The role of non-participants in labour market dynamics

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NON-TECHNICAL SUMMARY

The unemployment rate fluctuates considerably over the business cycle. Most mainstream macroeconomic models treat movements in the unemployment rate as being driven by flows between two states of labour market participation – employment and unemployment. These models tend to focus on changes in the number of people gaining jobs (becoming employed) or losing their jobs (becoming unemployed). For example, increases in unemployment are usually attributed to more people losing their jobs, fewer people gaining jobs, or some combination.

In this paper, we examine the influence of a third labour-market state – those not in the labour force (or NILF). These are working-age individuals who are neither officially employed or officially unemployed, such as non-working university students, stay-at-home parents, and early retirees. These non-participants are typically absent in macroeconomic models, although they have been gaining increased attention recently.

We explore the role for non-participants in determining labour market outcomes using data on the total number of worker flows between each labour market state, called gross flows. These data are produced by Statistics New Zealand each quarter as part of the Household Labour Force Survey. In this paper, we use these data in three ways:

- We use a standard labour economics tool for decomposing movements in the unemployment rate into the underlying gross flows (for example, how much of a change in unemployment is attributable to fewer people being hired versus more people losing their jobs). We find that flows via non-participation account for about two-thirds of the movements in the unemployment rate. This is much higher than in international studies, suggesting that NILF is an important factor driving New Zealand unemployment and wage rates.

- We use gross flows data to calculate a measure of the number of job-seekers in the economy. As non-participants are able to transition directly into employment, we find that the pool of job-seekers is persistently larger than the number of officially unemployed.

- We explore how non-participants impact wage determination. We do this by using this expanded pool of job-seekers to predict wage growth. We find that the expanded pool of job-seekers provides better forecasts of wage growth than the unemployment rate alone,
suggesting that non-participants play a role in determining wage outcomes.

Overall, we find that non-participants can add significant value to our understanding of labour market dynamics, and should not be ignored.

1 INTRODUCTION

Each quarter, on average, around 18,000 people transition from unemployment to employment and around 24,000 people transition from employment to unemployment. These worker separations and accessions are typically thought of as the fundamental drivers of the unemployment rate – if worker separations exceed worker accessions the unemployment rate will rise, and if worker accessions exceed worker separations the unemployment rate will fall.

However, there is a third state of the labour market – non-participation (often denoted not in the labour force, or NILF) – which is typically omitted from macroeconomic models. NILF refers to those working-age individuals in the economy who are neither officially employed nor officially unemployed (figure 1).

Figure 1: Number of people in each labour market state

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1 We thank Christie Smith, Evelyn Truong, Tugrul Vehbi, and Rebecca Williams for useful comments on this paper. Yuong Ha also provided helpful feedback on an earlier version of the paper.
According to formal economic definitions, non-participants do not take part in the labour market. They do not officially contribute (or seek to contribute) formal labour resources, and so should not impact the equilibrium unemployment rate or wage level.\(^2\) As such, non-participants are traditionally modelled as exogenous to labour market dynamics. More recently, however, there has been a rise in international economic evidence to suggest that non-participants can be ‘active’ in the labour market, which means they play a role in determining labour market outcomes (see, for example, Elsby et al. (2015)).

The role of non-participants comes in two main forms. Firstly, non-participants may determine labour market outcomes indirectly by acting as a potential pool of labour that can erode wage bargaining power. If there is a large number of labour market non-participants in the economy, firms may be less willing to compete for workers by offering higher wages due to the large pool of potential workers. Secondly, non-participants may influence the labour market directly, by transitioning from NILF into employment or unemployment when they desire. In this sense non-participants act as the *marginal workers*, entering the labour force only when competition for workers is sufficiently intense and wages are sufficiently high (Borjas, 2008). As such, when we see large transitions in and out of NILF, it is likely that these non-participants have a material impact on the equilibrium determination of unemployment and wage rates.

