Chapter 5

Cyclical labour market adjustment in New Zealand: The response of firms to the global financial crisis and its implications for workers

by
Richard Fabling
Independent researcher
and
David C. Maré
Motu Economic and Public Policy Research Trust

This chapter examines the dynamics of employment adjustment in New Zealand, focusing on the response of firms to the 2008-09 global financial crisis (GFC). New Zealand's Longitudinal Business Database is used to examine firms' employment responses to output shocks before and after the crisis, and to investigate variations in job and worker flows. The analysis of business microdata uncovers two key features of New Zealand labour market adjustment to the GFC. First, there was considerable heterogeneity across firms, both before and after the crisis, in the size of output shocks that firms faced, the amount of employment adjustment in response to any given output shock, and in the size of worker flows given the firm's employment adjustment. Second, the crisis not only moved the distribution of output shocks faced by firms, but also altered the relationship between output shocks and changes in job and worker flows and employment.

Access to the data used in this study was provided by Statistics New Zealand in accordance with security and confidentiality provisions of the Statistics Act 1975 and the Tax Administration Act 1994. The results in this chapter have been confidentialised to protect individual businesses from identification. See an earlier version of this work, Fabling and Maré (2012), for the full disclaimer.

Introduction

This chapter examines the dynamics of employment adjustment in New Zealand, focusing on the response of firms to the 2008-09 global financial crisis. It uses data from Statistics New Zealand's Longitudinal Business Database (LBD) to examine firms' employment responses to output shocks before and after the crisis, and to investigate variations in job and worker flows. This chapter's analysis of firm micro-data highlights two key features of New Zealand labour market adjustment to the 2008-09 crisis. First, there was considerable heterogeneity across firms both before and after the crisis, in the size of output shocks that firms faced, the amount of employment adjustment in response to any given output shock, and in the size of worker flows given the firm's employment adjustment. Second, the crisis not only moved the distribution of output shocks faced by firms, but also altered the relationship between output shocks and changes in job and worker flows and employment.

This study discusses the resilience of the New Zealand labour market to economic shocks, and the possible role of labour market policy settings. A resilient labour market is one that can recover from adverse shocks with minimum disruption in the form of long-term unemployment. The labour market features that promote resilience will depend on the nature of labour market shocks. For a labour market that experiences only cyclical shocks, resilience is achieved by some form of smoothing across the cycle. This may take many forms, such as long-term contracts (with countercyclical productivity/labour hoarding; pro-cyclical wages), unemployment insurance and benefits, or active labour market policies. The degree of cyclical flexibility may be reflected in cyclicality of employment, hours, wages, profits, and productivity. The mix of institutions and policies to achieve this smoothing will also affect the sharing of the costs of cyclical downturns. Optimally, smoothing should be greater for more risk-averse groups.

A labour market that is resilient to cyclical shocks may be ill-suited to shocks that require a reallocation of employment across industries, occupations, or regions. In order to respond effectively to such shocks, labour market institutions and policies that facilitate retraining, job turnover and reallocation, and geographic and industry mobility are needed.

The next section of the chapter discusses the nature of labour market resilience and what can be learned from the analysis of labour market flows. This is followed by a summary of recent cyclical variation in New Zealand, paying particular attention to developments since the onset of the global financial crisis (GFC). After describing the data in the fourth section, the microeconomic sources of aggregate employment and earnings fluctuations is analysed (fifth section of this chapter) and patterns of adjustment conditional on output shocks faced by firms, or on net employment change within firms. The chapter concludes with a summary of the main findings and a discussion of their implications.

Labour market resilience

Recessions impose costs. Reductions in labour demand lead to reductions in wages or employment, or to lowered productivity and profitability. Fluctuations in earnings make risk-averse workers worse off. Firms, especially small and young firms, may also be risk-averse due to their limited ability to absorb sustained losses.

Labour market institutions promote resilience by spreading the costs of labour demand fluctuations and by facilitating a rapid recovery of employment and earnings when labour demand expands. Faced with purely cyclical variation in labour demand, workers and firms have an incentive to maintain their employment relationship during downturns, to avoid hiring, firing and retraining costs, and to smooth incomes. Risk-averse workers would accept lower average wages over the cycle in exchange for a smoother earnings path, making stable employment attractive to employers as well. The absence of a complete insurance market to cover income risks leaves a demand for income smoothing through employment contracts. Such an arrangement of "job-based insurance" may, however, break down in unexpectedly severe downturns when it becomes too costly (relative to turnover costs) to continue the employment relationship. It also breaks down if labour demand fluctuations are characterised by a process of creative destruction, and require a reallocation of capital and labour between firms or industries. In this case, a resilient labour market should facilitate rapid and low-cost transitions that do not impose unnecessary costs, delays or income fluctuations. In practice, there is an inevitable tension between providing stability and flexibility.

In recent years, the European Commission has advanced the Danish notion of flexicurity to characterise the balance that needs to be struck between flexibility of adjustment and security of income and employment (European Commission, 2010). Their approach emphasises the need for flexibility in the labour market, together with income support policies to smooth incomes, and active labour market and training policies to aid reallocation. In a dynamic and changing economy, de facto (social) insurance is provided through the tax system rather than through employment contracts. The Danish, and more generally European, labour institutions reflect a combination of relatively generous provisions supported by relatively high tax rates.

In New Zealand, labour market policies are directed more towards fostering flexibility and maintaining work incentives than in many other countries. In 2008, New Zealand had one of the lightest systems of employment protection in the OECD (Venn, 2009), despite modest increases in protections as part of the 2000 Employment Relations Act (ERA). In 2009, protections were reduced by allowing a 90-day trial period for employees in firms with 19 or fewer employees, during which time employers could dismiss an employee without the employee being able to take a personal grievance for reasons of unjustified dismissal. From April 2011, all employers were eligible to use such trial periods. Despite the internationally low level of employment protection, most employees are covered by protections against unjustified dismissal that make dismissing workers a costly and potentially lengthy process, putting downward pressure on job destruction rates.

The majority of employees have their terms and conditions governed by individual contracts with employers. The prevalence of collective bargaining in New Zealand declined markedly in the 1990s, following significant legislative reforms (the Employment Contract Act, 1991). Private sector collective bargaining coverage dropped from 48% of employment in 1990 to 21% in 2000 (Foster et al., 2011). Despite legislative change in 2000 (ERA) that explicitly promoted collective bargaining and facilitated union membership growth

(Rasmussen, 2009), private sector collective bargaining coverage has remained at about 10% since 2004. Economy-wide union membership declined from 43% in 1991 to 21% in 2000 and has remained at that level since.

New Zealand has less extensive active labour market policies than European countries and has income support policies that emphasise in-work benefits, with only moderate replacement rates for unemployment benefits, providing limited scope for income smoothing. New Zealand also has relatively light regulatory controls, making it the easiest country in the world to start a new business and one of the easiest in which to do business (World Bank and IFC, 2012). Therefore firm entry and exit might be expected to play a relatively strong role in New Zealand's employment dynamics.

What can be learned from job and worker flows?

There is a well-established literature examining differences in job and worker flows across the business cycle, following the seminal American work of Davis and Haltiwanger (1992). A key insight from this literature is that job and worker flow rates are large compared with net employment changes, reflecting an ongoing dynamic process of reallocation of jobs and workers. In the United States, Canada and the United Kingdom, job reallocation, and job destruction in particular, are higher in downturns. Recessions can be seen as periods of heightened "creative destruction" in which new innovative firms replace less productive existing firms (Schumpeter, 1947). In European countries, job reallocation rates are less cyclical, and somewhat lower, than in the United States.

In trying to account for cross-country differences in unemployment and job flows, a key focus has been on the role of different labour institutions and policies.[1] Employment protection serves to raise firing costs, lowering job destruction rates and, in equilibrium, job creation rates, as employers are more cautious about hiring. By lowering the speed of job reallocation, employment protection can also slow the speed of adjustment to a new equilibrium, even though the impact on equilibrium employment and unemployment is ambiguous. (Nickell, 1978; Bertola, 1990; Bentolila and Bertola, 1990). Differences in firing costs can thus contribute to different patterns of cyclical adjustment, including the sort of cross-country differences in the cyclicality of job destruction noted above (Garibaldi, 1998).

The impact of unemployment benefit generosity is less clear cut. Lower replacement rates increase job search intensity and lower reservation wages, leading to higher equilibrium employment and lower equilibrium unemployment. With a lower reservation wage, some workers will accept lower quality matches. As a result, the rate of job-to-job flows may increase as workers try to improve the match. The low reservation wage may also discourage the creation of higher productivity but more risky jobs, with an adverse impact on employment levels.[2]

Drawing on these insights, New Zealand's system of relatively light employment protections, low unemployment benefit levels, and ease of firm entry suggest that New Zealand will have relatively high firm, job, and worker flow rates that are responsive to cyclical demand fluctuations.

A high rate of firm births and deaths is expected as a consequence of the ease of firm entry, which lowers the productivity hurdle that new firms must overcome. There will therefore be a larger pool of young, low-productivity firms that are vulnerable to going out of business when faced with an unanticipated reduction in demand. With a low hurdle, firm birth rates will be stronger when demand growth resumes.

Job flows will be high due to the relatively light employment protection. The high flows facilitate the reallocation of jobs, improving the speed with which the labour market is able to reach a new equilibrium and recover from a downturn.

High worker flows are expected as a consequence of low benefit levels and the consequently greater prevalence of on-the-job search. However, a pronounced decline in worker flows during recessions might be expected. During a downturn, workers will prefer to remain employed rather than become unemployed, leading to a drop in quit rates and possibly greater reliance on hour adjustment and wage flexibility. Hiring rates will also drop as positions remain filled by existing workers. Young workers entering the labour market for the first time and workers in high turnover industries may be at a particular disadvantage due to the cyclical decline in worker flows. Workers whose jobs do end involuntarily during a recession are at risk of a decline in earnings, as a consequence of their low reservation wages.

Recent cyclical variation in New Zealand

Prior to the GFC, New Zealand had experienced a prolonged period of growth. Leading up to the business cycle peak of 2007 Q4, output had been increasing for almost ten years, since 1998 Q1. This was the longest upswing in New Zealand since 1966, although the rate of growth had been slowing since 2005, reflecting a decline in activity in the tradable sector. Growth was starting to pick up again in 2007, until the economy went into recession in the first quarter of 2008, reflecting not only the onset of the GFC, but also the effects of an overdue cooling of the housing market. The contraction was sharp and its effects were widespread. Output had dropped by 3.1% by the first quarter of 2009 and there were steep declines in business and consumer confidence, retail sales, and investment. Growth stalled in the non-tradable sector, while tradable activity declined.

