

Leading Indicators of Output

In this article by Christopher Green and Craig Beaumont, a selection of leading indicators of economic activity is examined to determine their usefulness and reliability.

Summary

The delays in the public release of economic data, and the sometimes substantial revisions to which they are subject, make it difficult to accurately gauge the current state of the economy. This paper assesses the usefulness of various leading indicators in overcoming these difficulties. The indicators examined are principally drawn from the New Zealand Institute of Economic Research's long-running Quarterly Survey of Business Opinion (QSBO). In particular, the series examined include the past experiences and future expectations of businesses regarding employment, labour turnover, overtime, and profitability. A graphical analysis is used to assess the usefulness and reliability of the indicators, with the graphical results suggesting that the indicators are useful for predicting Gross Domestic Product growth one to two quarters ahead. However, the overall results suggest that the QSBO indicators are probably more suited to warning of turning points in economic activity, rather than predicting specific growth rates.

Introduction

One of the major problems in monitoring and forecasting the real economy is the delays which exist in the release of economic data. A further problem is the often substantial revisions that can occur in the National Accounts, effectively lengthening the delays in the measurement process. As a means to avoid some of these difficulties leading indicators are often utilised. This paper highlights a series of leading indicators principally drawn from the New Zealand Institute of Economic Research's long-running Quarterly Survey of Business Opinion (QSBO) that were found to be of use in indicating future directions in economic activity. The QSBO is conducted at the end of each calendar quarter from a sample of over 1,000 firms. A wide range of economic indicators is covered, with respondents reporting both their experiences of the past three months and their expectations for the next three months. In the next section a graphical comparison is undertaken, comparing movements in the leading indicators with movements in production Gross Domestic Product (GDP)¹. The concluding section analyses the usefulness and reliability of the indicators of production GDP.

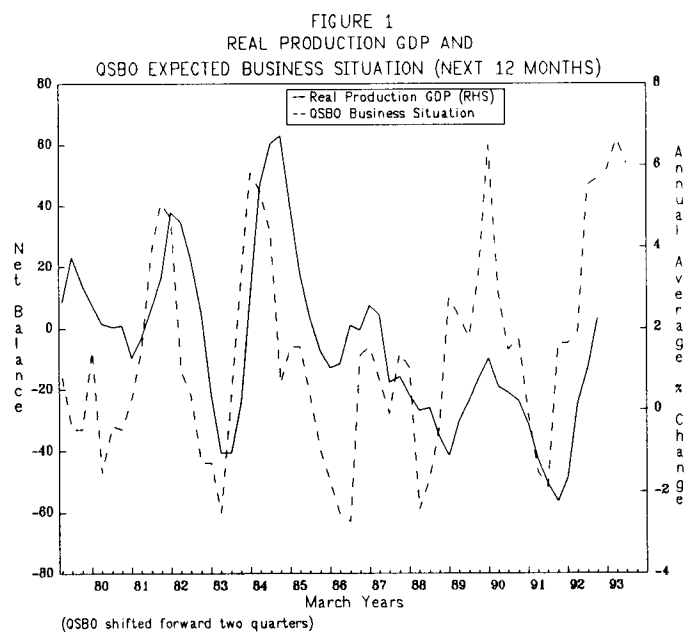
¹ Production measure has been selected as the measure of economic activity, given the excess volatility of the expenditure-based series and its recognised lower quality.

QSBO Indicators and Real Production GDP: Graphical Comparisons

Twelve economy-wide² business opinion series have been examined, using the same 'net percentage'³ form as reported in the QSBO, and have been plotted against annual average percentage changes in real production GDP. Annual average percentage changes have been selected, given the volatility of the point-to-point changes in real production GDP. However, it should be noted that the use of annual averages tends to show turning points two to three quarters after a turning point in point-to-point annual changes in GDP. The results of the 'cyclical indicator' test to establish the QSBO series' usefulness as indicators of turning points are shown in Tables 1 and 2 (appendix 1).

Business Opinion

Business Opinion Surveys provide an insight into current business sentiment and the short-term prospects for economic activity. Changes in business confidence should be closely correlated with movements in economic output. To test this hypothesis we compared the movements in Figure 1 of real production GDP and the QSBO expected business situation series. A useful means of detecting relationships between these two series is to compare the timing of major turning points. A visual inspection of the graph suggests that of the ten turning points identified, the QSBO Business Situation series



2 These statistics aggregate replies of respondents in the Merchants, Services, Manufacturers and Builders group.

3 The net percentage respondents is obtained by subtracting the percentage of respondents saying 'down' from those saying 'up' and dividing this value by a corrective factor [100 - percentage of N/A responses] to obtain the true direction and magnitude of the change, ie:

$$\frac{\text{up} - \text{down}}{100 - \text{N/A}} \times 100 = \text{net percent}$$

