# Box B
Lags from Activity to the Labour Market

While a number of indicators of activity suggest that domestic economic conditions improved from the end of last year, signs of stabilisation in the labour market have become apparent only in recent months, with job advertisements, vacancies and employment picking up. One explanation for this is that labour market conditions tend to lag the cycle in economic activity. For instance, in the early 2000s and in 2008–09, the downturns in both employment and wage growth look to have been preceded by downturns in output growth, with growth of output then picking up ahead of that of employment and wages (Graph B1). Some explanations for why the labour market lags economic activity are considered below, and the typical length of those lags are examined based on historical data.[1]

There are several reasons why a change in economic activity may affect labour market conditions with a lag:

- Firms often take some time to decide to adjust the number of their employees in response to changes in demand for their output. Following a pick-up in economic activity, firms may initially seek to increase production by using their existing workforce more intensively, for example by increasing employees' hours or by making better use of underutilised capital. Because there are fixed costs to hiring new employees, such as recruitment and training, firms often wait until they are confident that demand for their product will be strong before they decide to hire new staff. Conversely, following a downturn in demand, firms will typically wait before they decide to retrench experienced employees.

Graph B1
Activity and Labour Market Indicators
Year-ended growth, seasonally adjusted

Sources: ABS; RBA
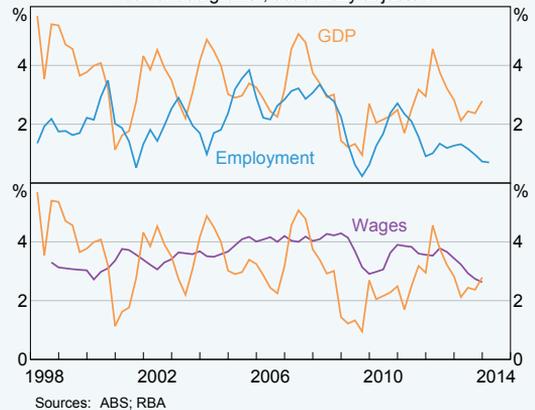
- There are also lags between a shift in demand for additional employees and actual changes in the number of employees. This reflects the fact that it can take several months to advertise vacant positions and then find and interview candidates.[2] Similarly, the process of reducing the workforce can also take some time.

- Wages may take even longer than employment to adjust to economic activity. For instance, collective agreements, which underpin the employment contracts of around 40 per cent of workers, are typically renegotiated only every two to three years, and there can be a lag before a new agreement is implemented. Similarly, award wages and the national minimum wage are adjusted only once a year, while contract employees may have their wages set for a given period. Wage growth may also be 'sticky' in cases where firms think that slower wage growth
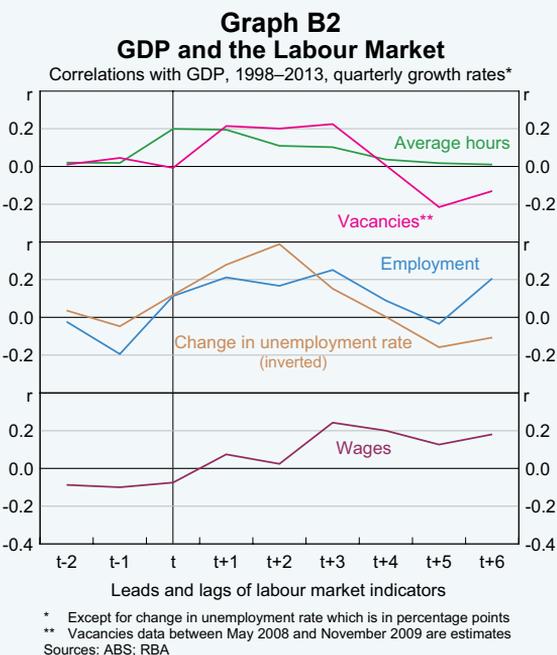
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1 There are also likely to be feedback effects from developments in the labour market to activity.

2 For further discussion, see Edwards K and L Gustafsson (2013), 'Indicators of Labour Demand', RBA *Bulletin*, September, pp 1–11.

might reduce the motivation and productivity of existing employees, or if there are significant fixed costs associated with employing new staff at lower wages.

While the extent of the lag between changes in economic activity and changes in employment and wages may vary from one episode to the next, the historical data can provide some guide to the typical lags. The evidence for these lags can be assessed using three simple statistical methods: correlation analysis, turning-point analysis and vector autoregression (VAR) analysis.

