



# Jobs Online Background and Methodology

DECEMBER 2009



## Acknowledgements

The Department of Labour gratefully acknowledges the support of our partners in *Jobs Online*



heraldjobs.co.nz

**Disclaimer:** The Department of Labour has made every effort to ensure that the information contained in this report is reliable, but makes no guarantee of its accuracy or completeness and does not accept any liability for any errors. The Department may change the contents of this report at any time without notice.

ISBN: 978-0-478-33397-8

© Crown copyright December 2009

This material is Crown copyright unless otherwise stated and may be reproduced free of charge without requiring specific permission. This is subject to it being reproduced accurately and not being used in a derogatory manner or in a misleading context. The source and copyright status should be acknowledged. The permission to reproduce Crown copyright protected material does not extend to any material in this report that is identified as being the copyright of a third party.

Department of Labour  
PO Box 3705  
Wellington  
New Zealand  
[www.dol.govt.nz](http://www.dol.govt.nz)

## Contents

Foreword.....	3
Introduction.....	4
Outline of the report structure.....	5
Definitions.....	5
Methodology.....	7
Receiving the data.....	7
Processing the data.....	7
Business rules.....	7
Quality control.....	8
Trend series and seasonal adjustment.....	8
The labour market overall.....	9
Vacancies for skilled occupations.....	10
Vacancies by region.....	11
Vacancies by industry.....	12
Vacancy growth in Australia.....	13
<i>Jobs Online</i> and the unemployment rate.....	14
<i>Jobs Online</i> and employment growth.....	16
<i>Jobs Online</i> and labour market expectations (from the QSBO).....	17
Labour turnover.....	17
Difficulty finding skilled labour.....	18
Labour as the main constraint on expansion.....	18
Conclusions about <i>Jobs Online</i> .....	19

## Figures

Figure 1: Skilled Vacancies Index – Trend series (May 2007=100).....	9
Figure 2: Comparing the SVI to the AVI (May 2007=100).....	9
Figure 3: Skilled Vacancies Index by occupation group (May 2007 = 100).....	10
Figure 4: Skilled Vacancies Index by region (May 2007=100).....	11
Figure 5: Skilled Vacancies Index by industry (May 2007=100).....	12
Figure 6: All Vacancies Indices – NZ and Australia (May 2007=100).....	13
Figure 7: Beveridge Curve.....	14
Figure 8: Skilled Vacancies Index and the unemployment rate.....	15
Figure 9: Skilled Vacancies Index and employment growth.....	16
Figure 10: Skilled Vacancies Index and labour turnover.....	17
Figure 11: Skilled Vacancies Index and difficulty of finding skilled labour.....	18
Figure 12: Skilled Vacancies Index and change in labour being the main constraint on expansion.....	19

## Foreword

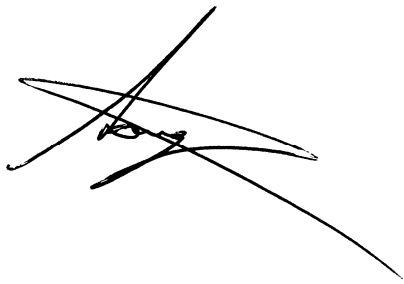
A key role of the Department of Labour is to support improvements in the performance of the labour market. One of the ways we do this is by strengthening the knowledge base to provide the Department, Ministers, government agencies and other key stakeholders with authoritative labour market knowledge and insights.

The release of *Jobs Online* marks an important step forward for us, adding a key, up-to-the minute indicator of labour market performance. *Jobs Online* builds on the experience of the Department's previous Job Vacancy Monitoring Programme, bringing our data collection into line with modern recruitment and statistical practice. *Jobs Online* brings together advertised job vacancy information from the major internet job boards, maximising the information value of the data they hold to create new labour market statistics without an increase in respondent burden or compliance costs.

This background report shows that there is a strong relationship between *Jobs Online* and a wide range of other indicators of labour market performance.

*Jobs Online* provides a key indicator of the overall performance of the labour market, but much of its strength is its ability to look at this performance in some detail. In particular, the data allows us to look at individual occupations and provides new insights that inform policy decisions in areas such as immigration, education and training.

*Jobs Online* would not have been possible without the willingness of the job boards to work in partnership with the Department. We are extremely grateful for their ongoing support.

A handwritten signature in black ink, consisting of several overlapping, fluid strokes that form a stylized name.

Monique Dawson  
Deputy Secretary  
Work Directions

## Introduction

Information on job vacancies is a key indicator of changes in labour market demand that complements other labour market indicators. By using advertised job vacancies to proxy the number of job openings, we are able to tap into an enormous administrative dataset without imposing major collection costs or adding to survey respondent burden.

Another feature of an administrative dataset is that it is extremely timely. The data is available for processing within a few days of the end of the reference period, providing an early indicator of turning points in the labour market.

*Jobs Online* draws on data from all newly listed job ads from the SEEK, Trade Me Jobs and [heraldjobs.co.nz](http://heraldjobs.co.nz) job boards. The series begins in May 2007, which is when data from both SEEK and Trade Me Jobs became available. Data from [heraldjobs.co.nz](http://heraldjobs.co.nz) has become available more recently. Because *Jobs Online* focuses on reporting change in job advertising rather than the overall level of job ads, we are able to blend new data sources together without creating large jumps in the series. The dataset currently includes over 20,000 unique new job ads each month.

