Reserve Bank of New Zealand Analytical Notes

Job-to-job flows and inflation:

Evidence from administrative data in New Zealand

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NON-TECHNICAL SUMMARY[1]

Job-to-job flows, characterised as the number of workers moving from one job to another without a spell of unemployment, have attracted renewed attention in the academic, and policy literature in recent years. In this note, I use the administrative Linked Employee and Employer Data (LEED) to create novel measure of job-to-job flows for New Zealand, and then examine their forecasting performance for non-tradable inflation and wage growth in New Zealand. Job-to-job flows outperform other measures at every forecast horizon. In this note, I also argue that job-to-job flows are an indirect measure of 'marginal cost', and deserve closer attention in understanding inflation dynamics. Job-to-job flows have been increasing very slowly since the recession of 2008-2009, and this is one contributing explanation for the low wage growth and inflation outcomes observed in recent years.

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1. Introduction

Job-to-job flows, which measure the people who move from one job to another without a spell of unemployment, have attracted renewed interest from macroeconomists in recent times. These flows are an important labour market transition/adjustment that are not captured very well by commonly-used models of labour market frictions. For example, in standard search and matching models unemployed individuals are assumed to be the only people who search over vacancies and thus are the only available labour for vacancies. In these models the tightness in the labour market is primarily characterised by the ratio of vacancies to unemployed. However, the presence of on-the-job-search, people who are currently employed searching over jobs, adds an additional dimension to labour market tightness, which is not captured in standard search and matching models.[2]

In this note I first summarise the theoretical and conceptual reasons why job-to-job flows might be a good indicator of marginal cost, and hence inflationary pressures. I then use previously unexplored data for New Zealand and show that job-to-job flows are a strong predictor of the non-tradables (domestic) inflation, and the wage growth in New Zealand. This evidence is novel for New Zealand and is in line with recent US evidence (Karahan et al 2018 for example).

This paper is also related to a recent monetary policy issue in New Zealand. Namely, that inflation and wage growth outcomes have been persistently below the inflation target, despite what appears to be a (relatively) strong labour market. The current paradigm of monetary economics often focuses on the inverse relationship between a measure of economic slack and inflation. Wages are one mechanism enabling this inverse relationship: as the labour markets get tighter, wages rise, subsequently increasing non-tradable inflation, where the tightness in the labour market is measured by the unemployment rate, the unemployment gap or the output gap. However, given the larger size of job-to-job flows compared with changes in unemployment, and the stronger link between these flows and wage growth, these other slack measures might be missing a very important element in inflation dynamics. Job-to-job flows have risen only gradually in recent years, and have not reached their pre-recession levels for example.

The remainder of this note is structured as follows: section 2 discusses the conceptual link from job-to-job transitions to wages and inflation. Section 3 discusses the New Zealand data. Section 4 provides empirical results, and section 5 concludes.

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[2] This issue was in fact raised by Nobel laureate James Tobin back in 1972 in his presidential address to the American Economics Association. He criticised the assumption that the unemployed are the only job searchers – that workers who wished to change jobs would first quit into unemployment in order to search another job. Instead, Tobin suggested that a much more attractive avenue would be on-the-job-search, which has now become a more common feature of search and matching models.

2. Job-to-job flows – Some theory and international evidence

In early search and matching models vacancies posted by firms could only be filled by people who are unemployed. However, people who are employed also search for jobs, commonly termed on-the-job search. Fallick and Fleischman (2004) show that in the United States 40 percent of all vacancies are filled in by people who were employed in another job. Mukoyama et al (2018) show that in the US only 16 percent of the people that quit their jobs are next classified as unemployed while the rest move to other jobs (or not in labour force).

In a recent paper, Faberman et al (2017) show that workers who engage in on-the-job search on average receive more job offers compared with people either in unemployment or not in the labour force. Moreover, Faberman et al (2017) also show that workers who engage in on-the-job search receive on average higher wage offers.