The most suitable dataset for analysing labour market dynamics through the lens of transitions between labour market states is gross flows data. These data measure the total number of workers who transition each quarter between each of the three states of labour-market participation – employment (E), unemployment (U), and non-participation (N).\(^3\) Gross flows data highlight churn and labour market dynamism more fully than the stock numbers reported by most statistical agencies (Davis et al., 2006).

Using gross flows data, we (among others) find that movements in and out of NILF occur with high frequency in New Zealand, and that these flows typically follow the broad economic cycle. Figure 2 shows the implied probability (derived from gross flows data) of transitioning in and

\(^2\)According to the labour market definitions used by Statistics New Zealand, the distinction between an unemployed person and a non-participant is that the unemployed person is *actively seeking and available for employment*, while a non-participant is not.

\(^3\)New Zealand has a large literature on gross flows data (e.g. Grimmond (1993) and Irvine (1994)). For a recent discussion of the magnitudes and cyclical properties of New Zealand’s gross flows data see Silverstone and Bell (2011).
out of N to and from E and U.\textsuperscript{4} The movements in these flows suggest that there may be a large role for non-participants in determining labour market outcomes in New Zealand. This role is amplified by the fact that the stock of non-participants is very large; in 2015 there were (on average) 1.1 million non-participants in the labour market. Given this large stock of NILF, even small changes in the probability of non-participants entering the labour market can lead to large changes in the unemployment rate.

Figure 2: Gross flow transition probabilities involving non-participants (annual average)

In this \textit{Note} we investigate the importance of non-participants to labour market developments using gross flows data. We provide three types of evidence which highlight the role of non-participants.

First, we decompose movements in the unemployment rate into their underlying gross flows drivers, using the decomposition approach developed by Shimer (2007) for the USA and Elsby et al. (2011) for the UK. We find that flows via NILF (termed ‘indirect’ flows) account

\textsuperscript{4}The correlations with the output gap (from the Bank’s August 2016 \textit{Monetary Policy Statement}) for different NILF flows are as follows – NE: 0.61; NU: -0.71; EN: 0.07; UN: 0.35.
for two-thirds of the variation in the New Zealand unemployment rate, which suggests that non-participants are influencing the labour market by transitioning into and out of the labour force.

Second, we calculate the participation margin of non-participants who may be able to enter the labour force (Elsby et al., 2015). The existence of a participation margin means that the pool of job-seekers is larger than the pool of unemployed, as some workers are able to enter employment directly from non-participation. This participation margin is likely to be relatively large in New Zealand, given that the typical flows in and out of labour market non-participation are larger in New Zealand than in most other countries. The gross flows decomposition we use allows us to compute this participation margin and to derive a gross-flows-based time-series of job-seekers that incorporates those non-participants who may enter the labour force.

Third, we look at how non-participants influence wages. We use two techniques (one based on in-sample fit, one on out-of-sample prediction) to show that the NILF-adjusted pool of job-seekers explains and forecasts wage growth better than the number of unemployed alone.

The rest of the paper is organised as follows. Section 2 provides a brief overview of the model used to decompose the gross-flows drivers of the unemployment rate. Section 3 presents results of the decomposition, showing the relative importance of direct flows between E and U and indirect flows via non-participation. Section 4 uses the indirect flows from the decomposition to refine the pool of job-seekers in the economy, and shows that this pool is larger than the number of unemployed. Section 5 looks at the importance of non-participants to wage determination. Section 6 concludes.

2 Decomposing the unemployment rate

The most intuitive way of exploring the role of non-participants in determining the unemployment rate is to decompose the movements in unemployment into their gross flows drivers. The type of decomposition we use in this paper is standard in the economic literature – an early example of this type of decomposition can be found in Abowd and Zellner (1985). The decom-

°The typically-assumed path from N to E would go: N (i.e. not seeking employment) ⇒ U (i.e. seeking, but no job) ⇒ E. The participation margin is the group of non-participants who directly transition from N to E.
position allows us to determine how much of the variation in the unemployment rate is driven by the gross inflows to and outflows from unemployment. The early two-state decomposition model developed by Abowd and Zellner (1985) assumes that an individual can only be either employed or unemployed at a given point in time. We follow the more-comprehensive three-state model of Elsby et al. (2011). The three-state model incorporates non-participation explicitly as a labour market state, which allows us to comment on the importance of NILF to labour market dynamics.