Correlation analysis estimates co-movement between changes in GDP growth and changes in a range of labour market indicators at different leads and lags. Over the past 15 years, the highest correlation between quarterly growth of GDP and changes in various labour market series – average hours, job vacancies, employment and the unemployment rate – occurs when the labour market series are lagged by between one and three quarters (Graph B2). The peak correlation between quarterly growth of GDP and wages occurs at three quarters, with the co-movement between wage growth and GDP growth at shorter lags appearing to be weaker than it is for the other series.[3]

Turning-point analysis focuses on the differences in the timing of peaks and troughs in the cycles in different variables. This approach provides further

Graph B2
GDP and the Labour Market
Correlations with GDP, 1998–2013, quarterly growth rates*

Leads and lags of labour market indicators

* Except for change in unemployment rate which is in percentage points
** Vacancies data between May 2008 and November 2009 are estimates
Sources: ABS; RBA

evidence that labour market variables tend to lag the business cycle by several quarters, with wage growth again tending to have a somewhat longer lag (Table B1). This method can also identify apparent asymmetries in the lagged relationships, and suggests that the turning points in employment and wage growth tend to occur with a longer lag following a peak in GDP growth than following a trough in GDP growth, with the difference being up to two quarters. This asymmetric response of

Table B1: Lags between Cycle Turning Points[(a)]
Average number of quarters lag from turning point in GDP growth, 1998–2013

	Hours	Vacancies	Employment	Unemployment rate	Wages
Peak	+2	+2	+3	+1	+4
Trough	+1	+1	+1	+1	+3

(a) Positive figures denote that the peak or trough in the labour market variable lags the peak or trough in activity; peaks and troughs are identified on the basis of the business cycle component of each series, which is extracted by taking the difference between the 7-quarter Henderson trend (which removes short cycles) and the 33-quarter Henderson trend (which removes long cycles); all variables are expressed in quarterly growth rates apart from the unemployment rate, which is expressed in quarterly changes
Sources: ABS; RBA

3 A number of the peak correlations are only marginally statistically significant.

the labour market is consistent with firms being quicker to hire new staff in an upturn than to reduce the number of existing employees in a downturn, perhaps because the costs of retrenchment – and then potentially re-hiring staff when conditions improve – are relatively large.

A drawback of both the correlations and turning point analyses is that neither quantifies the size of the links between changes in GDP growth and the various labour market indicators. One approach that can provide an estimate of the magnitude of these links is a VAR model, which captures the dynamic relationships between these variables. The results of VAR models can be interpreted using impulse responses, which trace out how quarterly changes in average hours, vacancies, the unemployment rate, and wages are linked to a change in GDP growth.[4] In general, this approach suggests similar lags to that of the first two methods. The impulse responses suggest that, following a 1 percentage point increase of quarterly GDP growth, growth in average hours worked increases immediately, while growth in vacancies increases one quarter later, although both these effects are relatively small and statistically insignificant (Graph B3). In contrast, the unemployment rate declines in the first and second quarters following the change in GDP growth and is around 0.4 percentage points lower a year later.

The VAR results imply that a change in GDP growth by itself has little relationship with subsequent changes in wage growth. In part, this may be because the

Graph B3
Response of Labour Market to a GDP Shock*
Response to a 1 percentage point shock to GDP growth

* Shaded area represents +/-2 standard error bands
** Cumulative responses
Sources: ABS; RBA
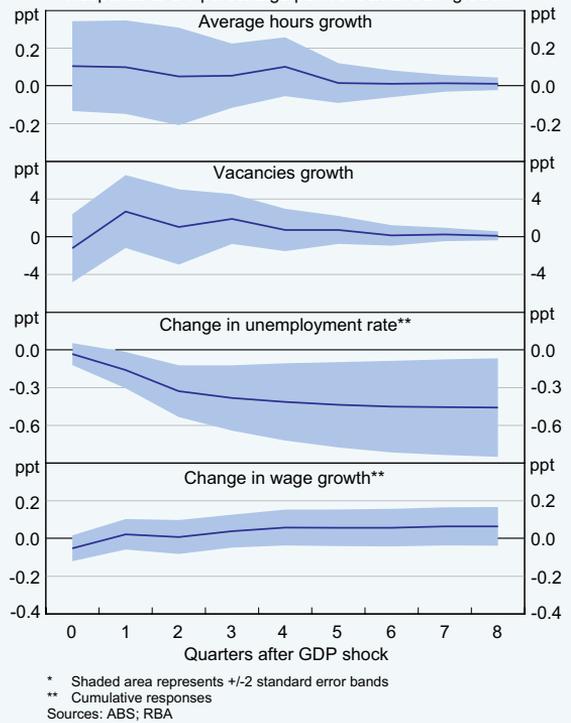
model does not differentiate between changes in GDP growth caused by demand-side factors from those caused by supply-side factors.[5] More generally, the results from VAR models can be sensitive to the variables included and the structure of the VAR, as well as the sample period used for estimation, and so the results shown here should be considered as illustrative only.

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4 The results presented are those from a structural VAR specification with five variables, ordered as follows: GDP, average hours worked, vacancies, the unemployment rate and the wage price index. All variables are expressed in quarterly growth rates apart from the unemployment rate, which is expressed in quarterly changes, and wages, which are expressed as the change in quarterly growth. The model is estimated over the period September quarter 1998 to December quarter 2013. Impulse responses are derived from a structural decomposition using a recursive Cholesky ordering. GDP is assumed to be the most exogenous variable in the system, with the ordering of the other variables reflecting the relative speed at which they are assumed to respond to a shock to GDP. In turn, GDP is assumed not to respond contemporaneously to any of the labour market variables, but may respond with a lag.

5 For instance, a negative aggregate demand shock would cause a fall in labour demand, an increase in the unemployment rate and a decline in wage growth. In contrast, a negative aggregate supply shock caused by an exogenous decrease in labour supply would also see a reduction in employment, but potentially an *increase* in wage growth as firms compete to hire the remaining pool of available workers.