One important feature of job-to-job flows is that they are pro-cyclical, which arises for two reasons. First, people who switch jobs tend to earn higher wages. Thus job-to-job flows tend to be positively correlated with higher aggregate incomes. Second, the number of job opportunities are greater during expansions. Expansions not only provide more job opportunities but also higher-quality job opportunities. During a tighter labour market employers are more willing to offer higher wages to attract new workers. In return, these higher wages attract more people to seek for new jobs. Therefore one would expect the number of on-the-job searchers to rise during expansions.

Conversely, recessions are associated with more slack in the labour market. There are fewer jobs, and more unemployed. Consequently, workers have significantly less bargaining power. Hence they are more likely to settle for lower wages, and lower-quality jobs with less secure tenure. This so-called "sullying" effect of recessions can lead to lower productivity as more workers become stuck in jobs to which their skills are poorly matched.

Evidence for the pro-cyclicality of search effort in New Zealand comes from the Household Labour Force Survey (HLFS). Question 26 in the HLFS asks: 'At any time in the last four weeks have you been looking for another job?' By examining responses to this question, Bell and Silverstone (2011) argue that job-search effort is pro-cyclical, and on average between 8-10 percent of all persons employed claim to be job-searching.

Wage growth and inflation are the outcome of interactions between workers and firms. Workers seek to maintain or increase the real value of their wages and firms try to maintain profits responding to changes in the cost of production among other factors. Wages feed into marginal costs, which are a key determinant of firm profits. Consequently, they also affect the price setting behaviour of the firms, as firms adjust revenues by changing prices. Current and expected future marginal costs are crucial for determining inflation since not all prices and wages can be adjusted every period in

response to economic shocks. So, inflation and nominal wage growth tend to move together and can reinforce each other further.

A sticky-price theory of inflation implies that inflation should equal a discounted stream of expected future marginal costs (Gali and Gertler 2001). Given that wage costs are an important component of marginal cost and they feed into prices by this virtue, the next question is then whether we can single out a proxy or a measure of marginal cost when faced with the large set of information on wages across the labour market flows. In this note, I argue that the wages that on-the-job searchers extract are a far better indicator of marginal cost compared to the wages of the unemployed who are assumed to fill in the "marginal vacancy". This follows from the following three observations: 1) Job-to-job flows are much larger than UE flows, and in that sense are a more important determinant of labour market tightness, 2) on-the-job searchers are able to extract higher wages for a similar job as they have better bargaining power, and 3) JJ flows create a cascade of additional vacancies (the chain effect of Akerlof, Rose and Yellen 1988).

In addition, increases in wages enable workers to demand more goods and services, increasing prices. This reinforces the link between the growth rate of wages and prices. Consequently, if job-to-job flows impact wages, then they should also affect the cost of production, and hence inflation.

3. Data

In New Zealand, the main source of data for gross labour flows in New Zealand is the quarterly Household Labour Force Survey (HLFS). Unfortunately, the HLFS does not include information about job-to-job flows.[3] I use the administrative Linked Employer and Employee Data (LEED) to capture job-to-job flows. Because the LEED links employees and employers, workers who switch firms and who stay in same firms can be observed. An employee who is observed to be with the same employer in two consecutive quarters is classified as a "continuing" employee. An employee who is found to be with two different employers in two consecutive quarters is classified as a "job-to-job" flow. Finally, an employee who appears in the LEED in one quarter and did not appear in the previous quarter is classified as a "new" employee. New employees could be coming from not in labour force, unemployment or from outside the country (migrants, or a returning New Zealanders). From LEED, it is also possible to extract the wages of each of these groups and their percentiles.