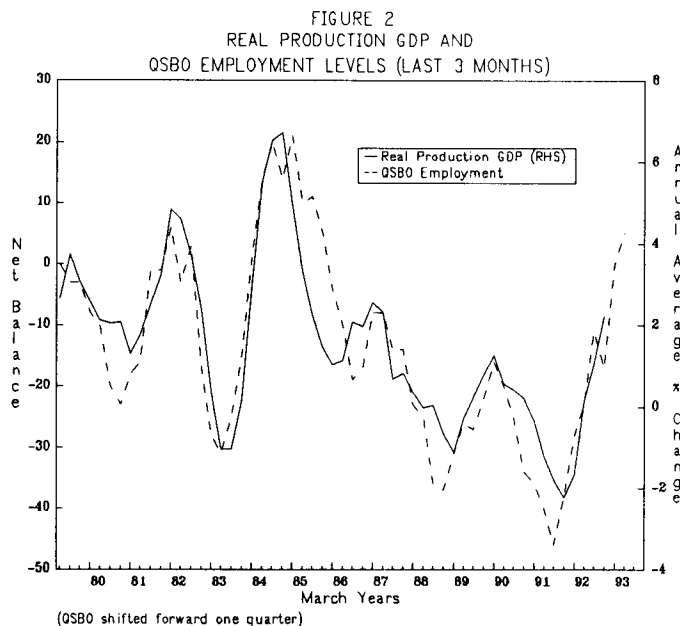
leads the cycle of GDP on nine occasions by around three quarters⁴. However, the business confidence series appears to have limited forecasting ability in determining movements of the level of production GDP, as evidenced by the substantial overestimation of GDP growth during the 1989-90 period.

Employment

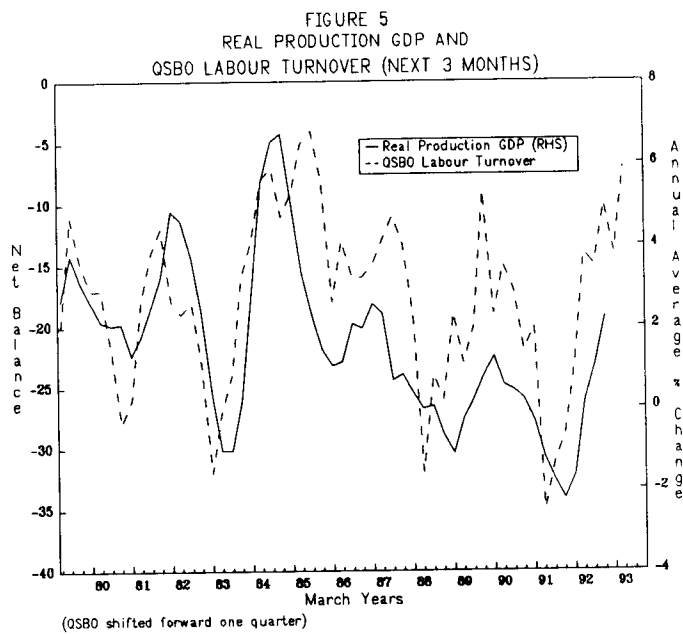
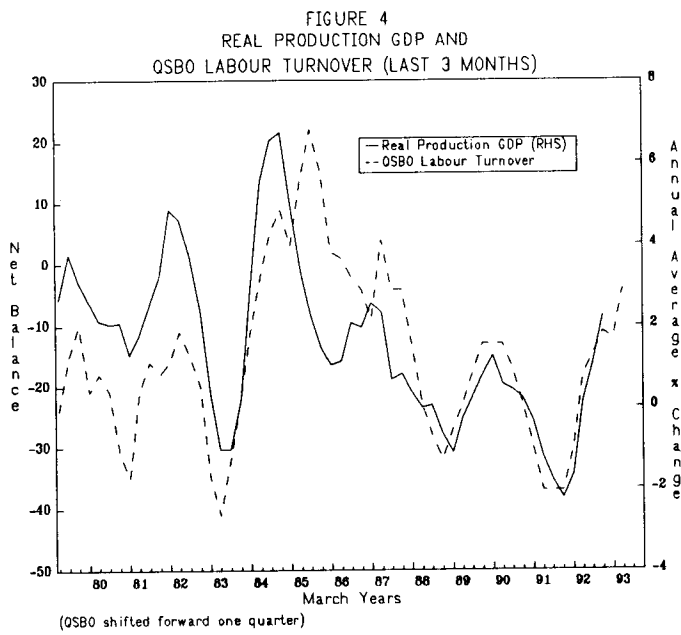
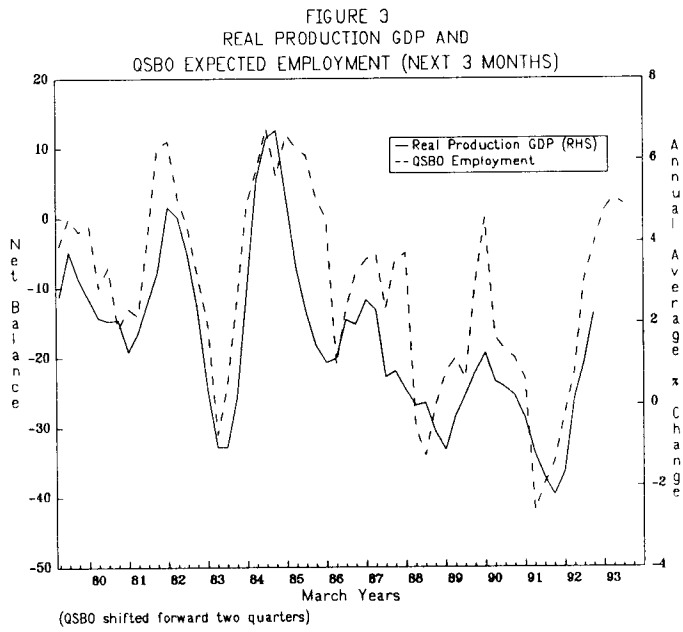
One would expect the employment situation to also provide insights into current business sentiment and the short-term prospects for economic activity. Respondents in the QSBO employment series are asked two questions regarding past and future overtime levels. The first question asks respondents whether the overtime worked in the past three months (compared to the previous three months) has been 'up', 'down', or the 'same'. A corresponding question is then asked with respect to expectations for the next three months. The survey of past employment levels compared with employment levels three months previously, appears to provide an accurate and reliable indicator of real production GDP (Figure 2). The past employment series leads GDP through eight out of the ten turning points examined, and provides a dependable indicator of both levels and cyclical changes. The QSBO expected employment series in Figure 3, leads GDP turning points on nine occasions, but is less able to indicate the level of specific quarterly changes.