The key outputs from *Jobs Online* focus on job ads for skilled vacancies (the Skilled Vacancies Index (SVI)). A comparison of online job ads with information on the total number of job openings (drawn from Statistics New Zealand's Business Operations Survey) indicates that, in 2008, online job ads in *Jobs Online* accounted for around one-third of total vacancies. However, when we looked at vacancies of skilled occupations<sup>1</sup> this proportion increased to around 70%. This gives us confidence that *Jobs Online* is highly representative of real job openings for skilled vacancies. Thus, nearly all of the indices presented in this report and our regular monthly report focus on skilled vacancies.

For some comparisons, such as with the index of online job ads in Australia, we have used an index of all online vacancies. We will continue to monitor the relationship between all job ads and overall changes in labour demand to see if greater use can be made of this indicator.

*Jobs Online* adds value to the base data by coding all vacancies to an occupational standard (4-digit ANZSCO) that enables direct comparison with other labour market statistics. This is done via an auto-coder that the Department has developed. This auto-coder is also used by the Department of Education, Employment and Workplace Relations (DEEWR) in Australia, who produce a similar report.

Detailed tables of *Jobs Online* data are available from the Department of Labour website at [www.dol.govt.nz/jobsonline](http://www.dol.govt.nz/jobsonline)

---

<sup>1</sup> Defined as skill levels 1-3 in the Australia New Zealand Standard Classification of Occupations.

## Outline of the report structure

This report has three sections:

1. **Definitions and methodology.** This section outlines the terms, processes and methods used in *Jobs Online*.
2. **Key breakdowns for the SVI.** This section shows the key breakdowns of the SVI into occupational, regional and industry groups over the full length of the time series available, and a comparison with Australia.
3. **Comparisons with other labour market indicators.** This section shows how the SVI compares to other indicators of labour market performance, and presents statistical measures of the robustness of these relationships.

## Definitions

**Advertisement:** Vacancies that are advertised on the job boards of SEEK, Trade Me Jobs and [heraldjobs.co.nz](http://heraldjobs.co.nz) (and other job boards as this data becomes available).

**ANZSCO:** Australia New Zealand Standard Classification of Occupations. ANZSCO is a skill-based classification of occupations. The structure of ANZSCO has five hierarchical levels. The highest level (1-digit) contains eight major groups and each level progressively divides into more specialised occupations.

**Auto-coder:** A Statistical Analysis Software (SAS) programme that automatically codes job titles and job descriptions to a 4-digit ANZSCO code.

**AVI:** All Vacancies Index. An index based on all job ads in *Jobs Online*.

**Correlation coefficient:** (or Pearson's  $r$ ) is a measure of the strength of linear dependence between two variables and will give a value between +1 (indicating a strongly positive relationship) and -1 (indicating a strongly negative relationship). The closer to zero the score is, the less likelihood there is any relationship between the variables.

**Data provider:** The data providers for *Jobs Online* are SEEK, Trade Me Jobs, and [heraldjobs.co.nz](http://heraldjobs.co.nz) (and other providers as this data becomes available).

**DEEWR:** Australia's Department of Education, Employment and Workplace Relations.

**Duplicates:** Duplicates refer to the duplicate advertisements within sites and between sites. Jobs are identified as duplicates if they appear in the same month, have the same region, job title and job description (shortened). Duplicates are also removed if they appear in two consecutive months.

**Jobs Online:** *Jobs Online* is a package of tools and reports that provide information on the labour market. This includes two indices: the SVI and AVI, a Background and Methodology paper and monthly reports on the labour market.

**Industry:** Industry categories are an amalgamation of those used by the respective data providers. The industry is selected from a list of categories by the person placing the job advertisement, and is not related to any official industry classification.

**Occupation:** Vacancies that have been advertised on the job boards are coded to 4-digit ANZSCO.

**Region:** Data is available for the following regions: Auckland, Wellington, Christchurch, Other North Island, and Other South Island.

**Skilled occupation:** ANZSCO has five skill levels underlying its occupational structure. An occupation is a skilled occupation if it has an ANZSCO skill level of 3 (a skill level commensurate with an NCEA level 4 qualification) or above.

**SVI:** Skilled Vacancies Index. The SVI is the main output of *Jobs Online* and includes only vacancies in occupations that have a skill level of 1-3 under the ANZSCO.

## **Methodology**

### **Receiving the data**

Data files are received from heraldjobs.co.nz and Trade Me Jobs within a few days of the end of the month and contain all new job ads that were listed in the month. The data for SEEK (NZ) is part of a package that is submitted to the Department of Education, Employment and Workplace Relations (DEEWR) in Australia for the Australian Internet Vacancy Index. The data for New Zealand is extracted directly from the DEEWR server, a day or two after the end of the reference month.