In the model, the change in unemployment over a given quarter is made up of the number of people leaving unemployment to each of employment and NILF, and the number of people entering unemployment from each of employment and NILF. We can express these numbers using gross flows data. Following the notation choice of Elsby et al. (2011), we use $\lambda_{ij}^t$ to denote the probability of an individual in labour market state $I$ transitioning to labour market state $J$ in period $t$ (calculated from the gross flows data). Thus, the change in employment can be expressed in terms of the people transitioning from E to U ($\lambda_{EU}^t E_t^t$, that is, the probability of transitioning from E to U, $\lambda_{EU}^t$, multiplied by the total number of people in employment in that quarter, $E_t$) plus the people transitioning from N to U ($\lambda_{NU}^t N_t$) minus the people who transition from U to each E and N ($\lambda_{UE}^t U_t$ and $\lambda_{UN}^t U_t$). Shimer (2007) thus gives the law of motion for unemployment as

$$\Delta U_{t+1} = \lambda_{EU}^t E_t + \lambda_{NU}^t N_t - \lambda_{UE}^t U_t - \lambda_{UN}^t N_t$$

The contributions from each of four labour market transitions can be derived from this law of motion. Two of the transitions are direct – there is the transition straight from E to U (direct job separation) and from U to E (direct job finding). Due to the three-state nature of the model, we can also identify the indirect transitions, which come via a period of non-participation. The flow between E and U via a period of non-participation is known as indirect job separation, and the flow between E and U via a period of non-participation as indirect job finding. It is these

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6Strictly speaking, the model decomposes movements in the steady-state unemployment rate – the rate that would prevail in the long run given the current inflows to and outflows from unemployment. We find that movements in the steady-state unemployment rate are almost identical to movements in the realised unemployment rate, and so we are confident that our decomposition explains movements in the actual unemployment rate too. See Appendix A for technical details of the concept of the steady-state unemployment rate.

7Elsby et al. (2011) details the derivation of the contributions.
indirect flows via non-participation that we will focus on – the relative importance of these flows in the decomposition shows the role of NILF in determining labour market outcomes.

3 THE ROLE OF NON-PARTICIPATION IN UNEMPLOYMENT RATE FLUCTUATIONS

Figure 3 shows the decomposition of movements in the unemployment rate since 1986Q3. The black line shows the percentage-point deviation in the unemployment rate from its level in 1986Q3, and the bars show the contributions from each of the four transitions identified above. Different economic cycles have different gross-flows drivers – for example movements since the mid-2000s have been predominantly driven by indirect flows (particularly indirect job separation), while the cycle in the early 1990s was driven more equally by all four drivers.

Figure 3: Unemployment rate decomposition

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8 The Household Labour Force Survey started in 1986Q2, and the decomposition process involves taking a 1-quarter difference, so the first possible date of decomposition is 1986Q3. Some of the Survey definitions were revised in June 2016 (see Statistics New Zealand (2016)) – we use the most recent (post-revision) vintage of data.

9 As discussed above, the deviations are in the steady-state unemployment rate, not the realised unemployment rate. The similarity of the movements between the two series means that the contributions are equally applicable to the realised unemployment rate. However, as the decomposition is approximate, the sum of the contributions will not always be identical to the deviation in the unemployment rate.
As well as allowing us to examine the gross-flow drivers of particular cycles, this type of unemployment decomposition allows us to comment on the long-run gross-flow drivers of unemployment in New Zealand. That is, we can answer the question what is the contribution of each gross flow driver to movements in the unemployment rate over the business cycle? We use a variance decomposition to determine how much of the long-run movements in the unemployment rate are explained by each of the four gross-flows contributions. These shares are shown in table 1.