Table 1 below presents the average gross flows between 2001 and 2016. Working age people fall into one of three categories: they are employed (E), unemployed (U) or not in labour force (N). On average, every quarter 24,000 people moved from unemployment (U) to employment (E), while 17,000 people moved from employment (E) to

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[3] For a recent analysis of gross flows in New Zealand, see Bell and Silverstone (2011), and Armstrong and Karagedikli (2017).

unemployment (U) over this period. The column employed-to-new-job (JJ) reveals that on average 150,000 people moved from one job to another. This flow is much bigger than the other cross-flows combined (though EE and NN flows are larger).

Table 1. 2001-2016 averages of gross labour flows (000s)

		Status at t+1			
		E		U	N
Status at t	E	1451		17	63
		JJ	EE		
		150	1301		
	U	24		24	25
	N	60		29	695

Note: *JJ comes from the LEED while the other flows come from the HLFS. For that reason the total employment numbers in these two sources may not be identical. E=employed. U=Unemployed. N=Not-in-the-labour-force. EE=Employed-to-employed-in-same-job. JJ=Employed-to-new-job (job-to-job).*

The largest labour flow is from employment to employment. Within this category, the job-to-job flows represent on average around 12 percent of the total employment-to-employment flows. The total number of people changing jobs is greater than the total number of people going in and out of unemployment, and significantly greater than the net change in unemployment (measured by the change in level of unemployment). Job-to-job flows are therefore more likely to capture dynamism or churn in the labour market. At the same time though, a job-to-job transition is more likely to happen when firms are competing aggressively for a limited pool of workers. Thus, job-to-job transfers are pro-cyclical.

The United States literature suggests that people in JJ on average receive more job offers, and higher-paying job offers than people looking for employment while in U and N categories. It is clear from table 1 that JJ flows are an important transition into (new) employment. Shortly, I investigate how important these flows are for non-tradable inflation and wage growth.

Figures 1-3 present the data that will be used later in forecasting analysis of non-tradable inflation. Figure 1 below shows job-to-job flows (JJ) as a percentages of continuing employees. The figure suggests that there was significantly more job switching prior to the 2008-2009 recession (between 11 and 12 percent of continuing employees) in New Zealand. Although job switching has recovered somewhat over the past two years it has been slow and has not reached its previous peak.

Figure 2 shows the ratio of the "JJ" to "New" employees from the LEED. It suggests that

a significant part of the employment growth in recent years is coming from new employees. These new employees may be people who were previously in N or U categories. They could also be new migrants or returning New Zealanders. Unfortunately, with the macro data available I cannot separate them out. These "new" entrants to the labour market are likely to have less bargaining power than job-switchers (JJ), and this is one explanation why wage growth in New Zealand has been relatively slow despite strong employment growth. Moreover, the chain effect of Akerlof et al (1988) is not as strong when new vacancies are filled in by new employees, leading to slower JJ flow and slower wage growth.

Figure 3 shows the average quarterly wage growth of the JJ flows and the continuing employees at different deciles. P_10, for example, refers to the tenth percentile or the first decile. This figure suggests that in the lower half of the wage distribution JJ workers received markedly higher wage growth relative to continuing workers. This is probably partly due to compositional effects. For example, younger and less experienced people are more likely to be in the lower half of the wage distribution, and are more likely to move between jobs as they climb up the job ladder.