### **Processing the data**

The steps undertaken to prepare *Jobs Online* indices are:

1. The data is standardized and unnecessary characters are removed to enable easier matching of duplicate job ads. It is processed and coded using SAS.
2. To ensure that only unique job ads are included, duplicates are removed from the data using SAS. Duplicates are removed firstly from within each provider's data, and then between providers.
3. An occupational auto-coder has been developed in SAS using a mix of matching techniques that essentially look for key words in the job title and job description. Job titles and job descriptions are matched to ANZSCO job titles by matching job titles with key words. The coding process was developed using manually coded data. DEEWR in Australia uses a similar auto-coding technique.
4. The outputs are presented as an index with a base month of 100 for May 2007. A month by month change is calculated from the base month, as follows:

$$\text{Index} = \frac{\text{New Month} - \text{Base Month}}{\text{Base Month}}$$

### **Business rules**

When constructing *Jobs Online* indices the following business rules are applied:

1. An index or percentage change will only be published if it includes data from at least two providers.
2. Duplicates are removed from the dataset when there is duplication of job ads within site and between sites.
3. When the auto-coder cannot classify an occupation it is removed from the entire dataset.

## **Quality control**

Various quality control steps have been embedded in the SAS code, such as data cleaning, converting all alpha characters to upper case, removal of non-alphanumeric characters, and removal of blanks except one space between words.

The results of the occupational auto-coder will be audited by a manual coder with a view to an ongoing process of improvement of data quality.

## **Trend series and seasonal adjustment**

Statistics New Zealand describes the seasonal adjustment and trend series process in the following way<sup>2</sup>:

*For any series, the survey estimate can be broken down into three components: trend, seasonal and irregular. Trend series have had both the seasonal and irregular components removed, and reveal the underlying direction of movement in a series. Seasonal adjustment aims to eliminate the impact of regular seasonal events on the time series. In the case of the labour market, there are cyclical events that occur at around the same time each year that affect labour supply and demand. For example, in summer time there is a large pool of student labour that is both available for, and actively seeking, work. There is also an increased demand for labour in the retail sector and in many primary production industries.*

For *Jobs Online* we have employed the trend series. A separate trend is created for the data from each job board and then combined. As more data become available we expect to make greater use of seasonal adjustment. All seasonally adjusted and trend series for *Jobs Online* are produced using the X-12-ARIMA package developed by the US Bureau of the Census.

---

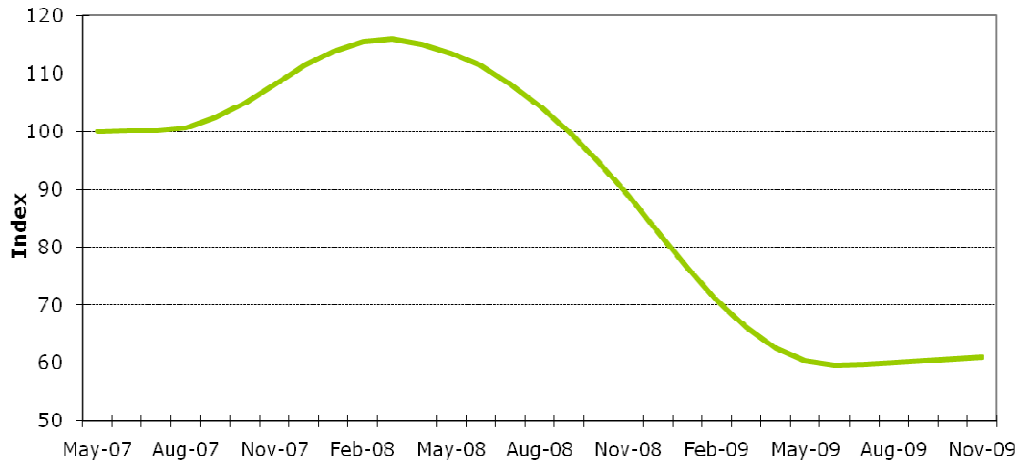
<sup>2</sup> Statistics New Zealand, 2009, Household Labour Force Survey – September 2009, Technical notes.

## The labour market overall

*Jobs Online* is an important indicator of overall labour market conditions. A rising index suggests that the labour market is tightening (due to either an increase in labour demand or a fall-off in labour supply) while a falling index indicates that the job market is softening.

Figure 1 below shows that the Skilled Vacancies Index increased from the beginning of the series in May 2007 till around March 2008. The index fell by 48% between March 2008 and May 2009. However, the trend has levelled off since June 2009 and has begun to rise slightly in recent months.