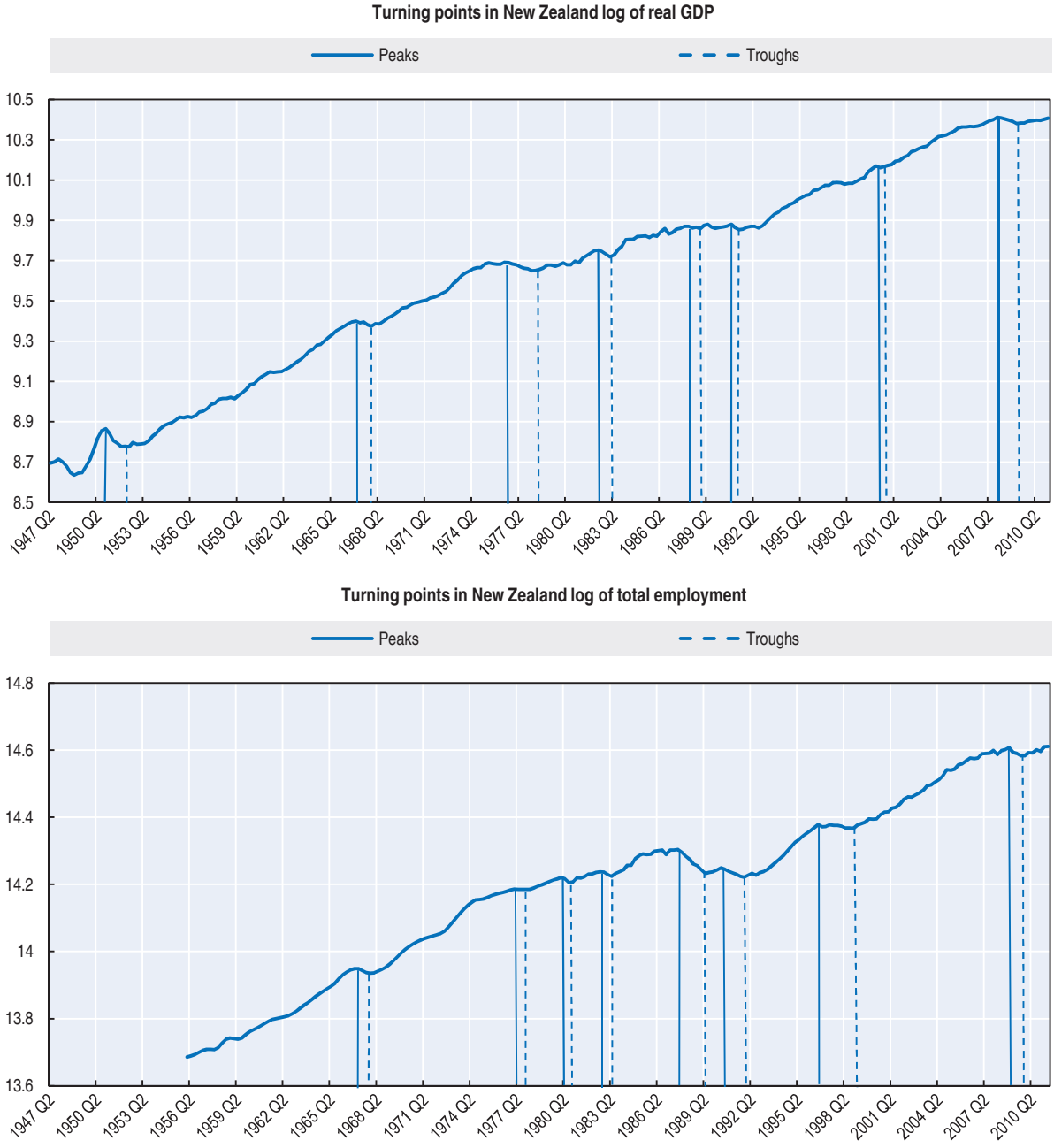
In comparison with other OECD countries, the recession in New Zealand was relatively mild – no doubt buoyed by the fact that in Australia, New Zealand's largest trading partner, gross domestic product (GDP) declined in only one quarter (2008 Q4). In New Zealand, aggregate growth resumed weakly in the second quarter of 2009, and real GDP was still marginally below its 2007 Q4 level in the first quarter of 2011.

The recession had a clear impact on the New Zealand labour market, albeit with a lag. Prior to the recession, employment had been increasing since the fourth quarter of 1998. Like output growth, growth in employment had been slowing since late 2005, although it continued to rise for several quarters after output contracted, before contracting for four quarters. Employment growth resumed for three quarters after output began growing again. The employment fluctuations were less pronounced than output changes, leading to pro-cyclical labour productivity changes. In contrast, wage growth held up until late in 2008, eventually slowing in 2009, in concert with employment growth.

Compared with previous recessions in New Zealand, the 2008 recession was initially less severe but was more prolonged. The impact on the labour market was roughly commensurate with the output changes, a pattern seen in recent recessions but in contrast to the major changes that occurred in New Zealand in the 1980s and 1990s.

Figure 5.1 shows cyclical variation in output and employment in New Zealand over the past 60 years, highlighting the timing of peaks and troughs for each series.[3] Employment declines have lasted longer than output declines in the previous three recessions, and have been more severe – especially for the contractions starting in 1987-88, when employment

Figure 5.1. **New Zealand output and employment cycles**



Note: Turning points were identified using the Bry-Boschan quarterly algorithm outlined in Harding and Pagan (2002), with (window = two quarters; minimum phase = three quarters; minimum cycle = five quarters). This was applied to seasonally adjusted real production GDP, and seasonally adjusted total employment derived by splicing the historical series in Chapple (1994) with the latest revision of the Household Labour Force Survey.
Source: Authors' calculations.

dropped by over 7% in seven quarters. Table 5.1 summarises the peak-to-trough declines in output and employment for recent cycles, together with the duration of each downturn, and the length of time before the previous peak levels were regained. The 2008 recession appears more significant on this basis. The output drop, in particular, is the longest-duration contraction since the 1976 Q2 recession,[4] and also the most sustained, taking at

least 13 quarters (to date) to regain the 2007 Q4 level of output. The contraction in output (-3.1%) is the deepest since 1982 Q2 (-3.1%).

Table 5.1. **Maximum cumulative decline in output and employment**

	Output decline (peak-to-trough)	Peak-to-trough duration	Time to regain peak level		Employment decline (peak-to-trough)	Peak-to-trough duration	Time to regain peak level
Peak	% change	(quarters)	(quarters)	Peak	% change	(quarters)	(quarters)
1950 Q4	-8.9%	6	14				
1966 Q4	-2.5%	4	8				
				1967 Q1	-1.4%	3	7
1976 Q2	-4.2%	7	18				
				1977 Q1	-0.1%	3	4
				1980 Q1	-1.5%	2	6
1982 Q2	-3.2%	3	5				
				1982 Q3	-1.3%	3	5
				1987 Q3	-7.2%	7	29
1988 Q1	-1.3%	3	4				
				1990 Q2	-2.8%	6	13
1990 Q4	-2.6%	2	9				
				1996 Q3	-1.2%	9	11
1997 Q3	-0.9%	2	5				
2007 Q4	-3.1%	5	at least 13				
				2008 Q4	-2.5%	4	9

Source: Authors' calculations.

Labour market adjustment during the GFC

While employment growth provides a useful summary indicator of the labour market responses to the cyclical downturn, the impacts are also evident in other labour market indicators. The labour force continued to grow and the participation rate remained high while employment growth slowed, leading to an increase in unemployment. Unemployment rose sharply, increasing from below 4% in early 2008 to stabilise at around 7% from late 2009. Employment intentions dropped almost immediately when output declined and remained negative until mid-2009, shortly before employment growth resumed. Average weekly hours of work had been dropping steadily since 2005, and continued to do so until 2010, when employment growth resumed, despite stronger growth in full-time than part-time employment. At the start of the recession, growth in full-time employment stalled and part-time employment grew more rapidly. By late 2009, part-time employment growth slowed and full-time employment growth picked up. Wage growth remained positive throughout the early stages of the recession, but slowed markedly in 2009, and has remained low.

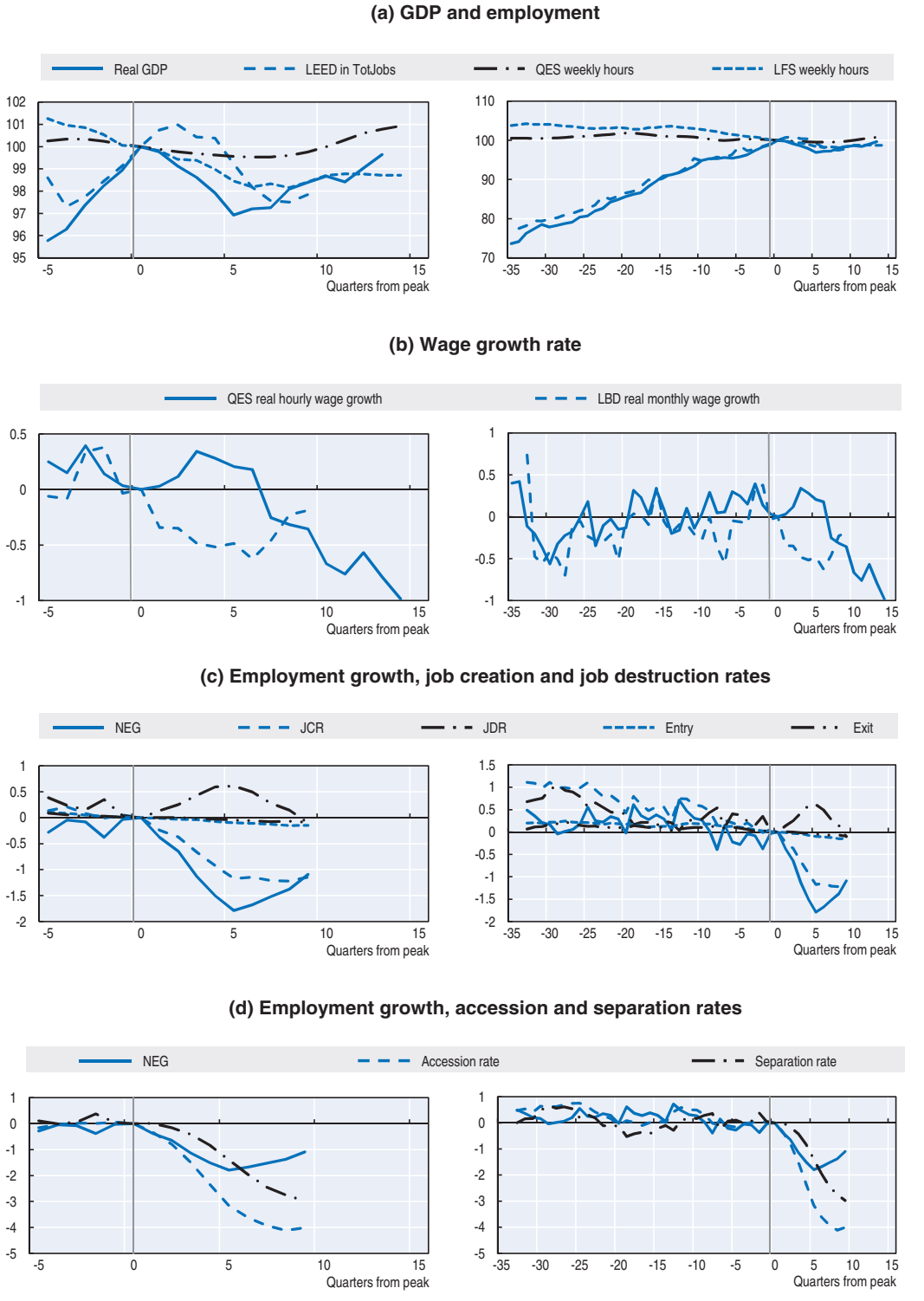
The unemployment rate has remained higher than pre-peak levels, particularly for young people. Since 2007 Q4, the overall unemployment rate rose from 3.5% to 6.5% for all workers, and from 13.1% to 27.6% for 15 to 19-year-olds.[5] Youth participation has also shifted – down from 65% to 45%, in contrast to relatively stable participation rates overall. Long-term unemployment has grown faster than unemployment overall – rising from 4.5% to 9.2% of overall unemployment.

The first row of Figure 5.2 shows GDP, linked employer-employee data (LEED) employment, and hours change around the 2007 Q4 GDP peak (left column) and for the entire period when LEED data are available (right column). Two hours measures are shown – one derived from the Quarterly Employment Survey (QES), which reflects average paid hours per

Figure 5.2. **Labour adjustment around the 2008 recession**

5 quarters before to 15 quarters after peak
2005 Q4-2011 Q1

All periods with LEED data 1999 Q2-2011 Q1



Notes: All series are seasonally adjusted by the authors using the United States Census Bureau's Win-X12 program. Series in the right hand column are subsequently smoothed using a centred five-period moving average, to aid presentation.
Source: Authors' calculations.

employee, and one from the Household Labour Force Survey (HLFS), showing hours worked per person. Both show declines following 2007 Q4, although the HLFS measure of average hours had been declining for some time prior to the GDP peak. Both series show a recovery in hours from around five quarters after 2007 Q4. The second row of Figure 5.2 shows growth in QES real hourly earnings per full-time equivalent employee, and growth in real monthly earnings, from the micro-data sample described in the fourth section below. Monthly earnings decline before hourly earnings, reflecting the drop in average hours. Real monthly earnings growth subsequently resumes as hours pick up, but real hourly earnings continue to decline.

