Employment and hours worked adjustment in New Zealand’s labour market

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1. Introduction

When economic growth slows or declines, firms often need to reduce the amount of labour that they utilise. Firms can make this adjustment either by reducing the number of people they employ, or by reducing the number of hours that their employees work. The same process also takes place when growth is strong, and firms need to increase the amount of labour they use in order to meet strong demand. In this Note we explore how important the adjustments to average hours worked and number employed are for New Zealand’s labour market.

Our results show that for New Zealand, adjustment in the labour market over the long-term is largely driven by changes in the number of people firms employ. However, this result largely reflects structural trends, such as population growth and the substantial increase in labour force participation since the 1990s.

We find that hours worked per employee are an important contributor to the cyclical adjustment of the labour market. We find that during a downturn, businesses tend to adjust hours worked by their employees, before they resort to letting them go. In an upturn, firms increase hours worked by current staff before hiring new employees.

In this Note, we examine labour market adjustment through two lenses. Firstly, we take a long-term approach and examine structural and behavioural changes in the labour market since the 1990s. Secondly, we examine how businesses adjust employment and hours worked over the business cycle.

2. Why does understanding adjustment in average hours worked and employment matter for the Reserve Bank?

The Remit for the Reserve Bank’s Monetary Policy Committee (MPC) directs the MPC to “support maximum sustainable employment”. It also states that “the MPC should consider a broad range of labour market indicators to form a view of where employment is relative to its maximum sustainable level”.

Currently, the Bank pays a lot of attention to understanding different measures of employment and unemployment (Robinson, Culling, and Price, 2019). However, hours worked are only represented in a few of the indicators the Reserve Bank has focussed on. Hours worked are also an input to the Bank’s structural forecasting model, NZSIM, and is captured in our ‘output gap indicator suite’ (Jacob and Robinson, 2019).

In addition, understanding how employment and average hours worked adjust over the business cycle can help the Reserve Bank understand the cyclical position of the

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1 The authors would like to thank Lewis Kerr, Adam Richardson, and colleagues in the Economics Department for feedback and discussion.
2 Specifically, average weekly hours worked per person is part of the dataset that the Reserve Bank uses to estimate potential GDP (Lienert and Gillmore, 2015).
labour market. By establishing the typical behaviour of the labour market during recessions and recoveries, we may be able to get a sense of whether the labour market is heading into a downturn or not.

3. What do we already know about how firms adjust total hours?

In New Zealand, studies have examined how firms adjusted to the global financial crisis (GFC). Microdata from Stats NZ shows that the GFC had an uneven impact on workers, with greater job losses for low wage workers, young workers, and workers with low tenure (Fabling and Maré, 2012). Relatedly, Cragie, Gillmore, and Groshenny (2012) find that the post-GFC pick-up in the New Zealand labour market was driven by both employment and hours worked.

Internationally, there is a range of literature discussing the importance of average hours worked versus number of people employed for labour market adjustment. Research has tended to find that adjustments in the number of people employed are more important for explaining variation in total hours worked over the business cycle (Hansen, 1985; Merkl and Wesselbaum, 2011). However, it also appears that changes in average hours worked by employees are becoming increasingly utilised by firms to adjust total hours worked (Bishop and Plumb, 2016). Cross-country research has also found that policies such as taxation, working-time regulations, and other labour market policies can significantly affect how the labour market responds to shocks (OECD, 2004; Causa, 2008).

This Note is closely related to the work of Culling and Skilling (2018), who examine changes in average hours worked over time. We also follow the approach of Bishop and Plumb (2016) to examine how firms adjust total hours worked over the business cycle.

4. What we do to examine changes in average hours worked and number of people employed.

Our first question is how important are average hours worked by employees for explaining changes in overall hours worked?

As figure 1 shows, average hours worked per person have trended up since the early 1990s, in-line with the rising employment rate. However, during this time, average hours worked by employed people have actually declined. We want to know how important average hours worked per employee and number of people employed are for explaining the trends we see in figure 1.c.
To examine this question, we decompose changes in aggregate average hours worked per person following the method outlined in Blundell, Bozio, and Laroque (2011). This decomposition allows us to attribute changes in average hours worked per working-age person to three factors: a structural component, an average hours worked by employees component, and a number-employed component (see Appendix A). To carry out this analysis, we use data from the Household Labour Force Survey (HLFS) on average usual hours worked in main job, by age and gender cohort. By using age and gender cohort-level data, we are able to attribute the trends we see in
the aggregate data to trends in specific age and gender cohorts, similar to Culling and Skilling (2018) for labour force participation rates.