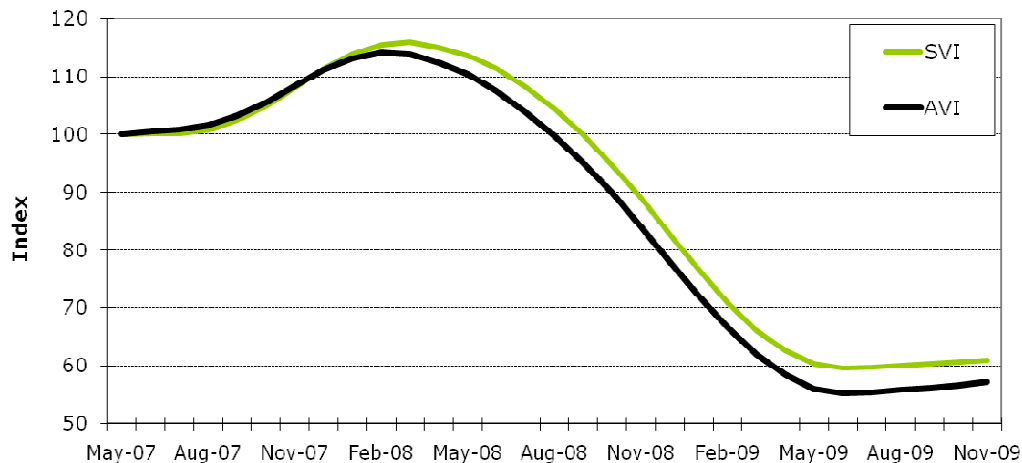
**Figure 1: Skilled Vacancies Index – Trend series (May 2007=100)**



Source: Department of Labour (SVI trend series)

Figure 2 below compares the SVI with the All Vacancies Index. This shows that the patterns have not been particularly different over the term of the index. The graph implies that vacancies for other occupations started to fall slightly earlier than those for skilled occupations but have since tracked along a parallel path.

**Figure 2: Comparing the SVI to the AVI (May 2007=100)**



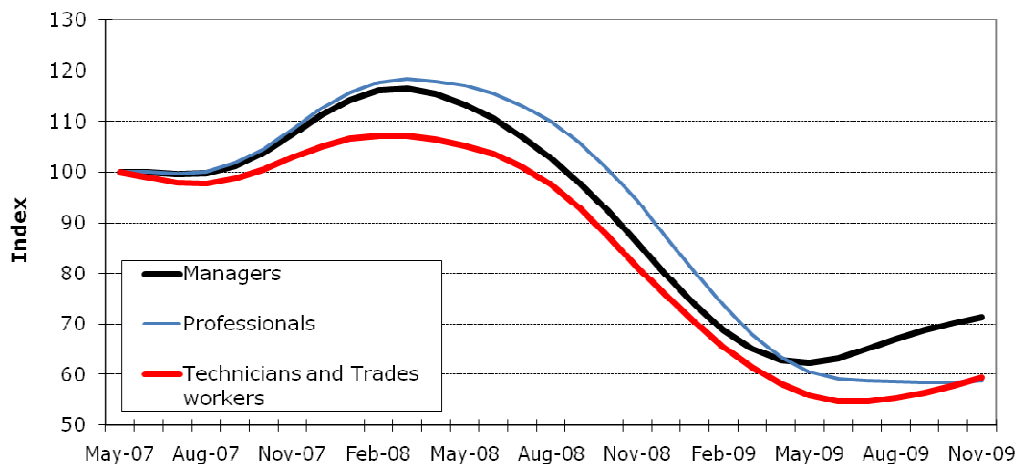
Source: Department of Labour (SVI trend series)

## Vacancies for skilled occupations

The results for the Skilled Vacancies Index are presented in Figure 3 below, and show that vacancies for managers have grown strongly since May 2009. There has been a rise in Technicians and Trades vacancies since July. The fall in the number of vacancies for Professionals has continued, but at a much slower rate since June.

Growth in vacancies was particularly strong for Managers and Professionals between the start of the series in May 2007 and around February 2008, both rising by just under 20%. Vacancies for Technicians and Trades workers also peaked in February 2008, but had risen by only 6% since May 2007.

**Figure 3: Skilled Vacancies Index by occupation group (May 2007 = 100)**



Source: Department of Labour (SVI trend series)

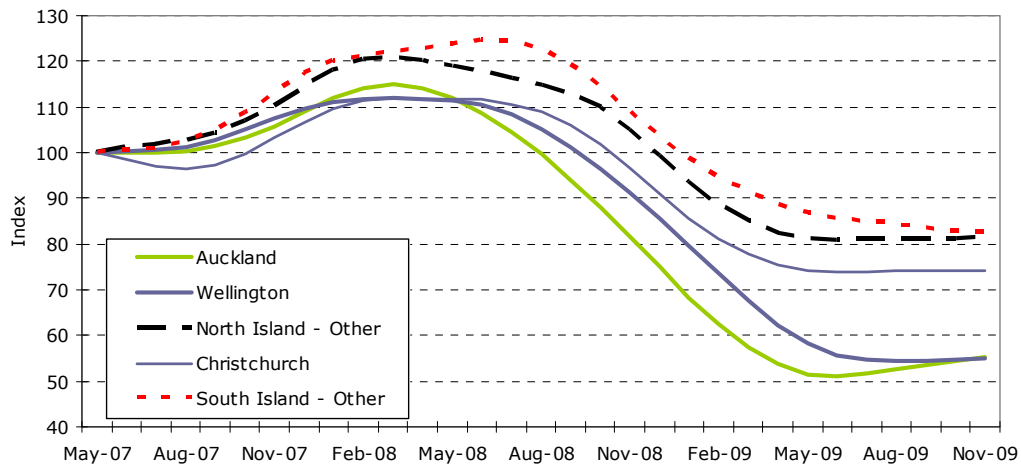
## Vacancies by region

Vacancy information is currently available at a broad regional level. The regional categories are common to all three job boards, although some providers also have more detailed regional data. Region is selected by the advertiser from a drop-down menu.