Aggregate employment fluctuations are the net result of large gross flows of jobs and of firms. The fifth section of this chapter examines changes in job and worker flows across firms. The current section summarises the changes in aggregate job flows (job creation and job destruction rates) and worker flows (accession and separation rates) that occurred during the 2008 recession. The quarterly job creation rate (JCR) and job destruction rate (JDR) are calculated following the approach of Davis, Haltiwanger and Schuh (1996) as the net change in employment, expressed as a proportion of average employment.[6] The JCR reflects employment changes in entering and expanding firms and the JDR reflects employment changes in exiting and contracting firms. Like the job creation and destruction rates, the worker flow rates are measured quarterly. They reflect the number of employees who had not been at the firm three months earlier (accession rate [AR]), or the number of previous employees who were no longer at the firm (separation rate [SR]).

The bottom half of Figure 5.2. provides information on the changes in job and worker flows that generate the aggregate employment changes. The dark line in the third row graphs shows the path of net employment growth (NEG), which is the quarterly change in aggregate employment expressed as a proportion of average employment during the quarter. The decline in NEG resulted from a rise in the JDR and a decline in the JCR. The third row graphs show the pronounced rise in the JDR in the six quarters after the GDP peak, together with the slight decline in the JCR. The JCR had, however, been gradually declining for the previous 30 quarters. The JDR had been following a similar slow decline until 2005 – about ten quarters before the 2007 Q4 peak. It then stabilised before its rise during the recession.

The patterns of worker turnover are markedly different from those of job turnover. The fourth row of Figure 5.2 shows changes in the worker accession and separation rates, together with the quarterly NEG rate. Prior to the 2007 Q4 peak, both the accession and separation rates were relatively stable. Immediately following the peak, the rates of both accessions and separations declined markedly, signalling a pronounced reduction in labour market liquidity. By 2010 Q2, six quarters after the peak, the worker accession rate had declined by four percentage points (from 17.9% to 13.7%). Despite the rise in job destruction, the worker separation rate dropped by 2.8 percentage points (from 17.0% to 14.2%) over eight quarters.

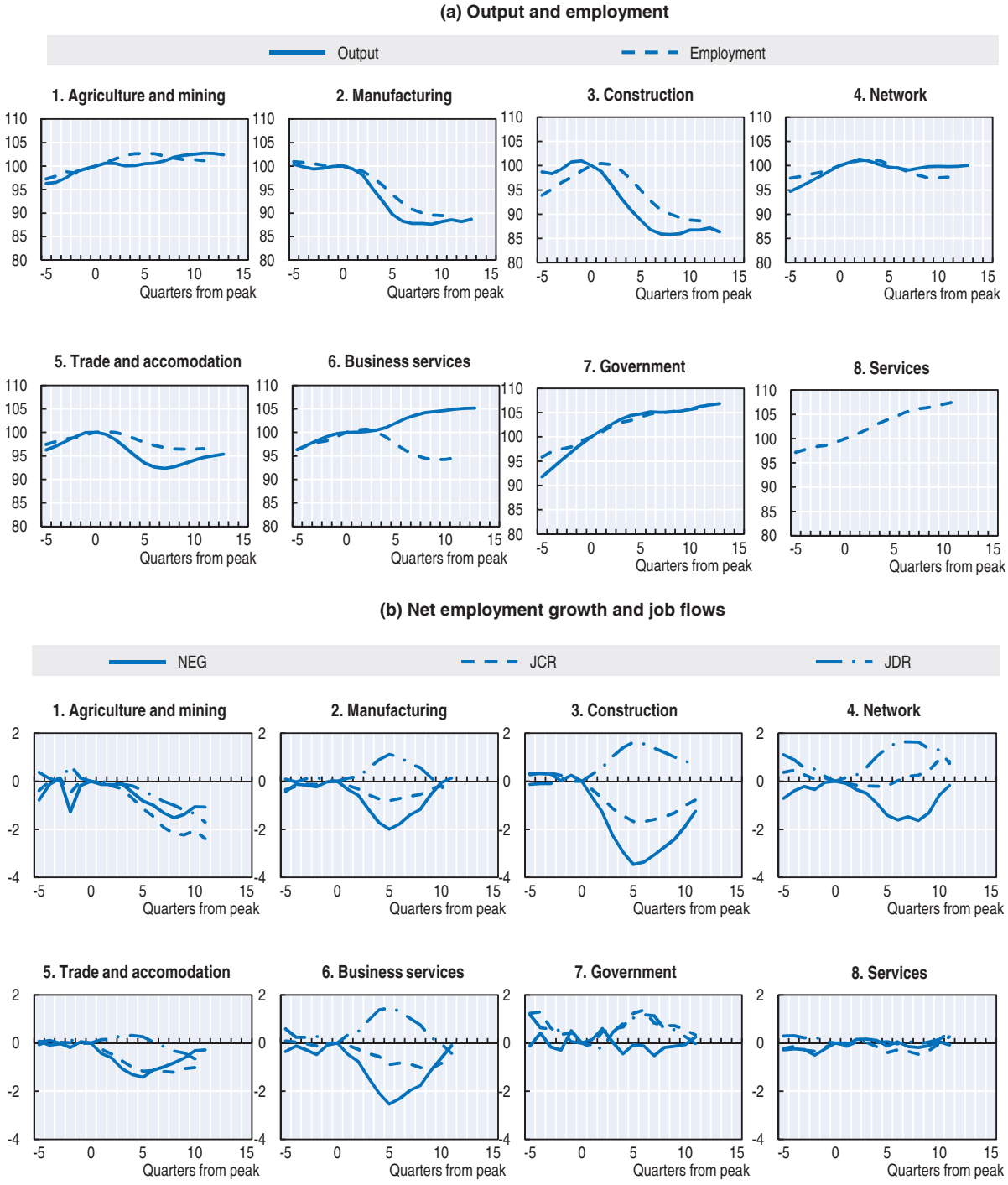
Variation across industry and region

The impact of the recession varied across industries, though it appears to have affected geographical regions similarly. Figure 5.3 provides a summary of output and employment growth, and job and worker flows by industry. Industries have been grouped as shown in Table 5.2.[7]

Output declines were particularly strong in the manufacturing, construction, and combined wholesale/retail/accommodation industries. These industries collectively accounted for around 45% of employment and experienced a 14% reduction in output and

a 9% reduction in employment. In agriculture and mining, network industries (electricity, gas and water, transport and storage, and communications), and government, output

Figure 5.3. **Job and worker flows by industry**



Notes: JCR = job creation rate; JDR = job destruction rate; NEG = net employment growth; TJ = total jobs; AR = accession rate; SR = separation rate. All series are seasonally adjusted by the authors using the United States Census Bureau's Win-X12 program and subsequently smoothed using a centred, 5-quarter moving average. In Panel (a), all series are indexed to a value of 100 in 2007 Q4. In Panel (b), series are expressed as percentage point deviations from 2007 Q4 values.
Source: LEED quarterly tables from Statistics New Zealand.

growth slowed but did not decline appreciably. In the business services industries, output growth resumed relatively strongly after only four quarters of weak growth. The same was not true of employment growth, which declined by around 8% in business services. Agriculture and mining also experienced declining employment in the face of stable or rising output. Employment in community and personal services industries continued to grow throughout the recession, though output data are not available for these industries. For other industries, employment growth followed a similar path to output growth, albeit with a lag. For wholesale trade, retail trade, and accommodation, cafés and restaurants, the decline in employment was small relative to the output decline.

Table 5.2. **Grouping of ANZSIC96 industries**

ANZSIC 1996 industry group		Grouped industry
A	Agriculture, forestry and fishing	1. Agriculture and mining
B	Mining	1. Agriculture and mining
C	Manufacturing	2. Manufacturing etc.
D	Electricity, gas and water supply	4. Network
E	Construction	3. Construction
F	Wholesale trade	5. Trade and accommodation
G	Retail trade	5. Trade and accommodation
H	Accommodation, cafés and restaurants	5. Trade and accommodation
I	Transport and storage	4. Network
J	Communication services	4. Network
K	Finance and insurance	6. Business services
L	Property and business services	6. Business services
M	Government administration and defence	7. Government
N	Education	7. Government
O	Health and community services	8. Services
P	Cultural and recreational services	8. Services
Q	Personal and other services	8. Services

The second panel of Figure 5.3 shows NEG rates together with job flow rates. Industries with the greatest employment declines – manufacturing, construction, and trade and accommodation, experienced the expected pattern of rising job destruction and declining job creation, which reversed as the contraction eased. In business services, the fluctuation in job destruction was particularly strong, accounting for most of the change in quarterly NEG. Three industry groups show atypical patterns. Job creation and JDRs both declined during the recession for agriculture and mining, and in network industries job creation and job destruction both increased. Job creation and destruction rise and then fall together in government, perhaps reflecting ongoing public sector reorganisation. There was minimal variation in job flows in the community and personal services industries.

Most regions show the expected pattern of pro-cyclical job creation and countercyclical job destruction. The exception is the Wellington region, where job creation continued to grow during the early stages of the recession, perhaps due to the concentration of public sector jobs in the region. Auckland experienced the strongest decline in employment but is the only region to have more than recovered its 2007 Q4 level of employment. The recovery reflects the fact that Auckland had the strongest recovery in job creation coming out of the recession. Job reallocation within each of the regions was achieved with greatly reduced worker reallocation rates. Accession rates in particular fell by 2% to 3% within five to ten quarters of the output peak, and did not rise again until after employment growth resumed.

Policy changes during the recession

Following the onset of the recession, New Zealand fiscal and monetary policies were both stimulatory, although they were not brought together as a formal stimulatory package. The 2007-08 government budget surplus of 3.6% of GDP was lowered to 0.1% of GDP in 2008-09, with a projected deficit of 2.8% of GDP by 2010-11. This change in fiscal position represented a fiscal impulse of 6.4% of GDP over four years, largely as a result of reductions in personal (4.1%) and business (0.4%) tax, and a programme of infrastructure spending (0.9%) (New Zealand Treasury, 2008; Giesecke and Schilling, 2010). Monetary policy remained expansionary throughout the recession, with the official cash rate – the main monetary policy instrument – staying at record low levels of 2.5% for most of the 2008-11 period.

In October 2008, the government introduced the "retail deposit guarantee scheme", to guarantee deposits in New Zealand financial institutions and maintain confidence in the financial system. The scheme was extended in 2010. Although the New Zealand and (closely related) Australian financial sectors fared relatively well in the GFC, there were nevertheless payouts under the guarantee scheme.

There have been ongoing incremental changes to labour market and benefit policies since 2007, including the expansion of active labour market policies directed at youth, the introduction of 90-day trial periods and the abolition of the youth minimum wage rate. There have not, however, been any major policy changes to date.

Data

This analysis uses quarterly data from Statistics New Zealand's LBD, which contains longitudinally-linked information on all employing enterprises in New Zealand from 1999 Q2 until 2010 Q1, thus covering all employees in New Zealand. The database brings together a broad range of administrative data collected for tax purposes and data from a range of business surveys.

For the current study, attention is restricted to private sector enterprises operating for profit. Such enterprises account for 94.7% of employing enterprises, and 75.8% of employees. The excluded enterprises are mostly public sector agencies that have disproportionately large employment. This study further restricts attention to enterprises that always employ three or more employees, to avoid problems encountered in longitudinally linking very small firms.[8] It also excludes a very small number of observations where key variables are missing and drop quarterly observations for which mean employment is zero. With these restrictions, the data covers 96.6% of employees in private-for-profit enterprises (55.1% of employing private-for-profit enterprises). On average, the quarterly data has around 98 000 enterprises employing around 1.2 million employees.