Figure 1. Job-to-job flows as a percentage of Continuing employees
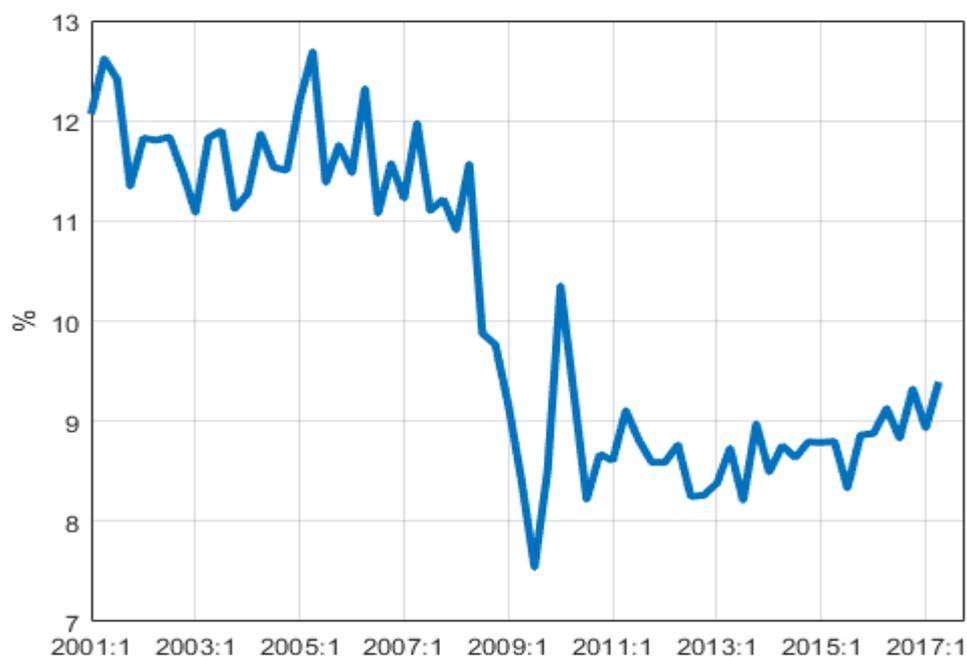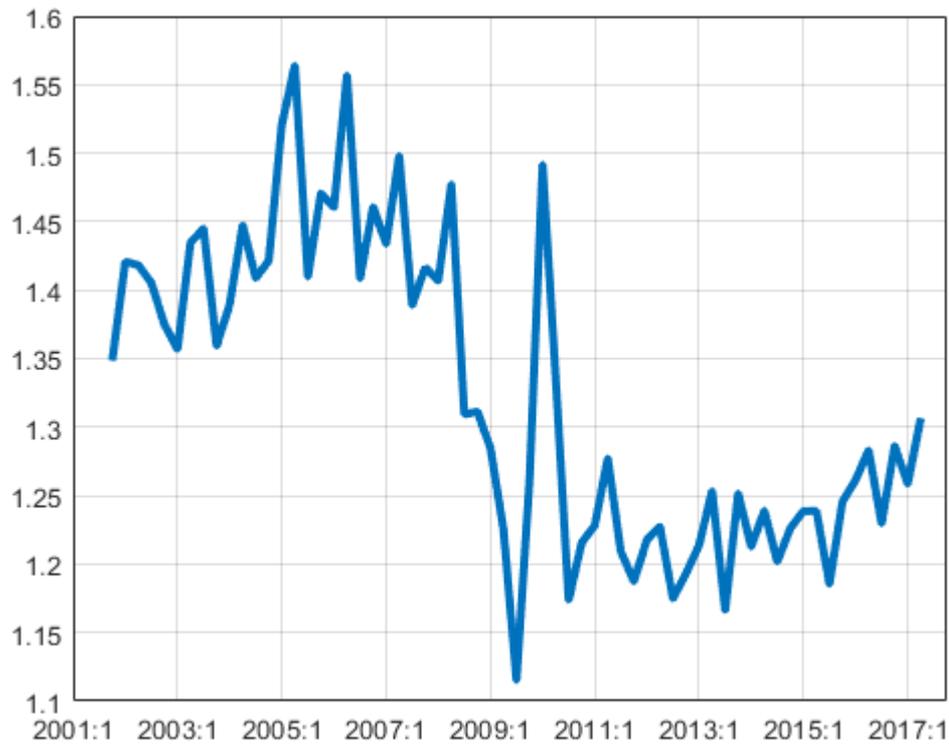
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Figure 2. The ratio of Job-to-job flows to New employees from the Linked Employer Employee Data (4-quarter moving average)

Note: *Because of strong seasonality in the "New" category, I took a four-quarter moving average of it before taking the ratio of JJ to New.*

The correlation coefficients between JJ flows and the other cyclical indicators such as the unemployment rate, output gap and non-tradables inflation are very strong. At the same time, the JJ flows seem to have predictive power over and above the lags of some key macro variables. Table 2 shows the Granger-causality tests between JJ and some other key cyclical variables such as the unemployment rate, the output gap, wage growth and non-tradable inflation. JJ flows Granger-cause all these variables with the exception of the unemployment rate.