Figure 4 below shows that vacancy growth from the start of the series in May 2007 to the peak in March 2008 was strongest outside the three largest cities, with growth in the South Island (outside Christchurch) tracking slightly higher than growth in the North Island (outside Wellington and Auckland).

Of the three largest cities, the number of job ads has held up best in Christchurch and the number of job ads fell the most in Auckland. It is important to note that this indicates only the change in regional labour market tightness. The start of the series in May 2007 does not necessarily represent an equilibrium point.

**Figure 4: Skilled Vacancies Index by region (May 2007=100)**



Source: Department of Labour (SVI trend series)

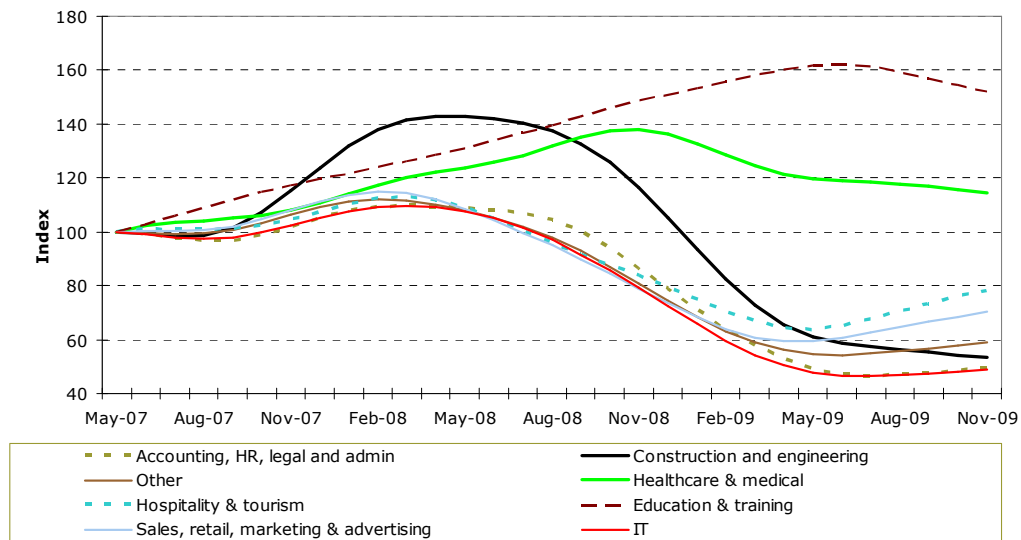
## Vacancies by industry

The industry groupings are derived by synthesising the common characteristics of the different job boards. These are self-selected by advertisers from a drop-down menu.

Figure 5 below shows that vacancy growth in the education and training, and healthcare and medical industries continued for some time after vacancy numbers in other industries started to fall. Education and training vacancies have only just recently started to fall, while health and medical vacancies have been falling slowly since the start of 2009. The retail, and hospitality and tourism industries have also started to rise since the middle of this year.

The construction and engineering industry has had the steepest fall in job ads, but also had the strongest rise from May 2007 till early 2008.

**Figure 5: Skilled Vacancies Index by industry (May 2007=100)**



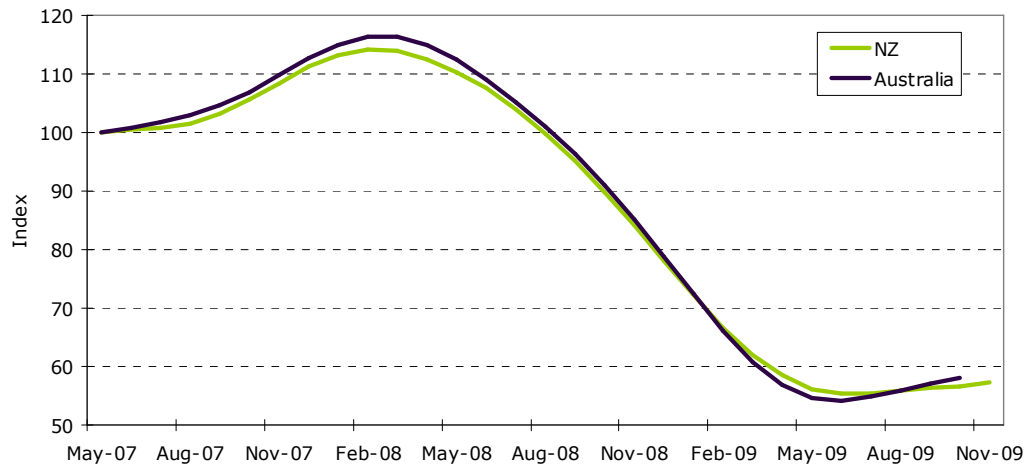
Source: Department of Labour (SVI trend series)

## Vacancy growth in Australia

DEEWR monitors online job ads in Australia in a similar way to *Jobs Online*. The Australian series covers all job ads and Figure 6 below compares this series to the All Job Ads series for New Zealand<sup>3</sup>.