The main variables of interest are quarterly employment and earnings, obtained from monthly pay as you earn (PAYE) income tax returns filed by employers from Statistics New Zealand's LEED. The unit of observation in the LEED is a job (an employer-employee combination, observed monthly). This analysis uses LEED-based measures that are aggregated to enterprise-level quarterly observations. Employment is measured as the number of employees being paid by an enterprise on the 15th day of the middle month of a quarter. The monthly earnings rate is calculated as the average gross monthly earnings of employees employed on the 15th day of a month, deflated by the industry-specific "all wage and salary" Labour Cost Index (LCI). An employment-weighted average of the monthly earnings rate is used, averaged across the three months in each quarter.

LEED data are also the source of information for worker and job flows. Accessions are identified as current employees who were not employed at the firm on the 15th day of the middle month of the previous quarter. Separations are those who were employed at the firm on the 15th day of the middle month of the previous quarter but are not employed in the middle of the current quarter. It is not possible to separately identify voluntary and involuntary separations. Accession and separation rates are calculated as a ratio to average quarterly employment ($(E_t + E_{t-1})/2$). NEG is also measured as a ratio to average employment, to give a measure that is bounded by -2 (for firm exit) and +2 (for firm entry).[9] This can be decomposed into the positive contribution from expanding firms (JCR) and the negative contribution from contracting firms (JDR). Wage growth is measured using an analogous formula: $\Delta w=(w_t - w_{t-1})/[(w_t + w_{t-1})/2]$.

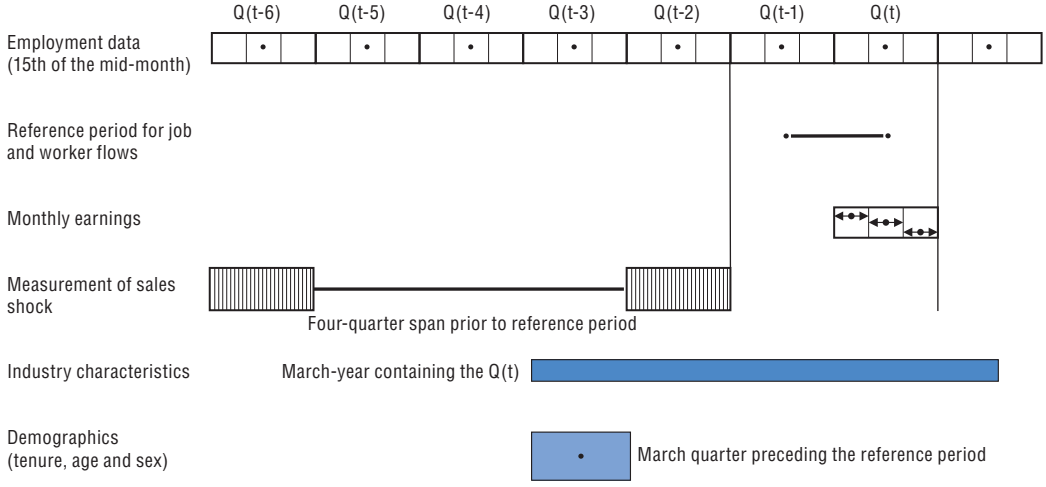
LEED also provides data on the demographic composition of each enterprise's workforce. This analysis uses information on workers' age and sex, and on workers' tenure at the enterprise. These are measured as the proportion of male and female employees in each of four broad age bands (under 15, 15-24, 25-55, and over 55) and the proportion of all employees with completed tenure of zero, one, two, three and four years. The final tenure category relates to workers who have completed five or more years of tenure. Because this measure is left-censored, this study restricts all regression analyses to the period from 2004 Q3 to 2010 Q1 for consistency. It uses annual data on the number of working proprietors and contractors engaged at each enterprise and express these as a proportion of total employment (sum of employees, contractors, and working proprietors).

Sales data are used to construct a measure of the output shock facing each firm. Sales data are obtained from monthly goods and services tax (GST) sales, aggregated to quarterly frequency. To accommodate the pronounced seasonality in sales data, and to reduce the influence of quarter-to-quarter volatility, an annual change in quarterly sales is used, measured analogously to the wage and employment changes. In order to ensure that the output shock precedes the measured employment and wage dynamics, the annual sales change lagged by two quarters is used. The two-quarter lag ensures that the year over which the output shock is measured entirely precedes the two quarters used for calculating employment and wage changes, as illustrated in Figure 5.4. Firms entering employment during the reference period almost never have lagged sales, so are omitted from the analysis of output shocks.

Changes in aggregate GDP and employment suggest that employment changes lag GDP by one to three quarters. If employment responds quickly, this study's approach may understate the negative response to output shocks, since a proportion of exiting firms will leave the population before the employment reference period. Conversely, if labour market lags are particularly long, this study will fail to detect employment responses to output shocks. It includes in the analysis indicators of firm performance that are potentially related to firms' labour dynamics and adjustment. An employment-based predominant two-digit ANZSIC96 industry is calculated for each enterprise, and heterogeneity across industries is examined by including intercepts for different combinations of firm size and industry, or by including averages of key characteristics by firm size and industry.[10] These characteristics include the proportion of employment in exporting firms, in firms with foreign direct investment, and in firms with some employees on collective employment agreements.[11] This analysis also uses employment-weighted average responses to subjective questions on whether the enterprise's profitability is high relative to that of competitors, and whether profitability has increased or remained stable in the previous year. Finally, it uses information on whether firms sought finance and, if so, whether

finance was available on acceptable or unacceptable terms. All of these indicators are drawn from Statistics New Zealand's annual Business Operations Survey (BOS), which is available from 2004-05 (i.e. for the entire tenure-restricted period of 2004 Q3 to 2010 Q1). The BOS has slightly narrower industry coverage[12] than the private-for-profit scope used for this chapter's other analyses. It also excludes enterprises with fewer than six employees, and those that have been in operation for less than a year. From a target population of around 34 000, information is collected from a sample, stratified by firm size and industry, yielding useable responses for between 5 500 and 6 000 enterprises (> 80% response rate). Using firm-level responses to BOS variables results in a small sample that does not support robust analysis of labour adjustment. Therefore average responses (with non-response coded as zero) are calculated by the (firm size by industry) sample strata and apply the contemporaneous annual averages to quarterly enterprise observations.

Figure 5.4. **Variable definition: data timing**



Source: Authors' calculations.

Microeconomic sources of aggregate adjustment

The aggregate decline in employment following the 2007 Q4 peak in GDP is the net outcome of heterogeneous patterns of adjustment at the firm level. Three dimensions of this heterogeneity are examined here. First, firms experienced different output shocks; second, conditional on the size of the output shock, firms had different net changes in employment; third, conditional on the size of the firm's employment change, there is heterogeneity in the pattern of worker flows (accessions and separations). Analysis of firm-level adjustment provides a richer understanding of the microfoundations of aggregate cyclical dynamics, as summarised by Davis and Haltiwanger (1999) and Davis, Faberman and Haltiwanger (2006).

Table 5.3 compares employment growth, and job and worker flows after the 2007 Q4 peak with those in the 34-quarter period up to and including the peak using LBD data. This shows similar patterns to those observed using published aggregate statistics (Figure 5.2). Net quarterly employment growth slowed from 0.85% to -0.64%. This reflects almost constant job destruction (of -6.7%) combined with a decline in job creation (from 7.6% to 6.0%). As in the published data, both accession and separation rates were lower following the GDP peak.

Table 5.3. **Changes in job and worker flows**

	Pre-peak	Post-peak
	1999 Q3-2007 Q4 (%)	2008 Q1-2010 Q1 (%)
Net employment growth	0.85	-0.64
Job creation rate	7.58	6.02
Job destruction rate	-6.73	-6.66
Accession rate	17.68	14.76
Separation rate	16.83	15.40

Note: Reported values are employment-weighted averages of quarterly rates.
Source: Authors' calculations.

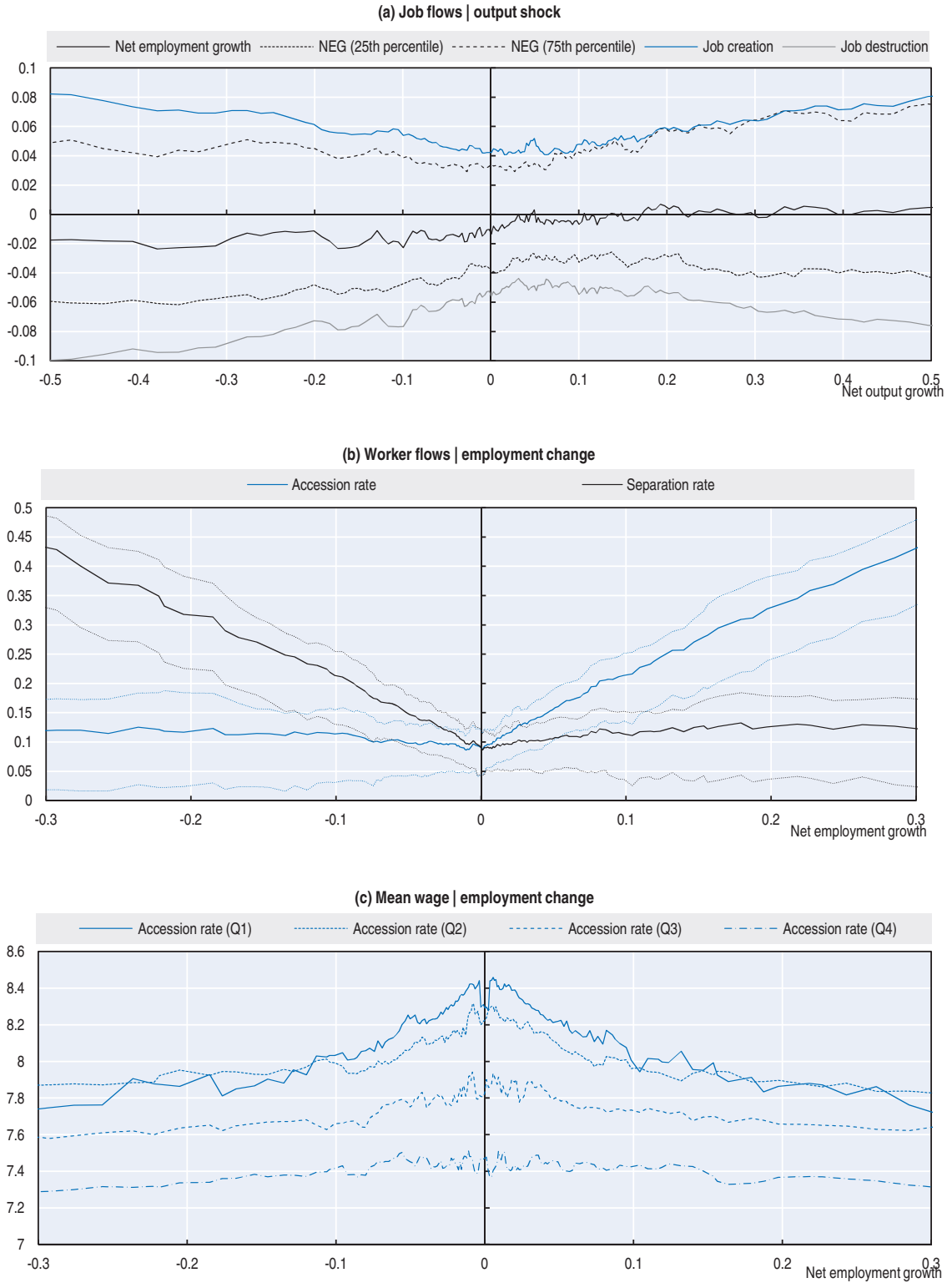
Heterogeneity of adjustment

The first panel of Figure 5.5 shows average NEG and job flow rates conditional on the size of the output shock experienced by firms. The output shock measure is divided into 181 discrete bins, each containing approximately the same proportion of employment. The figure restricts attention to output shocks between -0.5 and 0.5, since this range captures 82.6% of average employment. The employment response of firms to a change in output will be more pronounced when output growth is strongly related to an expected sustained increase in labour demand. Output growth may be a weak signal of changing labour demand if there is uncertainty about future growth prospects, as is the case around cyclical turning points, or if output growth is highly volatile. In such cases, there is likely to be a weak relationship between observed output changes and subsequent employment change.