Table 1: Proportion of unemployment variance by gross flow variable\(^{10}\)

<table>
<thead>
<tr>
<th>Direct</th>
<th>Indirect (via NILF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.5</td>
<td>65.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Separation</th>
<th>Finding</th>
<th>Separation</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0</td>
<td>2.5</td>
<td>50.0</td>
<td>15.9</td>
</tr>
</tbody>
</table>

In total, indirect flows via non-participation contribute 65.9 percent of the variance in the unemployment rate in New Zealand. Indirect job finding (that is, people transitioning from unemployment to employment via a period of NILF) is the largest contributor, alone accounting for half of New Zealand’s unemployment rate fluctuations. The role of indirect flows in New Zealand is much larger than in other countries. For example, Shimer (2007) finds that direct flows account for about three quarters of unemployment fluctuations in the US, and indirect transitions for only one quarter. Elsby et al. (2011) find that flows via non-participation account for only 9.5 percent of unemployment fluctuations in the UK.

The relative importance of indirect flows in New Zealand likely reflects the high incidence of flows into and out of non-participation in the New Zealand labour market relative to other countries. In New Zealand, the average quarterly transition probability from E to N is 5.5 percent and from U to N is 31.2 percent. By contrast, the transition probabilities in the United States are 2.7 percent and 23.3 percent respectively (Davis et al., 2006) and in the United Kingdom are 1.9 percent and 18.1 percent (Gomes, 2012). A similar divergence is seen in transitions out of non-participation: New Zealand’s N to E transition probability is 7.5 percent and N to U transition probability is 3.7 percent, versus 4.8 percent and 2.4 percent in the US (Davis et al., 2006) and 6.2 percent and 4.9 percent in the UK (Gomes, 2012). The high prevalence of flows

\(^{10}\)As the decomposition is approximate, these values will not sum to 100.
in and out of NILF in New Zealand suggests that those referred to as inactive (non-participants) are in fact rather active in labour markets.\footnote{The reasons why these flows are so high in New Zealand is outside the scope of this paper.}

The large contribution from non-participation relative to from direct flows likely also reflects the size of the pool of non-participants relative to the pool of unemployed. On average over the past decade, the number of working-age New Zealanders defined as non-participants (that is, not in the labour force) each quarter is about 1.1 million. By contrast, the average quarterly number of unemployed people over this period is about 130,000. Given the relative size of the two pools, even very small changes in transition rates in and out of NILF can have large implications for the other labour market states.

### 3.1 Job Finding versus Job Separation

We can also use our decomposition to differentiate between job separations and job finding as drivers of unemployment fluctuations. In this regard, our findings are largely in keeping with international evidence. We find that most (almost 80 percent) of the variation in the unemployment rate is driven by job separation. That is, when the unemployment rate rises, it is more likely to be because more people are losing their jobs than because fewer people are finding jobs. Internationally, Elsby et al. (2011) find that 71.1 percent of UK unemployment variance comes from changes in separations, and 30.2 percent from changes in the job finding. Fujita and Ramey (2009) and Solon et al. (2009) each build on the Shimer (2007) decomposition of the unemployment rate for the United States, and find that about half of unemployment fluctuations are attributable to changes in job separation.

### 4 Refining the Pool of Job-Seekers

Given the high importance of non-participants in determining movements in the unemployment rate, it is useful to consider the dynamics of employment search by those classed as non-participants. Strictly speaking, it should be the case that the pool of job-seekers in an economy
is exactly equal to the pool of unemployed, as non-participants who are seeking employment should be more-accurately classified as unemployed.

We find that adjusting for indirect flows in and out of non-participation reveals a much larger pool of job-seekers than just the unemployed. Adjusting for this difference involves deriving the total number of job-seekers from gross flows job finding rates and realised employment gains. Formally, if the gross flows job-finding rate is given by \( f_t^{12} \), the refined pool of job-seekers is given by \( \frac{U_E_t + N_E_t}{f_t} \) where \( U_E_t \) and \( N_E_t \) are the numbers of gross worker flows from U to E and N to E. Figure 4 shows the size of this pool, along with the number of unemployed, since 1986Q2.