The results indicate that fall in job ads since early 2008 has been almost identical in the two countries.

**Figure 6: All Vacancies Indices – NZ and Australia (May 2007=100)**



Source: Department of Labour (AVI trend series) and DEEWR (trend series adjustment by the Department of Labour)

<sup>3</sup> The Australian series has been re-based by the Department of Labour to start at May 2007, and the same trend method has been applied to both series.

## **Jobs Online and the unemployment rate**

*Jobs Online* is an important new indicator of labour market conditions. One of its main advantages is that it is extremely up-to-date, with results being published within a couple of weeks of the end of the reference month. The following sections outline the relationship between *Jobs Online* and other labour market indicators. These show that there is a strong correlation between these measures, giving us confidence that *Jobs Online* provides a robust early indicator of changes in the labour market.

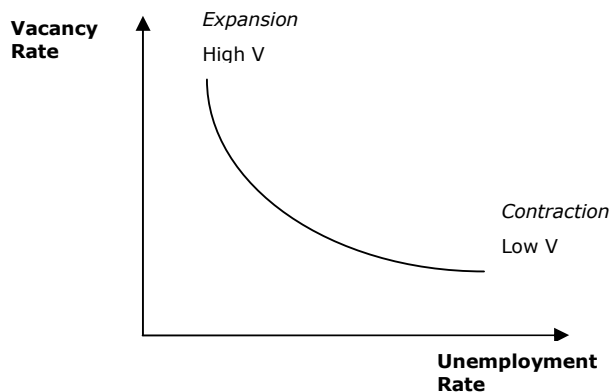
Job vacancies provide a measure of surplus or unmet labour demand. Conversely, the number of people unemployed provides an equivalent measure of surplus labour supply.

We expect changes in unemployment to have an inverse relationship with job vacancies for two reasons:

1. Surplus demand, reflected in increasing job ads, will drive an increase in the number of jobs available, pushing down the unemployment rate.
2. Changes in labour demand and supply will affect the likelihood that employers will need to advertise vacancies. An increase in labour supply leads to a decrease in the number of advertised job vacancies because employers can recruit without advertising. In contrast, when unemployment is decreasing, there is a diminishing level of surplus labour supply, leading to job vacancies rising as employers try to hire suitable workers. As many job openings are filled via means other than advertising (such as word of mouth) an increase in advertised vacancies could indicate that employers are struggling to fill positions.

The empirical relationship linking vacancies with unemployment and the overall economy is called the Beveridge Curve. The Beveridge Curve illustrates that a low number of vacancies coincides with high unemployment and a high number of vacancies coincides with low unemployment.

**Figure 7: Beveridge Curve**



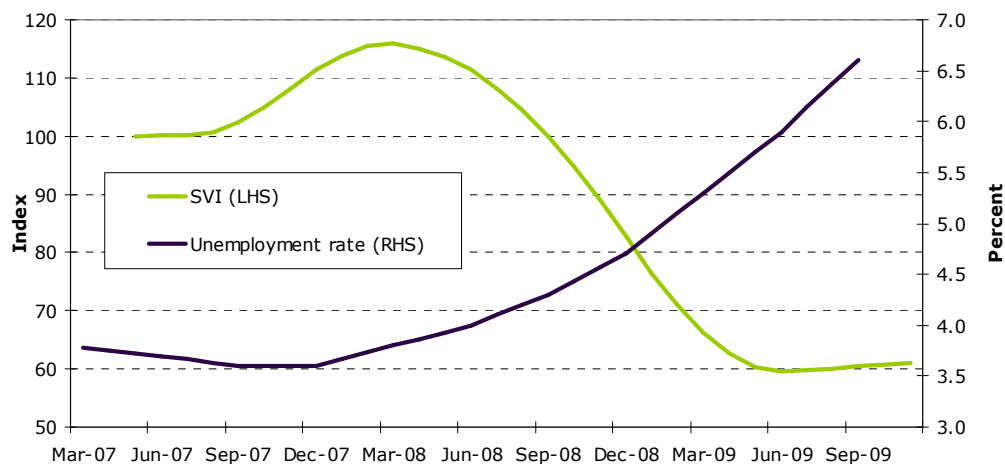
The Beveridge Curve sums up the state of the labour market by plotting the vacancy and the unemployment rates together. The curve is downward sloping indicating a negative relationship between the two variables. Figure 7 above shows expansionary periods are often associated with low unemployment and high job vacancies while recessionary periods are associated with high unemployment and low job vacancies.

The rationale behind the curve is that when the economy is expanding, the demand for labour is high (and job vacancies are high), but most people who are looking for work have already found employment (and unemployment is low). Alternatively, when the economy is slowing or contracting, there is little demand for additional workers and available jobs can be filled quickly so unemployment is high. These effects result in movements along the curve.

### Results from *Jobs Online*

Figure 8 shows a strong inverse relationship between changes in unemployment and changes in the SVI (correlation coefficient of 0.95). This very strong relationship indicates the potential for the SVI to be an early indicator of change in the unemployment rate.