The first panel of Figure 5.5 shows a clear positive relationship between (lagged) output growth and NEG for output shocks between -0.05 and +0.05 (elasticity of 0.2). For larger output increases or decreases, the elasticity is close to zero (0.03 or less), with the somewhat implausible implication that, on average, employment does not respond to output change. The lack of a relationship between large output shocks and current employment growth may be a consequence of volatile output fluctuations. For some firms, a negative output shock is a sign of reduced demand and consequently lowered labour demand. For others, a contraction in output reflects an unusually poor year, which is followed by subsequent growth in employment. On balance, a negative output shock is associated with relatively slow subsequent employment growth (-0.013 on average), whereas average employment growth following any positive output shock is fairly constant at around zero.

The dashed lines show the empirical 25th and 75th percentiles of NEG for each output shock bin. The average response of employment to output shocks, as captured by NEG, conceals systematic patterns of response at different points of the employment change distribution. For firms experiencing a positive output shock, the upper quartile of employment growth rises linearly with the size of the output shock. In contrast, the lower quartile employment change for firms experiencing a positive shock is around -0.03, regardless of the size of the shock. The positive output shock is transmitted to employment growth for firms with high levels of employment growth, but not for many firms whose employment continued to decline. A similar pattern is observed for firms experiencing a negative output shock. On average, the output shock feeds through to a decline in employment, but firms at the upper quartile of employment growth maintained employment growth of 0.03 to 0.04 regardless of the size of output shock. These patterns are consistent with behaviour predicted by Ss models of adjustment – expanding firms respond to positive shocks and contracting firms respond to negative shocks.

Figure 5.5. **Heterogeneous adjustment**



Notes: Output shocks are measured as lagged annual growth in sales, as described in the text. Figures are plotted using 181 discrete ranges ("bins") of NEG or output shocks, each containing approximately the same employment. Plotted lines are centred 5-bin moving averages. Dashed lines in Panel (b) are empirical 25th and 75th percentiles.
Source: Authors' calculations.

The other pattern evident in Figure 5.5 is that job creation and JDRs are both higher among firms experiencing large output shocks, regardless of whether the output shock is positive or negative. Again, this is suggestive of heterogeneous responses to output shocks, even within narrowly defined ranges of output shock. The slightly lower employment growth among firms facing negative output shocks is the net effect of some firms with sizeable increases in employment and some with sizeable decreases.

There is also considerable heterogeneity in accession and separation rates among firms with the same NEG. The second panel of Figure 5.5 shows average worker flow rates conditional on NEG. NEG is also divided into 181 discrete bins, each containing approximately the same share of total employment. The figure is restricted to net employment changes in the range of -0.3 to 0.3 (capturing almost 90% of average employment). The two curves have the familiar "hockey-stick" shape, with a low and relatively stable accession rate for contracting firms, and a near-linear increase in the accession rates as net employment increases for expanding firms. Similarly, the separation rate increases with the size of employment contractions but is low and stable for expanding firms. The dashed lines show the empirical 25th and 75th percentiles of worker flow rates. There is a sizeable 0.07 to 0.15 interquartile range evident for each level of employment growth, reflecting considerable variation in turnover rates.

The third panel of Figure 5.5 investigates whether the heterogeneity of worker flows is related to differences in wage levels across firms. Within each NEG bin, firms are ranked according to their worker turnover and calculate mean wages for each quartile of the worker turnover distribution.[13] There is a clear inverse relationship between wage levels and worker turnover. The firms with the highest turnover rates (fourth quartile of the accession rate) have significantly lower mean wages than other quartiles. The two lowest turnover quartiles have a similar level of relatively high wages. The wage profiles also show markedly higher wages among firms experiencing small absolute changes in employment. This reflects firm-size wage premiums, since large firms are over-represented among firms with small absolute changes in employment.[14] The patterns highlight the importance of controlling for differences in firm size, and other attributes such as industry, in subsequent regression analysis.

Changes during the global financial crisis

Table 5.4 provides a decomposition of the average changes in job flows summarised in Table 5.3 together with a decomposition of changes in average monthly wage growth. Specifically, Table 5.4 shows how much of the observed change was due to changes within contracting as opposed to expanding firms, or to changes within firms experiencing positive as opposed to negative output shocks.

The upper panel shows the contributions to overall employment change from subgroups of firms defined according to the size of their firm-level employment change. Contracting firms are divided into "large contractions" (NEG $\in$ (-2;-0.3)), and other contractions (NEG $\in$ [-0.3;0)). Similarly, expanding firms are categorised as large expansions and other expansions. Firm entry and exit are identified separately, although they are included in job creation and destruction respectively in most other results.

Comparing contributions before and during the crisis, the main changes come from a substantial reduction in the contribution from expanding firms – both large and other expansions – and a slightly larger negative contribution from small contractions. When

classified by the size of output shocks, the employment reduction came mainly from negative contributions from firms with small positive or negative output shocks.

Table 5.4. **Decomposition of growth in employment and wages**

	Employment		Average wage	
	Pre-peak (%)	Post-peak (%)	Pre-peak (%)	Post-peak (%)
Employment bins				
Exit	-1.51	-1.23	0.56	0.47
Large contraction	-2.71	-2.62	1.29	1.20
Contraction	-2.51	-2.81	1.16	0.71
Static	0.00	0.00	0.28	-0.01
Expansion	3.06	2.53	-0.22	-0.72
Large expansion	3.02	2.47	-1.39	-1.20
Entry	1.50	1.02	-0.58	-0.44
Total	**0.85**	**-0.64**	**1.10**	**0.01**
Lagged sales bins				
Exit	-0.01	-0.02	0.00	0.00
Large contraction	-0.06	-0.20	0.05	-0.09
Contraction	-0.34	-0.54	0.39	-0.06
Static	0.00	0.00	0.00	0.00
Expansion	-0.06	-0.27	0.61	0.18
Large expansion	0.15	-0.12	0.18	0.08
Entry	0.17	0.05	0.09	0.04
Zero (both periods)	1.00	0.46	-0.22	-0.16
Total	**0.85**	**-0.64**	**1.10**	**0.01**

Note: Large contractions (expansions) relate to net changes of less than -0.3 (larger than 0.3).
Source: Authors' calculations.

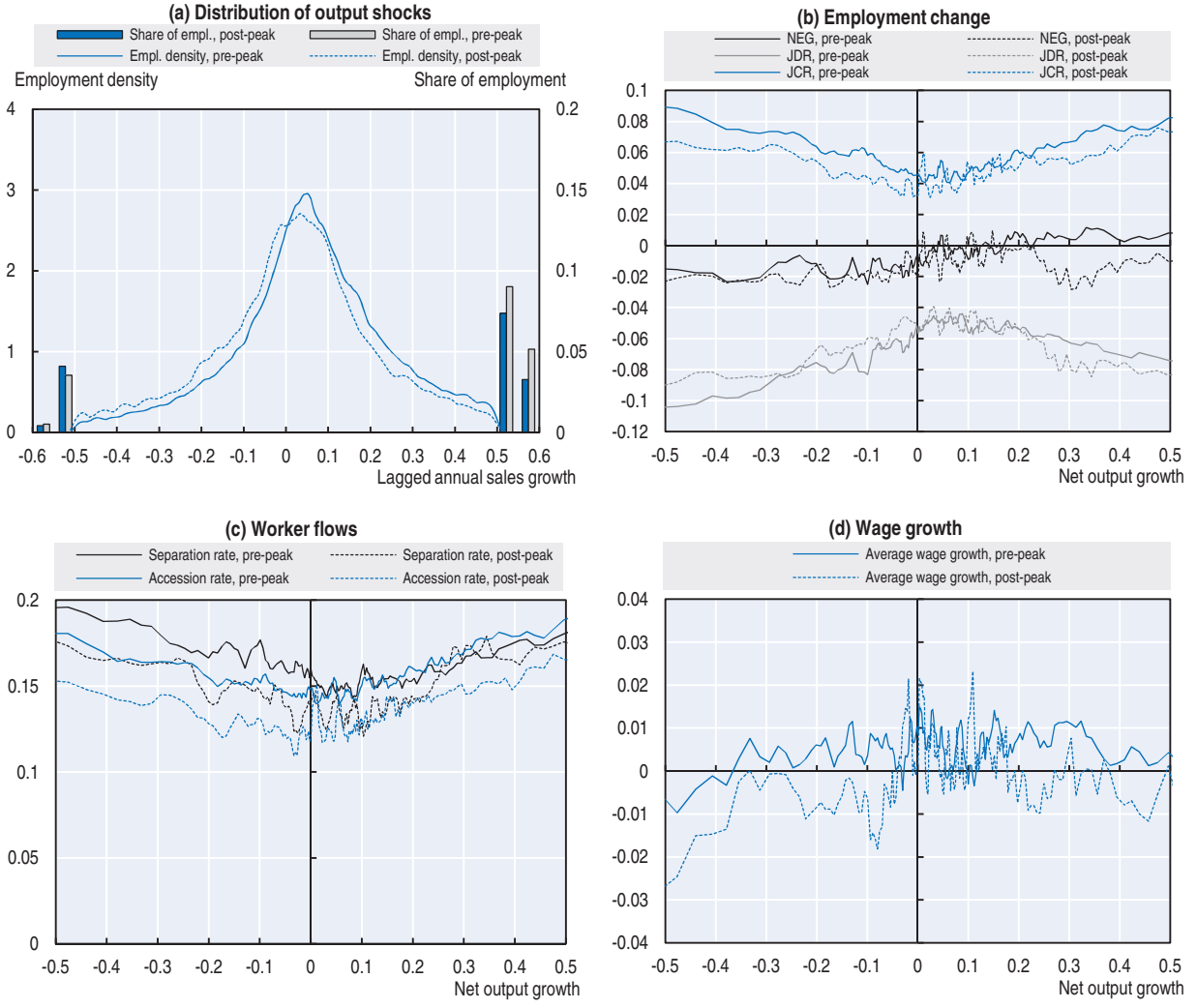
A similar decomposition is used to identify contributions to the reduction in wage growth, which dropped from 1.1% per quarter (nominal wage growth) before the crisis, to 0.01% after the crisis. The largest contributors to the reduction were from the changing contribution of firms with small employment expansions or contractions, or from firms facing small positive or negative output shocks.

The following sections summarise graphically the changes in the distribution of firms across the different growth bins and the changing patterns of employment and wage changes within bins. For those analyses, much finer employment and output shocks bins are defined than those shown in Table 5.4.

The impact of the crisis on NEG is assessed by examining the changing distribution of output shocks before and after 2007 Q4, and the changing response of employment change to a given level of output shock. Figure 5.6 summarises the observed patterns. The first panel shows that the distribution of output shocks shifted to the left – an increasing share of employment was in firms that experienced negative output shocks.[15] The second panel shows the changing profile of NEG, conditional on the size of the output shock. Post-peak, employment change is less systematically related to output shocks than it was prior to the crisis, even for small changes in output – the elasticity of employment with respect to output for output shocks in the -0.05 to 0.05 range is only 0.02, compared with 0.2 prior to the crisis. Post-peak, employment declines were somewhat smaller for firms experiencing negative output shocks of -0.3 or more, due to a larger decline in JDRs than JCRs, though both declined. Paradoxically, firms with positive output shocks of around 0.3 or greater

show employment declines (around -0.02). For a given output shock, job creation was lower and job destruction higher during the crisis than before it. It may be that output shocks were unexpectedly short-lived, leading to reversals of employment growth in the year following an expansion of output.

