>
<td>5,820</td>
<td>2,178</td>
</tr>
</tbody>
</table>

1 *p<0.05; **p<0.01; ***p<0.001
2 Models are stratified across Education, Region and Gender
4.6 Robustness

4.6.1 Proportional Hazards

The Cox model is based on the assumption of proportional hazards. There are a number of reasons why hazards may not be proportional. Job search intensity may rise or fall over time. Employers may take the length of unemployment as a signal of low skills. Financial incentives to become employed such as unemployment benefits can vary over time, although this is less relevant for the UK where social insurance and social welfare rates are similar. The proportional-hazards assumption of the Cox model is tested using the Schoenfeld residuals method. The results of the tests point towards the validity of the proportional-hazards assumption.

4.6.2 Spell Length Clustering

The Cox model assumes that the reported spells are continuous. However, there is clear clustering in the data around months. To ensure robustness of the results, we estimated a discrete time proportional hazards model to account for the time clustering in the data. The results are not sensitive to the use of the continuous time model.

4.6.3 Unobserved Heterogeneity

Frailty models are used to account for unobserved heterogeneity. For most individuals only one spell of unemployment is observed making the estimation of unobserved heterogeneity less useful. Oreopoulos (2003) accounts for unobserved heterogeneity by comparing the income outcomes of siblings. He finds that once you adjust for the siblings income there is no neighbourhood effect. We use a similar method by including all family members in the same cluster; this does not alter the results. Regressions are
repeated for single spells only, which reduces the number of observations from 7,998 to 5,106. Coefficient estimates and standard errors remain largely unchanged.

4.6.4 Comparison between BHPS and NOMIS data

The surprising feature of Figure 4.4 is that the distribution of unemployment spells for the areas of medium and high unemployment are very similar. To check how representative the BHPS sample is geographically, the BHPS residence-based proportions unemployment rate, shown in Figure 4.5, is compared with the Nomis residence based proportions claimant count rate, shown in Figure 4.6. The comparison shows the under sampling in the BHPS in the areas of high unemployment. This explains the lack of contrast between the unemployment spell distribution in medium and high areas of unemployment.

Figure 4.5: BHPS residence based unemployment rates (September of each year) and difference between high and low areas in red.
4.6.5 Disconnected from the Labour Market

One explanation for differences in the LAD unemployment rate is that people who are long-term unemployed, and effectively disconnected from the labour market, are clustered in areas of high unemployment. This does not appear to be the case. Figure 4.7 shows the claimant count rate by unemployment duration. The differences in the unemployment rate is predominantly in short duration spells of unemployment. To reinforce this using the BHPS data, we remove all spells greater then 3 years. A Kaplan Meier plot of unemployment spells (not shown) is clearly lower for the area of low unemployment.

This is similar to the conclusion reached by ? who compared the rates of short-term unemployment to the rates of long-term unemployment (lagged). The two move together strongly; whereas if there was a large cohort of people unemployed but disconnected from the labour market long-term unemployment would not be sensitive to cyclical changes.
Figure 4.7: Nomis data: Claimant count rates by area for spells under 3 years.
4.7 Policy Implications

While there have been many changes in local and regional development policy of the last half century the changes in policy implemented in 2010 are seen as some of the most significant (NAO, 2013). Current regional policy is though the 39 Local Enterprise Partnerships that were set up between 2010 and 2012. Some funding also goes directly though local authority districts, although this was reduced significantly in 2010.

The LEPs followed on from the nine regional development agencies (RDA’s) which were set up in the UK in 1997 (PWC, 2009). These agencies carried out a range of functions including business development, urban regeneration and training (ibid). While some of the functions of the RDA’s were subsumed into the new LEPs they have a smaller number of staff and fewer legislative powers (NAO, 2016; Shutt et al., 2012). The activities and capacities of the new LEPs vary widely and how funding is allocated across LEPS is opaque (NAO, 2016; Shutt et al., 2012). While the initial funding of the LEPs was low, funding was increased following the No Stone Unturned report (Heseltine, 2012).