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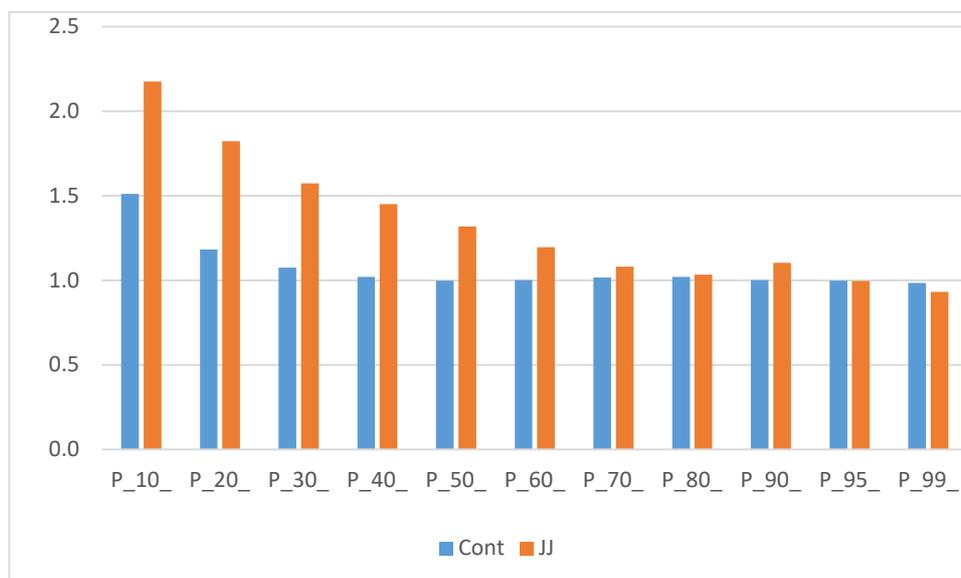Figure 3. Quarterly nominal wage growth of JJ and Continuing Employees at different percentiles

Table 2: Granger-causality tests

X	*JJ* Granger-causes *X*	*X* Granger-causes *JJ*
Unemployment rate	No	No
Output gap	Yes	Yes
Unemployment gap	Yes	Yes
Wage inflation	Yes	No
Non-tradeables inflation	Yes	No

4. Forecasting inflation

In this section, we conduct a simple forecasting exercise where we compare the forecasting performance of JJ with some other indicators of inflationary, wage pressures. More specifically, we estimate and forecast with the following equation:

$$\pi_{t+h} = \alpha + \beta \pi_t + \alpha X_{i,t} + \varepsilon_{t+h}$$

π_{t+h} is quarterly non-tradables (domestic) inflation, (or the quarterly nominal wage growth) at time period *t+h*. This left-hand side variable is a function of the past inflation rate (or wage growth), and a measure of cyclical pressure measure, $X_{i,t}$. α and β are parameters in the regression, and ε_{t+h} is the error term.

The measures of cyclical pressure that I use are the headline unemployment rate; a measure of the unemployment gap; the output gap; and JJ flows as a proportion of continuing employees.[4] (The unemployment and output gaps are from the RBNZ.)

Because of the sample is short, with a total of 66 observations, in order to account for potential breaks, I start estimation with a window of 20 observations which then leaves 48 observations for the forecast evaluation. I increase the window size by five observations at a time up to 45. In other words, I conduct the estimation and the forecast evaluation with six different samples.