Figure 5.6. **Post-peak changes conditional on output shock**

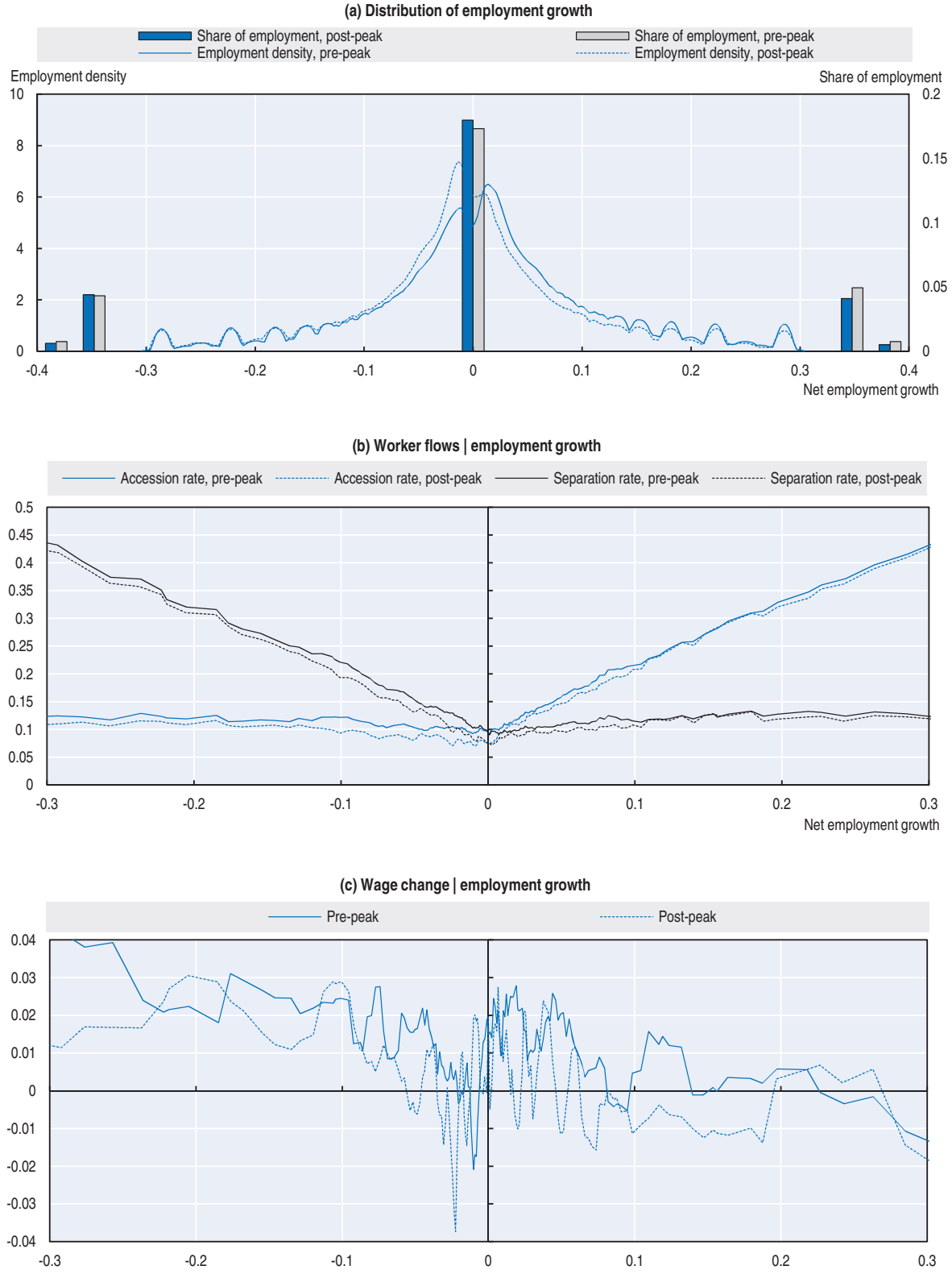


Notes: Output shocks are measured as lagged annual growth in sales, as described in the text. Figures are plotted using 181 discrete ranges ("bins") of output shocks, each containing approximately the same employment. Plotted lines are centred 5-bin moving averages. Dashed lines are for the post-peak period.
Source: Authors' calculations.

Consistent with the declines in overall accession and separation rates shown in the lower panel of Figure 5.2, the third panel of Figure 5.6 shows that, conditional on the size of the output shock, both accessions and separations are lower during the GFC, especially among firms facing larger negative shocks.

The first panel of Figure 5.7 shows that not only did the distribution of employment changes become more peaked, it also shifted to the left. There was a particularly sharp rise in the share of employment in firms with small employment declines, with a compensating reduction in the share with low to moderate increases. These distributional changes contribute to lower worker flows. However, as shown in the second panel of Figure 5.7, there

Figure 5.7. **Post-peak changes conditional on employment growth**



Notes: Figures are plotted using 181 discrete ranges ("bins") of NEG, each containing approximately the same employment. Plotted lines are centred on 5-bin moving averages. Dashed lines are for the post-peak period.
Source: Authors' calculations.

is an additional reason that overall worker flow rates dropped. Both accession rates and separation rates declined, even conditional on the NEG rate. Although the changes are small, they appear to be most pronounced for firms making small employment reductions.

The pattern of wage changes conditional on the size of employment change or output shock is relatively weak, as shown in the final panels of Figures 5.6 and 5.7. Wage growth is slightly lower for firms in which employment is growing (Figure 5.7). The wage measure is a monthly wage, so the slower growth may reflect reduced hours of work or greater use of part-time workers. Prior to the crisis, moderately large negative output shocks are associated with slower wage growth. During the downturn, this pattern is no longer evident, with wage growth being small and negative for a broad range of negative output shocks. Changes in average wage growth may arise not only from changes in wage growth but also from changes in the composition of the firm's workforce, and changes in average hours of work. Hours of work changes cannot be controlled, but it is possible to control for the changing composition of the workforce using a regression specification.

Modelling heterogeneous adjustment

The changing profile of worker flows and wages conditional on employment change, or of job and worker flows, employment and wage change conditional on output shocks does not necessarily represent a change in firms' reactions to the GFC. An alternative explanation is that the composition of firms within employment bins or output shock bins has changed. For instance, job and worker flow rates differ across industries for reasons unrelated to the crisis. The impact of the crisis also differed across industries. The GFC may have led to a re-ordering of firms across employment or output shock bins, leading to changes in average rates within a bin.[16]

In order to test the robustness of this analysis' main findings against firm heterogeneity, this analysis adopts a parsimonious regression specification that captures the key shifts. The regression can be readily extended to test whether particular firm characteristics are more strongly associated with shifts in the conditional profiles. Equation (1) shows the structure of the estimating equation:

$$Flow_{gt} = \alpha_g + \beta_t X_{gt} + \left[1(t=1) * \begin{vmatrix} \gamma^+ + \delta^+ G & \text{if } G>0 \\ \gamma^0 & \text{if } G=0 \\ \gamma^- + \delta^- G & \text{if } G<0 \end{vmatrix} \right] + e_{gt}. \quad (1)$$

Estimation is at the bin level, using one observation for each bin in each of two time periods – pre- and post-peak (t = 0,1 respectively). The dependent variable is a job or worker flow rate, a measure of wage growth, or NEG (conditional on output shocks). Change bins (either NEG or output shock) are indexed by g. The shape of the profile across bins is non-parametrically identified by a full set of intercepts, α_g. The vector X_{gt} contains average employment-weighted industry or firm characteristics. The term inside the square brackets captures deviations of the post-peak profile from the pre-peak profile. The specification allows for a level shift, which can be different for negative bins (γ^-), positive bins (γ^+), or at the point of zero change (γ^0).[17] Away from zero, the rise or decline in the profile is allowed to vary linearly with the bin value, G (employment growth or output shock). This is implemented by adding two slope parameters – one for negative bin values (δ^-), and one for positive bin values (δ^+). A residual term (e_{gt}) completes the specification. All regressions are weighted by the share of total average employment accounted for by the cell (g).

Table 5.5. **Changes in industry means**

	Pre-peak (%)	Post-peak (%)	Total (%)	Change (%)
Exporting	21.0	19.8	20.5	-1.2
Foreign direct investment	14.4	15.5	14.8	1.1
Collective employment contracts	30.5	31.1	30.8	0.6
High relative profitability	20.3	21.2	20.6	0.9
Stable or increasing profitability	62.8	54.4	59.6	-8.4
Sought finance	30.4	30.1	30.3	-0.3
x Finance terms acceptable	88.9	84.8	87.3	-4.1
x Finance terms unacceptable	6.7	15.2	9.9	8.5

Note: Reported values are employment-weighted averages based on quarterly data.
Source: Authors' calculations.

Table 5.6. **Modelling worker flows conditional on employment growth: Regression results**

	Accession rate		Separation rate		Monthly wage change	
shift if neg (γ^-)	-0.0229***	-0.0253***	-0.0218***	-0.0240***	-0.0108***	-0.0086
	[0.002]	[0.002]	[0.002]	[0.002]	[0.004]	[0.006]
shift if zero (γ^0)	-0.0161***	-0.0225***	-0.0161***	-0.0229***	-0.0151***	-0.0133
	[0.002]	[0.002]	[0.002]	[0.002]	[0.005]	[0.008]
shift if pos (γ^+)	-0.0117***	-0.0167***	-0.0124***	-0.0169***	-0.0157***	-0.0200***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.004]	[0.006]
Δslope if neg (δ^-)	-0.0233***	-0.0189***	-0.0128*	-0.0078	0.0160	0.0172
	[0.007]	[0.005]	[0.007]	[0.005]	[0.015]	[0.017]
Δslope if pos (δ^+)	0.0076	0.0000	0.0153**	0.0068	0.0308*	0.0546***
	[0.007]	[0.006]	[0.007]	[0.006]	[0.016]	[0.020]
Industry effects	No	Yes	No	Yes	No	Yes
Region effects	No	Yes	No	Yes	No	Yes
Firm size effects	No	Yes	No	Yes	No	Yes
Observations	358	358	358	358	358	358
R^2	0.999	1.000	0.999	0.999	0.745	0.839
p(equal slope effects)	0.002	0.015	0.005	0.068	0.501	0.154
p(uniform level shift)	0.000	0.000	0.000	0.002	0.599	0.257

Notes: Standard errors in brackets. All regressions are employment-weighted using average quarterly employment. Significance: * = 10%; ** = 5%; *** = 1%. Observations are period-bin combinations, with two periods ("pre-peak" = 2004 Q3-2007 Q4; "post-peak" = 2008 Q1-2010 Q1).
Source: Authors' calculations.

Table 5.6 reports the estimates of profile changes for worker flows and wage growth, conditional on NEG. The first column summarises the shifts in the accession rate (seen in Figure 5.7[b]). For very small negative changes in employment, the accession rate was -2.3% lower after the crisis than before. There was a smaller decline (-1.2%) for small positive changes. There was also a significant change in the slope of the profile for negative values of NEG, meaning that the drop was larger for firms experiencing relatively small employment declines. A similar pattern is evident in the third column of the table for the separation rate, although the slope coefficient is not significant. These estimates provide a good summary of the visual patterns evident in Figure 5.7. Similarly, column 5 of Table 5.6 summarises the profile of wage growth across employment bins (Figure 5.7[c]), revealing the overall drop in wage growth, which is slightly greater for expanding firms. The second, fourth, and sixth columns of the table show the impact of controlling for changes in industry, region, and firm-size composition within each cell. For accession and separation rates, controlling for cell composition narrows the difference between the positive and

negative shift coefficients and reduces the estimated slope effect. It does not, however, change the qualitative pattern. Controlling for cell composition in the wage-growth regression raises the estimated decline within expanding firms and makes the decline for contracting firms insignificant. This suggests that industries with high average wage growth rates became more prevalent among expanding firms.

Table 5.7 presents regression estimates to summarise profiles conditional on the size of output shock (analogous to Figure 5.6[b-d]). All of the regressions in Table 5.7 control for changes in industry, region and firm-size composition. Apart from the lowering of accession and separation rates across the full range of output shocks, the only other significant (at 5% level) effect is a drop in the JDR and net employment change among firms experiencing a positive output shock, consistent with the tilting of the JDR profile evident in Figure 5.6(b).