Our second question is how do businesses adjust total hours over the business cycle. This is important for the Reserve Bank because monetary policy has the most influence over the cyclical state of the economy. To analyse labour market adjustment over the business cycle, we decompose the change in total hours over the cycle into a contribution from employment and average hours following Bishop and Plumb (2016). We use data on total and average hours worked, and number employed from the HLFS.

5. What are the key results of our work?

Our results suggest two stylised facts about the New Zealand labour market:

1) Firstly, the majority of the adjustment in total hours throughout history has occurred through changes in the number of people employed.

2) Secondly, over the business cycle, there is substantial adjustment in average hours worked by employees. During a downturn, firms tend to adjust the hours worked by their staff first, before resorting to letting them go.

Turning to the first ‘fact’, our structural decomposition shows that increased employment has had the largest contribution to the change in average hours worked per working-age person since 1995 (figure 2). The persistent increase in employment has come from increased employment amongst older age cohorts and women.\(^3\)

The negative structural contribution reflects an aging population – a larger share of the employed population is transitioning into older age cohorts. These older age cohorts are less likely to be employed, and if they are employed they tend to work fewer hours on average.

Adjustment in hours worked per employee has been a small but persistent drag on average hours per working-age person. Most of the decline in workers’ average hours reflects falls in average hours worked by young male workers.\(^4\)

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\(^3\) Figure B.1. in Appendix B shows the contributions of each age-gender cohort to changes in the number of people employed.

\(^4\) Figure B.2 in Appendix B shows the contributions of each age-gender cohort to changes in average hours worked per employee.
Figure 2: Contribution to the change in weekly average hours worked per person since 1995

![Graph showing contribution to change in weekly average hours worked per person since 1995.](image)

Source: Stats NZ, author estimates.

Setting aside these broader trends in employment and hours, we turn to our second stylised fact. This fact is that over the business cycle, adjustment of average hours worked by employees plays an important role in how the New Zealand labour market responds to recessions and recoveries (figure 3).

Our results show that during a recession average hours worked by employees tend to be reduced first, before firms start letting staff go. The opposite holds true during a recovery, with hours worked by existing employees increasing before firms start bringing on new workers.

Table 1 shows that the contribution of average hours to the cyclical variation in total hours has also increased over time, from around 33 percent pre-1990, to 44 percent post-GFC (table 1).
Figure 3: Contribution to cyclical variation in total hours worked\(^5\)
\(^\text{\% deviation from trend, 4 quarter moving average}\)

Source: Stats NZ, author estimates.
Note: Following Bishop and Plumb (2016) we take logs of each variable, and detrend using the HP filter, with a smoothing parameter of 1600. Grey bars represent start and end dates of recessions, from Hall and McDermott (2016). Due to volatility in the data we take a four quarter moving average. The un-smoothed version of this chart can be seen in appendix B.3.

Table 1: Contribution of employment and hours worked to cyclical variation in hours worked\(^6\)

<table>
<thead>
<tr>
<th>Sample</th>
<th>Employment contribution</th>
<th>Average hours contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986 Q1 – 2019 Q2</td>
<td>62%</td>
<td>38%</td>
</tr>
<tr>
<td>1987 Q4 – 1990 Q4</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>1990 Q4 – 1997 Q2</td>
<td>64%</td>
<td>36%</td>
</tr>
<tr>
<td>1997 Q2 – 2007 Q4</td>
<td>63%</td>
<td>37%</td>
</tr>
<tr>
<td>2007 Q4 - Present</td>
<td>56%</td>
<td>44%</td>
</tr>
</tbody>
</table>

Note: numbers are rounded to the nearest percentage point.

\(^5\) Note: because we have taken a four quarter moving average of the data, the timing of the labour market does not quite line up in figure 2. We present the raw numbers in figure B.3. in Appendix B.

\(^6\) We follow the decomposition outlined in Merkl and Wesselbaum (2010).
6. What do our results mean for the Reserve Bank?

Our results have helped us establish two stylised facts about how firms adjust employment and hours worked:

1) Most of the adjustment in total hours worked in New Zealand has been through increases in the number of people employed since 1995.

2) However, adjustment in average hours worked by employees is an important factor in how firms adjust total hours worked during recessions and recoveries.

By knowing how hours worked have evolved throughout history and over the business cycle, we can make better-informed assumptions regarding the outlook for the labour market and wider economy.

In New Zealand, data on hours worked are more timely than the national accounts, and so analysing changes in average hours worked could provide a timely signal for changes in the economic outlook. For example, if we observe average hours starting to drop below trend, this could be a signal that firms are adjusting the amount of labour they are hiring in response to an economic downturn.