**Figure 8: Skilled Vacancies Index and the unemployment rate**



Sources: Department of Labour (SVI trend series) and Statistics NZ, (Household Labour Force Survey trend series)

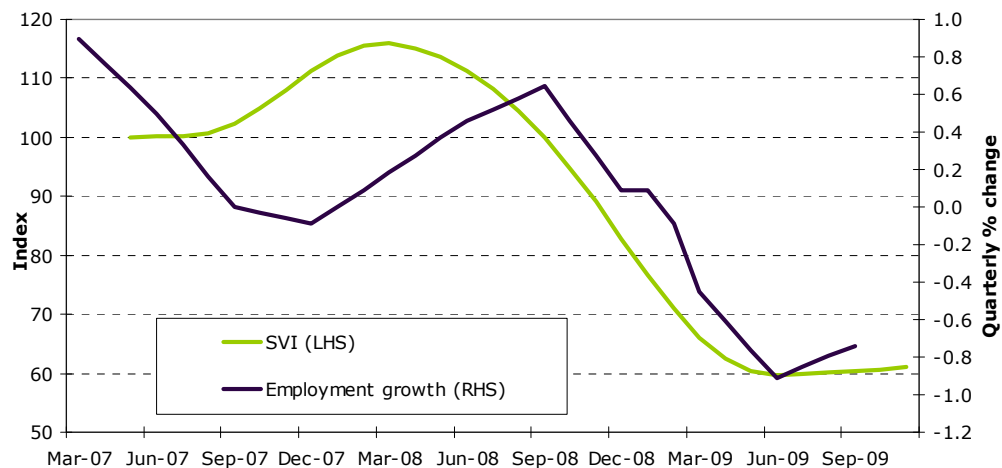
## Jobs Online and employment growth

Employment growth is one useful indicator for comparison with job vacancy data because changes in employers' demand for labour should precede changes in employment. As employers require more labour, advertised job vacancies should increase. In the future, when these positions are filled, employment should increase. Therefore, it would be expected that increases in *Jobs Online* lead increases in employment in a subsequent quarter. However, this relationship is not expected to be exact as we don't know whether vacancies are for a new position or an existing one. Nonetheless, *Jobs Online* should be very useful from a forecasting perspective.

### Results from *Jobs Online*

Figure 9 below shows that employment growth and vacancy growth move in largely the same direction, and they have the high correlation coefficient of 0.79. However, if employment growth lags vacancy growth by one quarter, the correlation coefficient rises to 0.95, showing that vacancy growth may be an important leading indicator of employment growth.

**Figure 9: Skilled Vacancies Index and employment growth**



Sources: Department of Labour (SVI trend series) and Statistics NZ, Household Labour Force Survey (trend series)

## Jobs Online and labour market expectations (from the QSBO)

The Quarterly Survey of Business Opinion (QSBO), conducted by the New Zealand Institute of Economic Research, measures three key indicators that we might expect to correlate with vacancy change. This section compares the results from *Jobs Online* since 2007 with the QSBO.

### Labour turnover

The QSBO measures labour turnover through the following question.

*Excluding seasonal variations, what has been your firm's experience during the past three months in respect of labour turnover?*

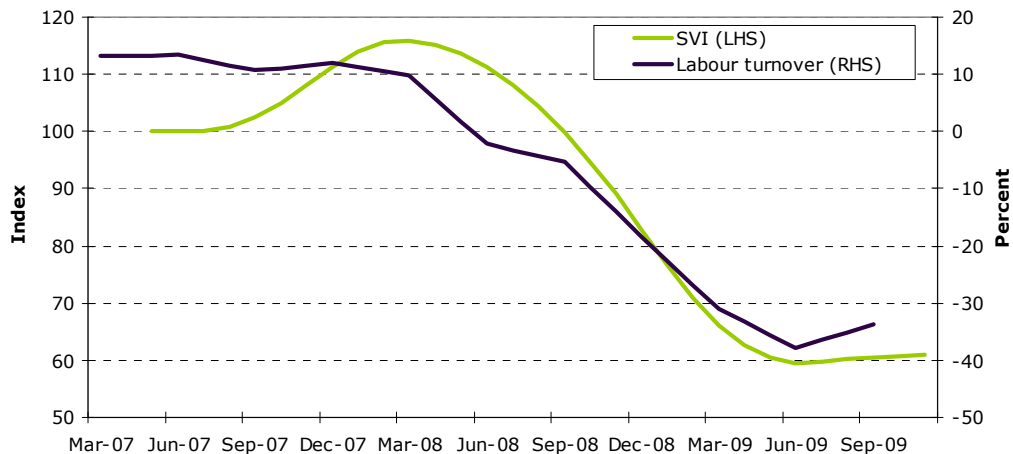
The result is presented as the net percentage of firms who said turnover had gone up minus the percentage who said turnover had gone down. Therefore, as the labour market softens and turnover goes down, the net percentage will fall.

We expect that changes in vacancy growth will have a positive relationship with changes in labour turnover.

### Results for Jobs Online

Figure 10 shows changes in vacancy growth compared to the net balance of labour turnover responses (those saying turnover has gone 'up' less those saying 'down'). A positive correlation of 0.69 was found between annual vacancy growth and the net balance of responses.