Table 5.7. **Modelling the response to output shocks: Regression results**

	Net employment growth	Job destruction	Job creation	Accession rate	Separation rate	Monthly wage change
shift if neg (γ^-)	-0.0061	-0.0071	0.0010	-0.0254***	-0.0193***	-0.0118
	[0.008]	[0.005]	[0.005]	[0.005]	[0.005]	[0.008]
shift if pos (γ^+)	-0.0110**	-0.00719**	-0.0038	-0.0236***	-0.0126***	-0.0061
	[0.005]	[0.003]	[0.003]	[0.003]	[0.003]	[0.005]
Δslope if neg (δ^-)	0.0093	0.0099	-0.0006	-0.0031	-0.0125	0.0007
	[0.012]	[0.007]	[0.007]	[0.008]	[0.008]	[0.012]
Δslope if pos (δ^+)	0.0038	0.0013	0.0025	0.0020	-0.0018	-0.0080
	[0.008]	[0.005]	[0.005]	[0.005]	[0.005]	[0.008]
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Region effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm size effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	362	362	362	362	362	362
R^2	0.722	0.921	0.895	0.956	0.929	0.738
p(equal slopes)	0.695	0.314	0.715	0.582	0.262	0.545
p(uniform level shift)	0.463	0.981	0.232	0.671	0.132	0.389

Notes: Standard errors in brackets. All regressions are employment-weighted using average quarterly employment. Significance: * = 10%; ** = 5%; *** = 1%. Observations are period-bin combinations, with two periods ("pre-peak" = 2004 Q3-2007 Q4; "post-peak" = 2008 Q1-2010 Q1).
Source: Authors' calculations.

As noted above (see "Heterogenity of adjustment"), there is considerable heterogeneity around the mean profiles that are summarised by these regressions. While the industry employment shares account for some of this variation, their coefficients are uninformative. Tables 5.8 and 5.9 present estimates from regressions where industry shares have been replaced by a range of firm and industry characteristics. The coefficients on these indicate whether there are significant differences in the behaviour of firms conditional on either employment growth or output shock.[18] Tables 5.8 and 5.9 present results conditional on output shock and employment growth respectively. The results show the effects of average tenure composition, working proprietor and contractor share, and the share of workers who are female, young (less than 25 years of age), or old (55 or over), and industry averages derived from BOS data, as described in the data section. Means of the BOS variables are presented in Table 5.5, separately for the pre- and post-peak periods. The largest changes are that the proportion of employment in firms reporting stable or increasing profitability dropped during the crisis, and firms were more likely to face problems when seeking finance.

Table 5.8. **Firm and industry characteristics conditional on output shocks**

	Net employment growth	Job creation	Job destruction	Accession rate	Separation rate	Monthly wage change
shift if neg (γ^-)	0.296	0.045	0.251	0.102	-0.194	-0.154
	[0.355]	[0.219]	[0.234]	[0.236]	[0.242]	[0.386]
shift if pos (γ^+)	0.288	0.042	0.246	0.102	-0.186	-0.148
	[0.357]	[0.221]	[0.236]	[0.238]	[0.244]	[0.389]
Δslope if neg (δ^-)	0.003	0.003	0.000	0.002	-0.001	-0.014
	[0.013]	[0.008]	[0.008]	[0.008]	[0.009]	[0.014]
Δslope if pos (δ^+)	0.007	0.005	0.001	0.004	-0.003	0.002
	[0.008]	[0.005]	[0.006]	[0.006]	[0.006]	[0.009]
Industry means (x pre-peak)						
Exporting	0.209	0.188**	0.021	0.216**	0.007	0.156
	[0.136]	[0.084]	[0.090]	[0.090]	[0.093]	[0.148]
Foreign direct investment	-0.363	-0.303**	-0.060	-0.267*	0.096	-0.168
	[0.223]	[0.138]	[0.147]	[0.148]	[0.152]	[0.242]
Collective employment contracts	-0.262	-0.181*	-0.082	-0.200*	0.063	-0.157
	[0.165]	[0.102]	[0.109]	[0.110]	[0.112]	[0.179]
Increase in relative profitability	0.441	0.384**	0.057	0.331*	-0.110	0.136
	[0.294]	[0.181]	[0.194]	[0.196]	[0.200]	[0.319]
Increased profitability	0.163	0.042	0.121	0.104	-0.059	0.010
	[0.255]	[0.158]	[0.169]	[0.170]	[0.174]	[0.278]
Sought finance	-0.044	0.136	-0.179*	-0.031	0.013	0.029
	[0.150]	[0.093]	[0.099]	[0.100]	[0.102]	[0.163]
Finance terms acceptable	0.148	-0.077	0.225	-0.003	-0.151	0.368
	[0.225]	[0.139]	[0.149]	[0.150]	[0.154]	[0.245]
Finance terms not acceptable	-0.319	-0.423	0.105	-0.348	-0.029	0.195
	[0.547]	[0.338]	[0.361]	[0.364]	[0.373]	[0.594]
Industry means (x post-peak)						
Exporting	-0.079	-0.021	-0.058	-0.030	0.049	0.107
	[0.109]	[0.067]	[0.072]	[0.073]	[0.074]	[0.119]
Foreign direct investment	0.119	0.068	0.051	0.024	-0.096	-0.395*
	[0.189]	[0.117]	[0.125]	[0.126]	[0.129]	[0.205]
Collective employment contracts	-0.061	-0.049	-0.012	0.021	0.082	0.153
	[0.133]	[0.082]	[0.088]	[0.089]	[0.091]	[0.145]
High relative profitability	-0.144	-0.076	-0.069	-0.264	-0.120	0.283
	[0.291]	[0.180]	[0.192]	[0.194]	[0.199]	[0.317]
Stable or increasing profitability	-0.017	-0.060	0.043	-0.095	-0.079	0.113
	[0.166]	[0.103]	[0.110]	[0.111]	[0.113]	[0.181]
Sought finance	-0.035	0.065	-0.100	-0.021	0.013	0.119
	[0.162]	[0.100]	[0.107]	[0.108]	[0.110]	[0.176]
Finance terms acceptable	-0.029	-0.012	-0.017	0.019	0.048	0.335*
	[0.168]	[0.104]	[0.111]	[0.112]	[0.115]	[0.183]
Finance terms not acceptable	-0.102	-0.118	0.016	0.094	0.196	0.232
	[0.189]	[0.116]	[0.124]	[0.126]	[0.129]	[0.205]
Firm characteristics						
Share of employees with tenure:						
< 1 year	0.008	0.149***	-0.141**	0.282***	0.274***	-0.083
	[0.091]	[0.056]	[0.060]	[0.061]	[0.062]	[0.099]
1 year to < 2 years	0.221*	0.170**	0.051	0.195**	-0.026	-0.032
	[0.113]	[0.070]	[0.074]	[0.075]	[0.077]	[0.122]
2 years to < 3 years	-0.176	-0.094	-0.082	-0.183**	-0.007	0.012
	[0.129]	[0.080]	[0.085]	[0.086]	[0.088]	[0.140]
3 years to < 4 years	0.268	0.154	0.114	0.173	-0.095	0.143
	[0.191]	[0.118]	[0.126]	[0.127]	[0.131]	[0.208]
4 years to < 5 years	0.054	0.005	0.048	-0.015	-0.069	-0.267
	[0.186]	[0.115]	[0.123]	[0.124]	[0.127]	[0.202]

Table 5.8. **Firm and industry characteristics conditional on output shocks** *(cont.)*

	Net employment growth	Job creation	Job destruction	Accession rate	Separation rate	Monthly wage change
Share of total employment:						
Working proprietors	0.620	0.792	-0.171	1.466**	0.846	-0.155
	[0.917]	[0.566]	[0.605]	[0.611]	[0.626]	[0.997]
Contractors	0.499	0.307	0.192	0.211	-0.289	0.526
	[0.304]	[0.188]	[0.201]	[0.202]	[0.207]	[0.330]
Female	-0.022	-0.0696*	0.047	0.016	0.038	-0.034
	[0.067]	[0.0413]	[0.044]	[0.045]	[0.046]	[0.073]
Young (< 25 years)	-0.190	-0.109	-0.081	-0.067	0.123	0.158
	[0.116]	[0.072]	[0.077]	[0.077]	[0.079]	[0.126]
Old (> 55 years)	0.148	0.214	-0.065	-0.068	-0.216	-0.086
	[0.245]	[0.151]	[0.162]	[0.163]	[0.167]	[0.267]
Medium-sized firm share (20 to 50)	0.033	-0.060	0.092	0.110	0.077	0.209
	[0.207]	[0.128]	[0.137]	[0.138]	[0.141]	[0.225]
Large-sized firm share (50+)	0.154	0.086	0.069	0.248**	0.094	0.060
	[0.174]	[0.107]	[0.115]	[0.116]	[0.119]	[0.189]
Auckland region share	0.041	-0.023	0.064	-0.017	-0.057	-0.066
	[0.071]	[0.044]	[0.047]	[0.047]	[0.048]	[0.077]
Wellington region share	-0.163	-0.179**	0.016	-0.164**	-0.001	0.200
	[0.120]	[0.0742]	[0.080]	[0.080]	[0.082]	[0.131]
Christchurch region share	-0.120	-0.116	-0.003	-0.072	0.048	0.099
	[0.121]	[0.074]	[0.080]	[0.080]	[0.082]	[0.131]
Other North Island share	0.030	-0.003	0.033	0.035	0.005	-0.140*
	[0.076]	[0.047]	[0.050]	[0.051]	[0.052]	[0.083]
Observations	362	362	362	362	362	362
R^2	0.707	0.914	0.866	0.951	0.922	0.678
p(char effects are zero)	0.229	0.000	0.010	0.000	0.000	0.266
p(equal slope effects)	0.857	0.871	0.903	0.878	0.908	0.426
p(uniform level shift)	0.160	0.469	0.147	0.959	0.036	0.388

Notes: Standard errors in brackets. All regressions are employment-weighted using average quarterly employment. Significance: * = 10%; ** = 5%; *** = 1%. Observations are period-bin combinations, with two periods ("pre-peak" = 2004 Q3-2007 Q4; "post-peak" = 2008 Q1-2010 Q1).
Source: Authors' calculations.