Figure 4: Estimated pool of job-seekers and the number of unemployed

Our measure of the pool of job-seekers – which accounts for seekers in the NILF category – is persistently larger than the number of unemployed. On average, the pool of job-seekers is about 12,000 people larger than the pool of unemployed, which represents an increase of about 10 percent of the pool of unemployed. This difference reflects the participation margin described above – some non-participants are able to transition directly into employment when conditions suit them. The existence of a large participation margin suggests that some non-participants are in fact ‘active’ in the labour market, and provides another reason why there is a significant role for non-participants in labour market outcomes.

\(^{12}\)As defined in Appendix A.
5 THE ROLE OF NON-PARTICIPANTS IN WAGE DETERMINATION

The final section of this paper considers the role of non-participants for wage dynamics. Given the importance of non-participants in determining fluctuations in the unemployment rate and in establishing the wider potential pool of labour resources, it is natural that non-participants may also influence wage growth. In order to test this hypothesis, we conduct two tests of wage forecasting – one in-sample and one out-of-sample.

5.1 IN-SAMPLE PHILLIPS CURVE SPECIFICATION

The in-sample test involves fitting two wage Phillips curves, one using the number of unemployed as our measure of labour market slack, and the other using the number of people in the expanded pool of job-seekers. The estimated Phillips curve specification is

\[ w_t = \beta_0 + \beta_1 X_{t-2} + \epsilon_t \]

where our wage growth measure \( w \) is annual growth in average hourly private-sector ordinary-time earnings from the Quarterly Employment Survey and \( X \) is each of our slack measures.\(^{13}\) The models were estimated with ordinary least squares over the sample 1987Q1 to 2016Q2. Table 2 shows the Akaike Information Criterion (AIC) of the two models.\(^{14}\) A lower AIC corresponds to a better model. Thus, we conclude that the extended pool of job-seekers provides a better in-sample prediction of wage growth.

| Table 2: AIC statistics of different wage Phillips curve specifications\(^{15}\) |
|-----------------|-----------------|
| Unemployed      | Job-seekers     |
| 146.8           | 123.6           |

\(^{13}\)The choice of a two-quarter lag on \( X \) was chosen on the criterion of maximising \( R^2 \); the findings were robust to different lag selections.

\(^{14}\)We use the original AIC statistic from Akaike (1974), with the finite-sample correction put forward by Cavanaugh (1997).

\(^{15}\)As a robustness check, we also estimated the model with an AR(1) wage term included: \( w_t = \beta_0 + \beta_1 X_{t-2} + \gamma w_{t-1} + \epsilon_t \). In this case, given the persistence in wage growth, neither the number of unemployed nor our measure of job-seekers significantly contributed to the fit of the model. Thus, we conclude that the more useful test of the
5.2 Out-of-sample wage forecasting

The out-of-sample test involves forecasting wage growth using a pseudo-out-of-sample forecasting exercise. In particular, we estimate the following forecasting model

\[ w_{t+h} = \beta_0 + \beta_1 X_t + \epsilon_t \]

where, again, our wage growth measure \( w \) is the Quarterly Employment Survey measure and \( X \) is each of our slack measures. We use an expanding estimation window starting with the 20 quarters between 1986Q2 and 1990Q2 and expanding to the full sample of 121 quarters from 1986Q2 to 2016Q2. Direct forecasts are generated for \( h \) between 1 quarter and 8 quarters.\(^{16}\) For each horizon, for each slack measure, and for each estimation window, the forecast error was computed and retained. These were turned into a root mean square forecast error (RMSFE) for each model and for each horizon – a lower RMSFE indicates a superior model. Table 3 shows the RMSFEs for each model, and figure 5 shows the RMSFEs for the job-seekers (NILF-adjusted) model relative to the model with just the number of unemployed – a value below 1 means that the NILF-adjusted model outperforms the unemployment model.