This chapter investigates geographic effects of unemployment at a number of levels. The chapter provides support for regional development initiatives by showing that it takes longer to get a job in certain parts of the country. We argue that shortages in labour demand occur across large geographic areas. While the analysis in the chapter is based on the government office regions it could also be applied to the LEPs as they are large areas.

The main finding of this chapter is that there is sufficient labour mobility within regions; there is no relationship between the local authority district you live in and the length of time it takes to get a job. The policy implication is that funding within regions or LEPs should be targeted at the best projects rather than the worst areas. A further policy implication is that enterprise funding that is being channelled though the local
authority districts would be better channelled through the LEPs. If local unemployment was driven purely by a deficit in local labour demand then geographically targeted employment initiatives or improved transport links might be an appropriate response. However, the results of this chapter suggest that high rates of local unemployment are driven primarily by the concentration of people with characteristics that are associated with longer spells of unemployment; this is a result of strong clustering in the housing market. An initiative to create employment opportunities in a local authority district with high unemployment would be likely to create employment for people from that region but not necessarily from that local area. While this may be desirable in itself it would need to be established that the business would be likely to stay once the grants ran out.

A third finding of this chapter is that the smallest geographic area, measured by the council house tenure, is very important. There is a strong correlation between council housing and unemployment duration for both the older cohort that self selected into the council house and for people living with their parents. This is potentially consistent with a number of theories: lack of financial incentives, low skills or initiative, peer effects or social norms. Understanding which of these is at play is required for effective policy. Policy interventions may include minimum wages, education, policing, drug prevention and housing policy. The change between regional development agencies and local enterprise partnerships shifted the focus more towards short term economic outcomes. The complex social problems associated with areas of deprivation are unlikely to be improved with short term initiatives.

4.8 Conclusion

The hypothesis tested in this chapter is that employees and jobs are spatially separated at a local level. The question is broken down into two parts. First, does it take longer to get a job if you live in an area of high unemployment? And second, if it does, can
this be attributed to a shortage of local labour demand? We test this hypothesis using unemployment spell data from the BHPS from 1991 to 2008. While the data is not fully representative of areas of high unemployment, it does exhibit clear differences between areas of high and low unemployment which allows for the hypothesis to be tested.

A key challenge in identifying spatial effects is in specifying the right level of spatial aggregation. Too large an area results in over aggregation: the job search field of the unemployed is much smaller than the area. Alternatively using a search field that is too small can result in bias due to spatial auto correlation. Both a highly aggregated regional variable and a very fine local authority district variable are used together to account for geographic effects. If a neighbourhood effect is identified, the next challenge is in differentiating between a lack of local labour demand and a range of other possible mechanisms, including self-selection by people with the weakest employment prospects into the areas with the cheapest accommodation.

The results from the Cox proportional-hazards model show that for the whole sample there is a small but significant neighbourhood effect. However, when the very young are removed from the sample this relationship disappears. A strong neighbourhood effect is shown for the cohort under 21 years of age. This is difficult to interpret as a shortage of local labour demand. If this was the case then you would expect all groups to be affected. It is not clear what the precise mechanism is that is affecting young workers. Educational opportunities, differences in social pressures or black market employment are all possibilities.

While the local authority district is not significant for most of the cohort, the regional and national economic situations are very important. The South of England is the best place to live from an employment point of view. Scotland, Wales and particularly Northern Ireland have longer durations of unemployment that are not explained by observed covariates. Recessionary periods are also shown to be associated with longer unemployment durations. However, the combined effect of individual factors such as
education, age and living in a council house are at least as important in determining an individuals unemployment spell length as the macroeconomic climate.
Chapter 5

Conclusion

5.1 Introduction

The unemployment rate is possibly the most important economic statistic available. To understand what the unemployment rate means, and to try and ascertain why it varies among groups, regions and countries, we need to look at the flows that generate the rate. The goal of this thesis is to develop the literature on labour market flows using microeconomic data. I demonstrate the extent and the mechanisms through which unions, local geography and firm leverage alter labour market flows. The three core hypotheses tested were:

1. Firms with weak balance sheets cut costs and employment more following revenue shocks.

2. Unions reduce redundancies and are most beneficial to senior staff.

3. It takes longer to get a job if you live in an area of high unemployment.

The mechanisms through which each of these variables operate are not well understood. None of these relationships were quite what was expected at the outset. This highlights
the importance of using microeconomic data to confirm relationships that are frequently assumed in macroeconomic comparisons.