In every one of these windows, the JJ measure of cyclical pressure outperforms the three other measures of slack in forecasting inflation. The statistical significance of the forecast performances depends on the horizon, and the window we use. However, the statistical significance is the case in most horizons in every single window.

In figures 4a and 4b below I show the (RMSE) from the estimation window that starts with 25 observations as the benchmark results. However, the other results are very similar, and are available upon request. Our quasi-real time estimation window starts with the 2001Q1 – 2007Q1 sample, and ends in 2017Q2 when the LEED data ends. This gives a forecast evaluation sample of just over ten years. The forecast performance of the different cyclical measures is tested using the Diebold-Mariano test, with the unemployment gap as the baseline measure of slack. A full circle indicates a statistical significance at 1 percent, an empty circle indicates statistical significance at 5 percent level, and an empty square indicate statistical significance at 10 percent level.

Figure 4a below plots the relative RMSEs (relative to the unemployment gap) for the quarterly non-tradables inflation. Figure 4 reveals that JJ flows are significant at every horizon except 4, 6, and 11 quarter ahead horizons, and they beat every other indicator. The improvement is around 10 percent on average. However, since the LEED data is not timely and comes with a lag of 4 quarters, it should be noted that the horizons up to $h=4$ show the forecasting performance of the JJ flows that would have been achieved if the data arrived in a timely manner.

Figure 4b below plots the relative RMSEs (relative to the unemployment gap) for the quarterly nominal wage growth. Forecast performance improves around 10-15 percent relative to the unemployment gap, depending on horizon.

These results suggest that JJ flows have forecasting ability for both domestic inflation and the nominal wage growth. This is, at the very least, suggestive of the contribution that JJ flows can provide in understanding inflationary and wage pressures.

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[4] Whether I normalise the JJ with continuing employees, total employment or the labour force makes no difference to the results.