This paper also raises a number of questions that warrant further investigation, including:

- why average hours worked per employee have become more important for cyclical labour market adjustment (table 1);
- whether large changes in average hours worked by employees could be a leading indicator of economic downturns; and,
- why average hours worked by employees have been declining. For example, how do trends in underemployment, and part-time, seasonal, and multi-job employment line up with declining average hours?
References


Appendix A: Mathematical decomposition

A.1. Decomposition of aggregate average hours worked per working-age person

This section provides further detail on how we decompose movements in average hours per working-age person into a contribution from changes in average hours worked per-employee (intensive margin), and changes in the number of people firms employee (the extensive margin). This decomposition is outlined in more detail in Blundell et al. (2011).

Essentially, the decomposition boils down to a simple equation:

\[ \Delta H_t = S_t + B_t \]

Where \( H_t \) is average usual hours worked per person (which we plot in figure 1.c). \( S_t \) is the contribution of structural factors to the change in average hours per working-age person (hours per WAP), which accounts for changes in the structure of the working-age population (Blundell, Bozio, and Laroque, 2011). \( B_t \) is a behavioural component, which captures the extensive and intensive margins.

We calculate \( B_t \) and \( S_t \) for \( j \) male and female age-cohorts, and then sum them together to obtain the aggregate intensive and extensive margin contributions. The calculation for the structural contribution is:

\[ S_t = \sum_{j=1}^{j} H_j t [q_{jt} - q_{jt-k}] \]

Where \( q_{j.t} \) is the population share of cohort \( j \) at time \( t \). The expression accounts for the change in the population share of each cohort between the current quarter, and the base quarter for the decomposition. In our analysis, the base quarter is 1995 Q1.

The calculation for the intensive and extensive margins is:

\[ B_t = \sum_{j=1}^{j} q_{jt-k} \{[h_{jt} - h_{jt-k}] e_{jt} + [e_{jt} - e_{jt-k} h_{jt-k}] \}

Where \( h_{j,t} \) is average hours worked by employees in cohort \( j \), and \( e_{j,t} \) is the employment rate for cohort \( j \). The first term inside the curly brackets is the extensive margin, which accounts for changes in average hours worked, holding employment constant. The second term inside the curly brackets is the extensive margin, accounting for changes in employment rates, whilst holding average hours constant.\(^7\)

\(^7\) Blundell, Bozio, and Laroque (2011) note that the change in total average hours worked can also satisfy the decomposition:

\[ B_t = \sum_{j=1}^{j} q_{jt-k} \{[h_{jt} - h_{jt-k}] e_{jt-k} + [e_{jt} - e_{jt-k} h_{jt-k}] \} \]

We looked at both versions, and the results were almost indistinguishable from each other. Blundell, Bozio, and Laroque (2011) highlight that in order to create the decomposition of the behavioural component (\( B_t \)), they need
Appendix B: Additional charts

B.1: Age-gender cohort contributions to the extensive margin

Figure B.1 shows the contribution of each age-gender cohort to the extensive margin (the blue stacked bars in figure 1). The largest contributions have come from women and older workers. This is consistent with the strong rise in labour force participation rates by these age-gender cohorts, documented in Culling and Skilling (2018), and Callaghan, Culling, and Robinson (2018).

Figure B.1: Contributions to extensive margin

to assume that the measure of the intensive margin has the same sign as the change in average hours worked per worker.
B.2: Age-gender cohort contributions to the intensive margin

Figure B.2 shows the contribution of each age-gender cohort to the intensive margin (the grey bars in figure 1). Some key observations here are that younger people, and men aged 25-54, have seen a persistent decline in average hours worked (the intensive margin), whilst women aged 25 and above have seen a trend increase in average hours.

Figure B.2: Contributions to intensive margin
B.3: Intensive and extensive margin contributions to cyclical variation in total hours

Figure B.3 re-creates figure 2, without using smoothed data. Although the data are quite volatile from quarter to quarter, it is still evident that the hours adjustment occurs before employment.

One issue with filtering our data using the HP filter is that it has well-documented flaws (see Hamilton (2018) for an overview). To help mitigate the end-point problem, we appended the Bank’s forecasts to the data before de-trending. We also carried out the analysis with several different methods, including changing the smoothing parameter in the HP filter and using the filter proposed in Hamilton (2018).

In all our specifications, the overall conclusions were unchanged. That is, the intensive margin was the first to adjust in a recession and in the subsequent recovery.

Figure B.3: Extensive and intensive margin contributions to cyclical variation in hours
total hours (deviation from trend)

Source: Stats NZ, author estimates.

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8 For example Kaiser and Maraval (1999) show that we can append ARIMA forecasts to the data that we are filtering to improve the HP filtering process.