5.2 Empirical Findings and Future Directions

The main empirical findings are chapter specific and were summarised within the respective chapters. This section will synthesize the empirical findings in a broader context and point towards promising areas of future research.

5.2.1 Firm Adjustment and Leverage

The strength of firms’ balance sheets is widely believed to affect aggregate outcomes. Weak balance sheets are expected to intensify recessions as firms quickly shed any excess costs. They may also prolong recessions as firms pay down debt rather than investing in new assets. The microeconomic evidence supporting these processes is not strong.

Chapter 2 looks at how firms adjust their costs when faced with a fall in revenue. This is the process that generates the need for redundancies, both directly within the firm and indirectly when suppliers revenue is reduced. The literature on firm growth shows that most firms only need to adjust to small revenue changes, however, a substantial minority have to adjust to large changes. Firms do not adjust their costs immediately for a range of reasons including a need to maintain human capital in the firm. The chapter looks at how firms’ balance sheets affect how the firms adjust their operating costs and employee numbers. Operating costs, defined as all the costs between the gross profit and the operating profit, contain a range of costs that could be viewed as investments by firms that are financially constrained. These type of investments may be particularly important in services businesses where plant and equipment investment is small.
Balance sheet measures of bank debt and liquidity are used to capture the state of the balance sheet. No robust relationship between cost cutting and measures of balance sheet weakness are found; firms with high debt in the previous year cut their costs in the same way as firms with net cash. While negative findings are less valuable from a publication point of view, they are just as useful from the point of view of developing the literature. The goal of the literature is to identify the most important variables; to achieve this many variables will need to be ruled out.

A large body of literature looks at the relationship between investment and contemporaneous cash flow and finds a positive correlation. This correlation has been interpreted as evidence that financially constrained firms reduce investment. A difficulty with this interpretation is that many of these firms which have reduced cash flows and reduced investment also have cash balances.

A key contribution of this chapter is to look at the change in costs and control for historic profitability. Instead of managers preferring internal cash flows to external funds to fund investments, managers have a minimum profit rate. If the business is loss making, managers focus their energy on returning the business to profitability. These firms grow less, cut their operating costs more and reduce investment.

An extension of this work will be to use the full Amadeus dataset of European firms to explore cross country differences in cost-cutting behaviour. Another extension would be to combine financial statement data with survey data which asks firms if they have had difficulty in getting finance. The goal would be to establish why firms are financially constrained: is it due to a poor trading history, a weak balance sheet or due to a change in lending practices on the part of banks?

A possible limitation identified in Chapter 2 is that financial accounts data do not differentiate between movements in prices and movements volumes. However, as I look at cost cutting, as well as at changes in employment, this is less important. Irrespective of why revenue has fallen, this will put pressure on the firm to adjust in some way.
Chapter 5. Conclusion

5.2.2 Redundancies and Union Membership

Chapter 3 looks at involuntary job separations from an individual perspective. This is important both for individuals who may join a union to avoid being made redundant, and for macroeconomic comparisons of labour market institutions. Redundancies are the main component of involuntary job separations but temporary job endings also comprise a major component. The chapter looks at how unions affect job separations using the British Household Panel Survey from 1990 to 2008. It was expected at the outset that unions would reduce redundancies and that senior employees would benefit the most; that unions enforce seniority rules. One possible reason for this assumption in the literature is that US employment contracts have seniority rules written into them. However there is little empirical evidence that this is what happens in unionised firms even in the US. The importance of context is highlighted in this paper. How redundancies are implemented may differ significantly across countries; a number of other possible selection rules other than seniority are available when staff are being made redundant.