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Figure 4. Forecasting performance for quarterly non-tradable inflation
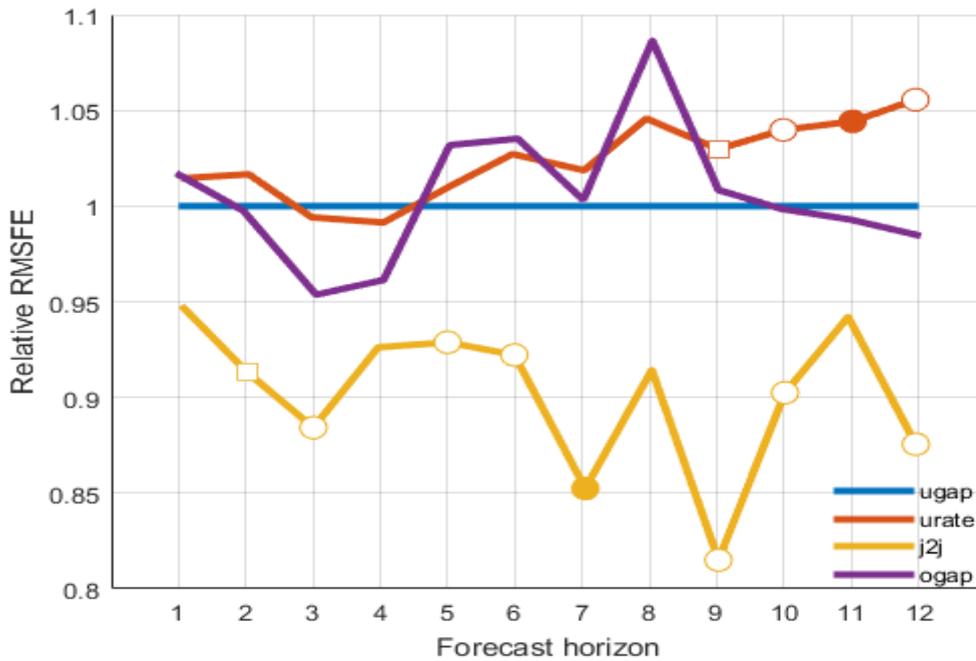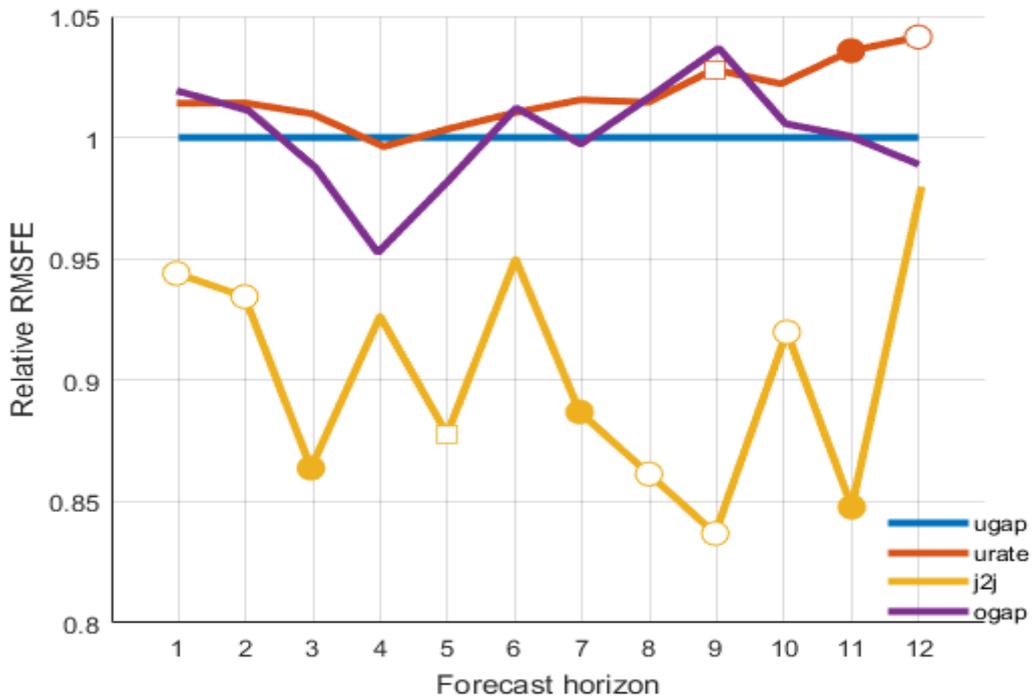
Note: *RMSFEs are relative to the unemployment gap (ugap). A value less than 1 indicates superior forecast performance. ugap= unemployment gap (RBNZ), urate=unemployment rate (Statistics New Zealand), j2j=job-to-job flows to continuing employees ratio, ogap=output gap (RBNZ).*

5. Conclusions

The macro-labour United States literature has focused attention on the gross, and job-to-job flows. In this note, I introduce a previously unexplored data set in New Zealand, namely the job-to-job flows from the Linked Employer and Employee Data available from Statistics New Zealand. This data set is very rich, and offers many attractive features to understand labour markets and inflation dynamics in New Zealand. Unfortunately, it is currently only available with a 4 quarter lag. This paper is a first attempt to evaluate the usefulness of this administrative data from New Zealand in forecasting inflation and wages.

This paper also sheds light on a recent monetary policy issue in New Zealand, namely that inflation and wage growth have been persistently subdued, despite what appears to be a (relatively) strong labour market. This paper argues that the low JJ flows help to explain low inflation and wage growth in recent years. Empirically, I find that job-to-job flows are the best forecaster of non-tradables inflation relative to other measures of cyclical pressure. In addition, it appears that more of the recent hiring in the recent years are coming from new employees (either from unemployed, not in labour force or migration), who potentially have lower wage growth relative to employed workers who transition from jobs-to-jobs. More recently, the JJ flows have started picking up towards the end of the sample. Unfortunately, the long publication lags of this data hinder their timely use for monetary policy decision-making.

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