**Figure 10: Skilled Vacancies Index and labour turnover**



Sources: Department of Labour (SVI trend series) and NZIER (QSBO)

## Difficulty finding skilled labour

The QSBO measures the difficulty of finding skilled labour through the following question.

*Is finding the skilled or specialist staff you want today compared to three months ago harder, the same or easier?*

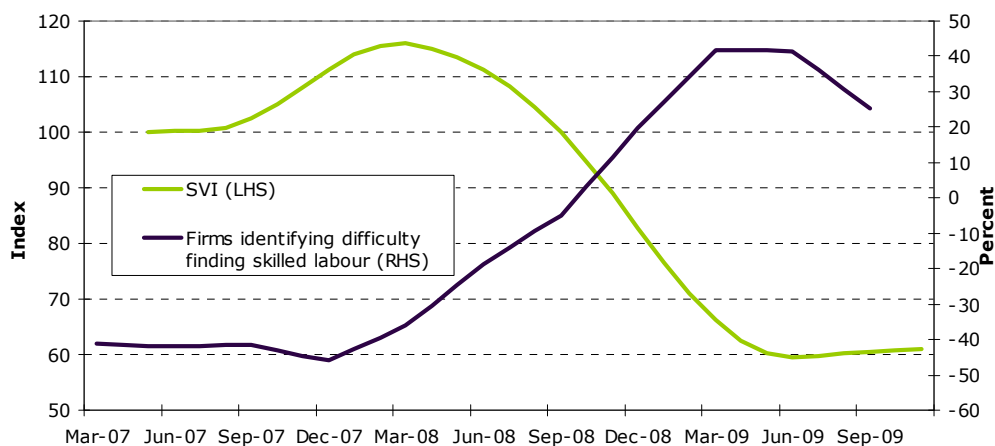
The result is presented as the net percentage of firms who said it was easier to find skilled labour minus the percentage who said it was harder. Therefore, as the labour market softens and skilled employees are easier to find, the net percentage will rise.

We expect that high vacancy growth will be associated with a greater difficulty in finding skilled staff.

## Results for *Jobs Online*

Figure 11 below compares *Jobs Online* to the net balance of responses (the percentage replying it is 'easier' to find skilled staff less the percentage replying 'harder'). A negative correlation of 0.91 was found to exist between annual vacancy growth and annual changes in the net balance of responses.

**Figure 11: Skilled Vacancies Index and difficulty of finding skilled labour**



Source: Department of Labour (SVI trend series) and NZIER (QSBO)

## Labour as the main constraint on expansion

The QSBO measures labour shortages through the following question.

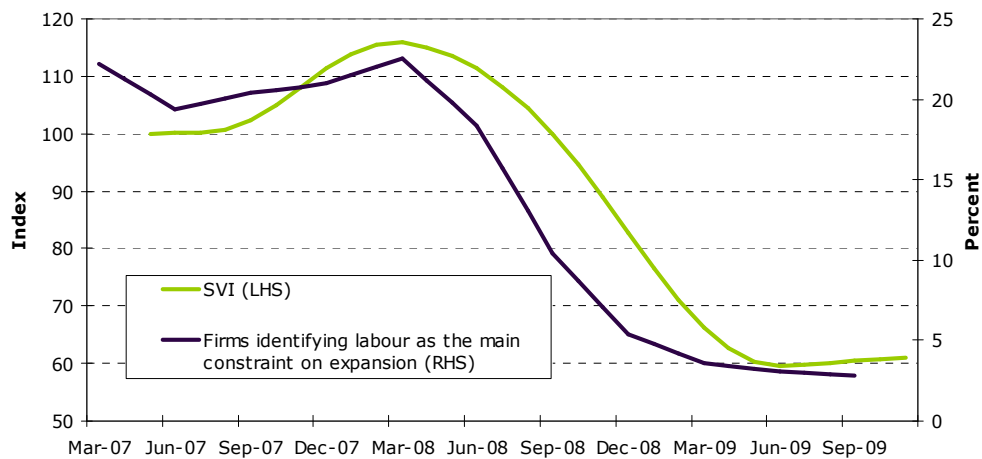
*What single factor, if any, is most limiting your ability to increase production?*

A shortage of labour is one of the six factors firms may select. It is expected that high vacancy growth will be positively related to the number of firms identifying a shortage of labour as their most limiting factor.

### Results for *Jobs Online*

Figure 12 compares annual vacancy growth with annual changes in the number of people saying that labour is the single most limiting factor constraining production. There was a positive correlation of 0.92 between annual vacancy growth and annual changes in the proportion of firms identifying labour as being the limiting factor.

**Figure 12: Skilled Vacancies Index and change in labour being the main constraint on expansion**



Source: Department of Labour (SVI trend series) and NZIER (QSBO)

### Conclusions about *Jobs Online*

The results in the preceding sections show that *Jobs Online* has a very strong relationship with other labour market indicators. In some instances it is a robust leading indicator, and has the considerable advantage of being very up-to-date.

*Jobs Online* draws on an extremely large dataset, which allows considerable disaggregation. One of the most important components of this is the ability to look at detailed occupation groups. This ability will be enhanced as the time series develops.