Specifically, I examine how an individuals probability of redundancy depends on their tenure and union membership. Descriptive statistics show that there is no difference between the redundancy rates of union members and people who work in firms that do not recognise unions. Redundancy rates in general decline with tenure, particularly for the first few years of tenure. By interacting union membership and tenure I demonstrate the effect of union membership across different tenure levels. Union members with short tenure are less likely to get made redundant than non union members with the same tenure. For long tenure employees there is no difference between union and non union members. This is possibly explained by unionised firms being more inclined to implement voluntary redundancies with severance packages that are taken up by long tenure employees.
Involuntary job separations are relatively rare compared to quits. On an annual basis c.3% of people get made redundant compared to 14% quitting. As a source of aggregate variation in labour market flows, the quit rate is a potentially more important line of research. The dominant relationship between unions and employment flows comes through the channel of quits rather than redundancies. The average partial effect of unions on redundancies is 0.5% whereas the average partial effect of unions on quits is 2%. While the mechanisms by which these two relationships occur are probably very different, it does suggest that any theory that relates unions to rigidities should be focused on quits (or wages) rather than redundancies.

An extension of this work would be to look at job satisfaction and redundancies. A person’s job satisfaction last year is an important covariate of their probability of redundancy. This could mean a number of things. One interpretation is that people who are not very good at their jobs will be dissatisfied and more likely to be targeted for redundancy. Another interpretation is that when firms come under pressure due to falling sales this pressure is transmitted on to employees with a resulting loss in job satisfaction prior to the firm implementing redundancies.

Individual survey data such as the BHPS provide a rich source of information on individual behaviour over time. However the data is purely from the point of view of the person surveyed. A limitation of the analysis in Chapter 3 is that the survey data is based on an individuals interpretation of events. Somebody who was made redundant from their own perspective may have been fired from the firm’s perspective. It is not possible from the data to differentiate between the two.

5.2.3 Unemployment Durations and Geography

Chapter 2 and Chapter 3 looked broadly at the inflows into unemployment. In Chapter 4, heterogeneity in how long it takes people to find a job is explored. There is a lot of
heterogeneity in the hazard rates from unemployment both in recessionary times and in times of full employment.

Chapter 4 looks specifically at neighbourhood effects and seeks to identify if there is geographic isolation: does it take longer to get a job if you live in a certain area because there are no jobs in that area. The motivation for this is the large spread in the unemployment rate across the UK’s local authority districts. As people self-select into the areas that they live in, the challenge in this line of research is to identify what neighbourhood effects actually mean.

A neighbourhood effect is shown for some cohorts only. Young people who live in areas of high unemployment have longer spells of unemployment than you would expect for their observed characteristics. However, for the majority of the individuals there is no neighbourhood effect. These results are not consistent with the idea that there is a geographic disconnect between where jobs and employees are located. If there was a geographic dislocation then people from a range of cohorts who live in high unemployment areas would be expected to have longer spells of unemployment.

This has important policy implications in seeking to address localised unemployment. If a lack of local labour demand had been identified as a likely source of localised unemployment, then policies such as local enterprise funding or better public transport may have been an appropriate response. The neighbourhood effect that is identified in the young cohort is attributed to social causes such as peer effects or network effects. There are a number of possible policy responses including the funding of training and further education, funding of social programs to reduce antisocial behaviour or housing policy to reduce the clustering of low cost accommodation.

While I argue that the results are not consistent with a local disconnect between jobs and employees, I do find that there are significant regional differences. Large scale regions (Wales, Scotland, Northern Ireland, Southern England and the Midlands) are also included in the regression. Scotland, Wales and particularly Northern Ireland have
significantly longer unemployment durations that are not accounted for by individuals observed characteristics. An extension of this work would be to look further at the dramatic results that are observed for Northern Ireland. The hazard rate from unemployment is 60% lower for the observations from Northern Ireland. The number of unemployment spells observed in Northern Ireland is relatively small but could be supplemented with the Understanding Society dataset for the years after 2009. It would be interesting to see if this was driven by both sides of the community and whether it is dominated by the long-term unemployed.