Table 5.9. **Firm and industry characteristics conditional on employment change**

	Accession rate	Separation rate	Monthly wage change
shift if neg (γ^-)	0.241*	0.249*	-0.180
	[0.128]	[0.129]	[0.413]
shift if zero (γ^0)	0.242*	0.249*	-0.177
	[0.128]	[0.129]	[0.413]
shift if pos (γ^+)	0.249*	0.256*	-0.180
	[0.128]	[0.130]	[0.415]
Δslope if neg (δ^-)	-0.005	0.009	0.001
	[0.007]	[0.008]	[0.024]
Δslope if pos (δ^+)	-0.004	-0.001	0.0464*
	[0.008]	[0.008]	[0.027]
Firm characteristics			
Share of employees with tenure:			
< 1 year	0.205***	0.204***	0.093
	[0.031]	[0.031]	[0.099]
1 year to < 2 years	0.116**	0.110**	-0.046
	[0.045]	[0.045]	[0.144]
2 years to < 3 years	0.064	0.069	0.066
	[0.049]	[0.050]	[0.160]

Table 5.9. **Firm and industry characteristics conditional on employment change** *(cont.)*

	Accession rate		Separation rate		Monthly wage change	
3 years to < 4 years	0.120*		0.120*		0.324	
	[0.063]		[0.064]		[0.203]	
4 years to < 5 years	-0.021		-0.026		0.322	
	[0.076]		[0.077]		[0.245]	
Share of total employment:						
Working proprietors	-0.313		-0.405		-0.463	
	[0.288]		[0.291]		[0.931]	
Contractors	0.124		0.122		-0.039	
	[0.115]		[0.116]		[0.372]	
Female	0.015		0.020		0.105	
	[0.026]		[0.026]		[0.085]	
Young (< 25 years)	0.065		0.060		-0.137	
	[0.049]		[0.049]		[0.157]	
Old (> 55 years)	0.062		0.039		-0.225	
	[0.100]		[0.101]		[0.322]	
Medium-sized firm share	-0.003		0.013		-0.167	
	[0.044]		[0.045]		[0.143]	
Large-sized firm share	-0.009		-0.001		-0.129	
	[0.047]		[0.047]		[0.151]	
Auckland region share	-0.008		0.001		0.058	
	[0.026]		[0.027]		[0.085]	
Wellington region share	-0.017		-0.002		0.139	
	[0.044]		[0.045]		[0.142]	
Christchurch region share	-0.040		-0.039		-0.023	
	[0.043]		[0.043]		[0.137]	
Other North Island share	-0.067**		-0.057**		0.085	
	[0.028]		[0.028]		[0.090]	
Industry means	x pre	x post	x pre	x post	x pre	x post
Exporting	0.043	0.012	0.039	0.011	0.012	0.047
	[0.044]	[0.038]	[0.044]	[0.038]	[0.141]	[0.122]
Foreign direct investment	-0.043	-0.010	-0.033	-0.006	-0.199	0.371
	[0.073]	[0.070]	[0.074]	[0.071]	[0.236]	[0.226]
Collective employment contracts	-0.048	-0.045	-0.035	-0.040	0.288	0.026
	[0.057]	[0.048]	[0.058]	[0.048]	[0.184]	[0.154]
High relative profitability	-0.049	-0.060	-0.096	-0.089	0.119	0.486
	[0.094]	[0.116]	[0.095]	[0.117]	[0.303]	[0.375]
Stable or increasing profitability	0.153	-0.044	0.179*	-0.039	-0.074	-0.426*
	[0.103]	[0.078]	[0.104]	[0.079]	[0.332]	[0.252]
Sought finance	-0.075	-0.029	-0.096*	-0.043	-0.144	-0.697***
	[0.056]	[0.067]	[0.056]	[0.068]	[0.180]	[0.216]
Finance terms acceptable	0.032	-0.133*	0.029	-0.134*	0.095	0.402*
	[0.071]	[0.069]	[0.071]	[0.070]	[0.228]	[0.222]
Finance terms not acceptable	0.148	0.016	0.129	0.023	-0.866	0.741***
	[0.164]	[0.076]	[0.166]	[0.077]	[0.531]	[0.245]
Observations	358		358		358	
R^2	0.999		0.999		0.818	
p(char effects are zero)	0.000		0.000		0.011	
p(equal slope effects)	0.916		0.509		0.324	
p(uniform level shift)	0.001		0.005		0.927	

Notes: Standard errors in brackets. All regressions are employment-weighted using average quarterly employment. Significance: * = 10%; ** = 5%; *** = 1%. Observations are period-bin combinations, with two periods ("pre-peak" = 2004 Q3-2007 Q4; "post-peak" = 2008 Q1-2010 Q1).
Source: Authors' calculations.

Overall, there are relatively few statistically significant coefficients across the two tables. Prior to the cyclical peak, the job creation and accession rates were significantly higher in export industries, and in industries in which firms reported high relative profitability, controlling for the size of output shocks (Table 5.8). However, these patterns were absent post-peak. Conditional on output shocks, few firm characteristics were significantly related to job and worker flows. Worker flow rates are higher in firms with a high proportion of low-tenure workers, though this is not surprising if there is persistence in employee turnover rates over time. Low-tenure firms also have higher JCRs and lower JDRs, as expected. Firms in which working proprietors account for a high proportion of employment have higher worker accession rates, conditional on the size of their output shock, as do large firms. The only other significant pattern is that firms with a presence in the Wellington region experienced the lowest job creation and worker accession rates.

Due to the inclusion of both pre- and post-peak industry-level covariates, the level-shift coefficients (γ^- and γ^+) are not interpretable, although the difference between them is interpretable. For the output shock (Table 5.7), only in the case of the separation rate are the positive and negative shifts different from each other. Furthermore, none of the slope-change coefficients are significantly different from zero.

Table 5.9 shows the role of industry and firm characteristics in explaining patterns of job flows and wage growth, conditional on employment growth. As in Table 5.8, the post-peak shift parameters (γ) are not interpretable due to the inclusion of pre- and post-peak industry means. The difference between γ– and γ+ is significant for the accession and separation rates implying a wedge between the two, consistent with Table 5.6. The increase in slope of the wage-growth curve for positive employment change (δ+), which was also evident in Table 5.6 and Figure 5.7 remains significant, though only at the 10% level. Few firm characteristics are significantly related to worker flows or wage growth, conditional on employment growth cells. Accessions and separation rates are higher for firms with a relatively high prevalence of low-tenure-workers, as would be expected in high turnover firms. Worker flows are lowest for firms in the North Island outside of Auckland or Wellington. Similarly, industry characteristics do not account for the heterogeneity of worker flow rates within employment growth cells. The only industry characteristics associated with heterogeneity of wage growth are finance-related. Wage growth was lower in industries where a high proportion of firms sought finance, though only post-peak. Puzzlingly, in industries where a high proportion of firms reported that finance terms were not acceptable, wage growth was lower.

Conclusions

New Zealand's labour market institutions favour flexibility and work incentives, and have relatively light levels of protection for those out of work. Given these settings, this chapter hypothesised that the output and employment declines associated with the 2008-09 financial crisis would have been accompanied by lowered worker flows (accessions and separations), and raised rates of firm exit. The first of these hypotheses is supported by the data but no evidence was found of significant adjustment in the form of firm exit. It is possible that this margin is important for firms outside the scope of the analysis – namely, very small (less than three employee) and potentially working proprietor-only businesses.

More generally, this chapter's analysis of firm micro-data highlights two key features of New Zealand labour market adjustment during the GFC. First, there was considerable heterogeneity across firms, both before and during the crisis, in the size of output shocks

that firms faced, the amount of employment adjustment in response to any given output shock, and in the size of worker flows given the firm's employment adjustment. For small changes in output (net change between -5% and 5%), the elasticity of employment change with respect to output change was, on average, 0.2 prior to the crisis. For larger output changes, the employment response was less systematic – perhaps reflecting transitory volatility in output. Output growth was, however, transmitted into employment growth for faster growing firms (those at the upper quartile of NEG for a given output shock), and output declines led to employment declines for slower growing firms. Conditional on the level of NEG, there is a clear relationship between worker turnover rates and wage levels. Firms with low worker turnover tend to have higher wage levels.

Second, the crisis not only moved the distribution of output shocks faced by firms, but also altered the relationship between output shocks and changes in job and worker flows and employment. Worker and job turnover rates, as well as wage growth, were lower during the crisis, even controlling for the size of firms' output shock or NEG.[19, 20]

This study interprets slower worker turnover and wage growth post-peak as a reflection of workers' desire to retain jobs in the crisis. For workers who lost employment, the lower turnover rates would have made it more difficult to find jobs. Increased use of active labour market policies targeted at affected workers, such as youth, serves as a mechanism for ameliorating the impact on them. Recent studies have argued for increased generosity of unemployment benefit levels during recessions, on the grounds that the payment levels or durations help to fund extended job search, without smaller adverse work disincentives than would accompany generous payments in non-recessionary times.[21]

Notes

1. A recent review of theoretical and empirical findings on the impact of labour market institutions on job and worker flows, including the impact on cyclical adjustment patterns, can be found in Bassanini et al. (2010). See also Martin and Scarpetta (2011). Other relevant studies include Messina and Vallanti (2007); Gómez-Salvador, Messina and Vallanti (2004) and Salvanes (1997).
2. Acemoglu and Shimer (2000) argue that social insurance can encourage workers and firms to establish more productive jobs that require investments in specific and risky skills. Without such insurance, workers would favour less risky and less productive jobs.
3. Turning points were identified using the Bry-Boschan quarterly algorithm outlined in Harding and Pagan (2002), with (window = two quarters; minimum phase = three quarters; minimum cycle = five quarters). This was applied to seasonally adjusted real production GDP, and seasonally adjusted total employment derived by splicing the historical series in Chapple (1994) with the latest revision of the Household Labour Force Survey.
4. The recession starting in 1950 Q4 took 14 quarters to regain its previous peak, and the recession starting in 1976 Q2 took 18 quarters.
5. The relative rise in youth unemployment started at around the same time as the 1 April 2008 increase of the minimum wage for 16 to 17-year-olds to the level of the adult minimum wage (from USD 9 to USD 12 per hour) and the introduction of a new entrants' wage (USD 9.60 per hour).
6. Specifically, the measure compares employment on the 15th day of the month in the middle of a quarter to employment at the same point in the middle of the previous quarter.
7. This study uses official LEED statistics at the two-digit ANZSIC 2006 industry reallocated to ANZSIC 1996 industries using the algorithm in Grimes, Maré and Morton (2009). Each ANZSIC 2006 industry is allocated to an ANZSIC 1996 industry provided at least 82% of the source industry's employment is in the target industry, otherwise it is omitted. The resulting concordance omits 3.2% of employment and misallocates up to 1.5% of employment.
8. This study refines the longitudinal links in the LBD, making use of plant-level data, as outlined in Fabling (2011).

9. Net employment growth (N) is related to the more familiar percentage growth rate ($g = (E_t - E_{t-1})/E_{t-1}$) by the formula $N = 2g/(2+g)$.
10. Industry and firm size categories are defined to match the survey strata for BOS, from which industry-firm-size characteristics are drawn.
11. This measure of collective employment agreement coverage overstates the true measure of around 10% (Foster et al., 2011) because it counts all employees at affected firms – not just those on collective contracts.
12. Using ANZSIC 96, the excluded industries are M (government administration and defence), P92 (libraries, museums and the arts), and Q95-Q97 (personal and other services, and private households employing staff). Using ANZSIC 06, excluded industries are O (public administration and safety) R89-R90 (heritage and artistic services) and S95-S96 (personal and other services, and private households employing staff).
13. This study ranks by accession rate. The results are very similar using separation rates, since it is conditioning on a narrow net employment growth range. Quartiles are employment weighted so that each quartile contains approximately the same number of jobs.
14. Using the formula $(E_t - E_{t-1})/[(E_t + E_{t-1})/2]$ the smallest non-zero net employment growth for a firm of initial size n is an increase of $1/(n+0.5)$ or a decrease of $-1/(n-0.5)$. For a firm with employment of 20, the smallest non-zero change is an increase of 0.049 or a decrease of -0.051.
15. The output shock distribution excludes firms who entered during the quarter over which employment change is measured, because lagged sales are almost always unavailable for such firms. It also excludes firms that exited during the four-quarter period over which the output shock is measured, since such firms are not part of the sample for which employment change is observed (though firms with an output shock of -2 remain in the sample). Consequently, the proportion of employment in firms with -2 output shocks is underestimated.
16. This is, at best, a partial explanation. It cannot account for uniformly lower worker flow rates conditional on net employment growth.
17. The last of these only appears for net employment growth bins, since output shocks are seldom zero and, consequently, there is no separate zero bin for output shocks.
18. The industry and firm characteristics may also be related to which output shock or employment growth bin the firm is in but this relationship is not investigated in the current paper.
19. The puzzling exception is that firms facing a given large positive output shock had lower net employment growth post-peak, resulting from lower job creation and higher job destruction.
20. The impact of selected industry and firm characteristics is estimated on heterogeneous flow rates but few statistically significant relationships were found.
21. See e.g. Chetty (2008); Schmieder, von Wachter and Bender (2012); or Kroft and Notowidigdo (2011).

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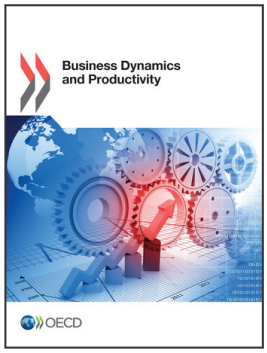

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