Table 3: Root mean square forecast errors for each slack measure

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Unemployed</th>
<th>Job-seekers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.20</td>
<td>1.68</td>
</tr>
<tr>
<td>2</td>
<td>1.74</td>
<td>1.34</td>
</tr>
<tr>
<td>3</td>
<td>1.35</td>
<td>1.13</td>
</tr>
<tr>
<td>4</td>
<td>1.13</td>
<td>1.06</td>
</tr>
<tr>
<td>5</td>
<td>1.15</td>
<td>1.09</td>
</tr>
<tr>
<td>6</td>
<td>1.22</td>
<td>1.19</td>
</tr>
<tr>
<td>7</td>
<td>1.39</td>
<td>1.22</td>
</tr>
<tr>
<td>8</td>
<td>1.48</td>
<td>1.27</td>
</tr>
</tbody>
</table>

At each horizon, the model based on the pool of job-seekers provides a more accurate out-of-sample forecast than does the model based on the number of unemployed. This suggests that two series as a measure of slack is the baseline specification (no AR term) we used.\(^{16}\) 8 quarters was selected as the maximum forecast horizon because monetary policy is assumed to have its greatest impact over medium-term horizons of about 2 years.
the job-seekers pool is a useful alternative measure of the potential labour market, and that labour market non-participants have an influence on wage determination.

6 Conclusion

This paper has presented a novel use of gross flows data in the New Zealand context, investigating the effect that those not in the labour force have on labour market outcomes. We find strong evidence that non-participants have a large impact on labour market dynamics, based on three types of evidence.

Firstly, we decompose the movements in the unemployment rate into contributions from gross flows between states of labour force participation, and show that indirect flows (that is, flows via non-participation) account for about two-thirds of the variation in the unemployment rate.

Secondly, we use gross flows data to construct an alternative measure of labour market slack – the pool of job-seekers, which captures the potential labour supply from non-participation as
well as those officially unemployed. We find that the pool of job-seekers is about 12,000 people larger than the number of unemployed (on average), which suggests that non-participants are transitioning into the labour force with reasonable frequency.

Finally, we investigate the impact of non-participants on wage determination. We find that the NILF-adjusted pool of job-seekers provides better forecasts for wage growth than the number of unemployed, in both in-sample and out-of-sample tests.
REFERENCES


APPENDIX A  DETAILS ON THE STEADY-STATE UNEMPLOYMENT RATE

The steady-state unemployment rate can be calculated each quarter as the rate that would prevail in the long run given the current inflows to and outflows from unemployment (derived from gross flows data). Intuitively, if this rate were achieved in the economy, there would be no forces (in the absence of shocks) pushing the economy away from that rate.

Following Elsby et al. (2011), the steady state unemployment rate is calculated by

\[ u^*_t = \frac{s_t}{s_t + f_t} \]

where

\[ s_t = \lambda^{EU} + \lambda^{EN} \times \frac{\lambda^{NU}}{\lambda^{NU} + \lambda^{NE}} \]

is the job separation rate

\[ f_t = \lambda^{UE} + \lambda^{UN} \times \frac{\lambda^{NE}}{\lambda^{NU} + \lambda^{NE}} \]

is the job finding rate

\[ \lambda^{IJ} \]  is the gross flows transition probability from state I to state J

We use gross flows data to calculate New Zealand’s steady-state unemployment rate. Although there are some small differences between the unemployment rate and its steady state, the movements in the two series are very similar (figure 6). This similarity between the realised unemployment rate and its steady state makes sense from the following perspective: as the unemployment inflow and outflow rates vary over the business cycle we would expect realised unemployment to fluctuate. At the same time, as these inflow and outflow rates determine the steady state, we would expect it to display similar fluctuations. The similarity in movements means that although the model we use decomposes the steady-state unemployment rate rather than the actual unemployment rate, we can be confident that the conclusions of our gross-flows decomposition are applicable to the actual unemployment rate as well.

\[ ^{17}\text{The contemporaneous correlation between the two series is 0.97, and all of the cyclical peaks and troughs occur at the same times.} \]
Figure 6: Unemployment rate and steady-state