The most economically important covariate of unemployment durations is whether you live in a council house. For individuals it is more important than the severe recession of the early 1990s. The council house dummy variable could mean a range of things. It is consistent with the replacement rate hypothesis: that people with higher replacement rates have lower job search intensities. It is also consistent with peer effects and network effects where people with low hazard rates from unemployment are in very close proximity. Differentiating between social isolation and replacement rate hypotheses is an important line of future research.

5.3 Conclusion

Our understanding of the drivers of unemployment remains limited despite years of research. It is not yet clear why the unemployment rate varies between groups, regions and countries. In this thesis, I use microeconomic data to analyse employment flows to make small but I hope important contributions to our understanding of unemployment. I have demonstrated the extent and particular mechanisms through which balance sheet effects affect cost adjustments, unions alter redundancies, and local geography affects unemployment durations.
Appendix A

Redundancies Simulation Code

R Code for simulating the unions and redundancies dataset.

```r
#1. Simulate period0 union membership and tenure
N = 12000 # Number of Individuals
pid <- seq(1:(N)) # pid - Id Numbers
um <- c(rep(1,N*0.3),rep(0,N*0.7))
ten <- c(rlnorm(N*0.3, meanlog = 1.7, sdlog = 1.1),rlnorm(N*0.7, meanlog = 1, sdlog = 1)) # Tenure is log-normally distributed, union members have longer tenure
dat1 <- data.frame(cbind(pid,um,tен)) # Period 0 dataframe with pid's union membership dummy and tenure

#1. Simulate period1 to period5$
for (i in 1:5) {
  dat <- get(paste("dat",i,sep="")) # Base data for period 1-5. Take in dat1 output dat2.
ystar <- -1.7 -0.15*dat$um - 0.03*dat$ten + 0.015*dat$ten*dat$um + rnorm(N) # 3 per cent redundancy rate with normally distributed error term.
dat$red <- as.numeric(ystar>0) # Variation in union / non union redundancy rate across tenure
}
```

107
Appendix A. Redundancies Simulation Code

ystar <- -0.92 -0.15* dat$um + rnorm (N)
# 16 per cent quit rate for non union members, 14 per cent for union members.
dat$quit <- as.numeric(ystar>0)

nt <- runif (N)
dat$tenx <- ifelse (dat$red ==1| dat$quit ==1,nt,dat$ten + 1)
# Tenure increases by one each period if no quit or redundancy

ystar <- -1.4 +2.3* dat$um + rnorm (N) #1.6,2.8
# Union members transition between statuses at 10 percent per year.
dat$umx <- as.numeric(ystar>0)

datz <- dat[,c("pid","ten","umx")]
colnames(datz) <- c("pid","ten","um")
assign(paste("dat",i+1,sep=""),datz)
# Data to be passed forward to the next year.

datx <- dat[,c("pid","ten","um","red","quit")]
# Data to be used for estimation
assign(paste("datx",i+1,sep=""),datx)
}

sm <- rbind(datx2,datx3,datx4,datx5,datx6)
# Merge period1 to period 5
Bibliography


Bibliography


Bibliography


Bibliography


Cameron, A. C. and Trivedi, P. K. (2010). Microeconometrics using stata. Stata Press, College Station, TX.


Cassino, V. and Thornton, R. (2002). Do changes in structural factors explain movements in the equilibrium rate of unemployment?


Bibliography


Freeman, R. B. and Schettkat, R. (2002). Marketization of production and the us-

York.

Gahan, P. G. (2002). (what) do unions maximise? evidence from survey data. Cam-

Gal, P. N., Hijzen, A., and Wolf, Z. (2013). The role of institutions and firm hetero-
geney for labour market adjustment: Cross-country firm-level evidence.


Cambridge.

1285.

Gomes, P. (2012). Labour market flows: facts from the united kingdom. Labour Eco-
nomics, 19(2):165–175.

Guilkey, D. K. and Murphy, J. L. (1993). Estimation and testing in the random effects

change on coastal flood risk in england and wales: 2030–2100. Philosophical Trans-
actions of the Royal Society of London A: Mathematical, Physical and Engineering


Bibliography


Bibliography


Bibliography


Shutt, J., Pugalis, L., and Bentley, G. (2012). Leps–living up to the hype? the changing framework for regional economic development and localism in the uk.