Labour Turnover

The economy-wide labour turnover series asks respondents two questions regarding past and expected future labour turnover. The past labour turnover series (Figure 4) leads economic activity on five occasions, is coincident on three and lags on two occasions. The expected labour turnover series (Figure 5) while leading GDP through eight turning points, is again less useful in indicating the level of quarterly changes.

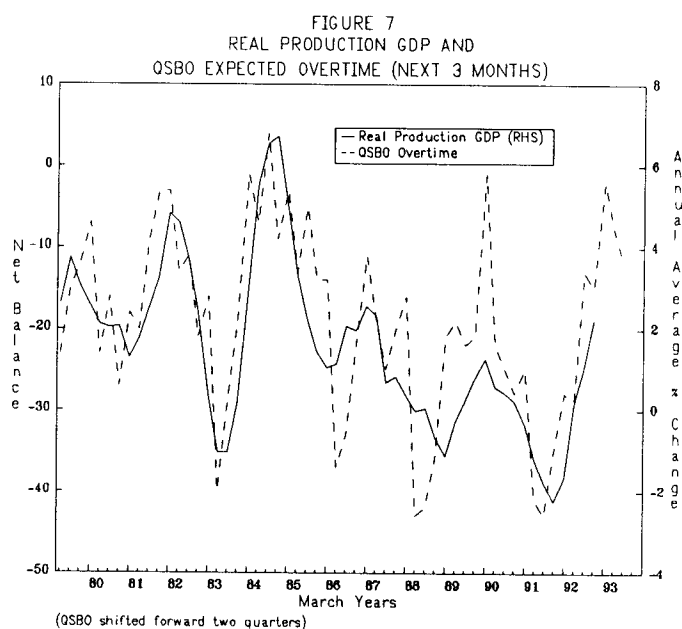
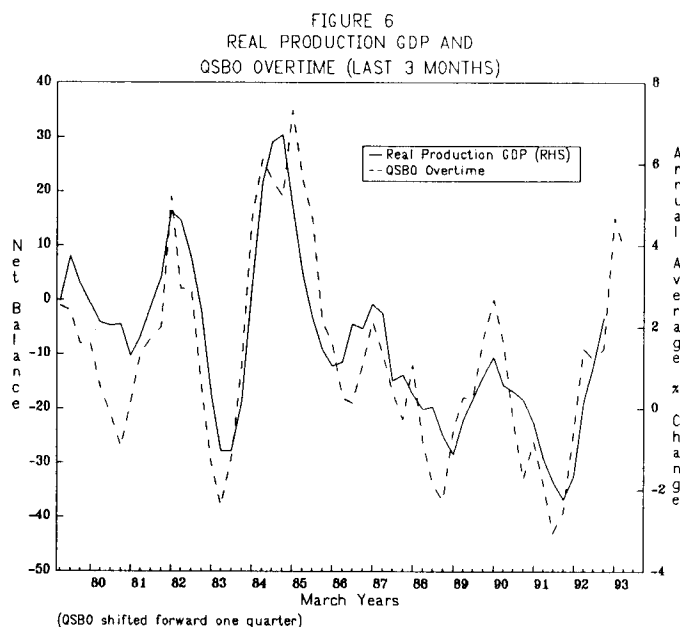


4 The description of the timing of turning points refers to the unshifted indicators against the production GDP measure of economic activity.



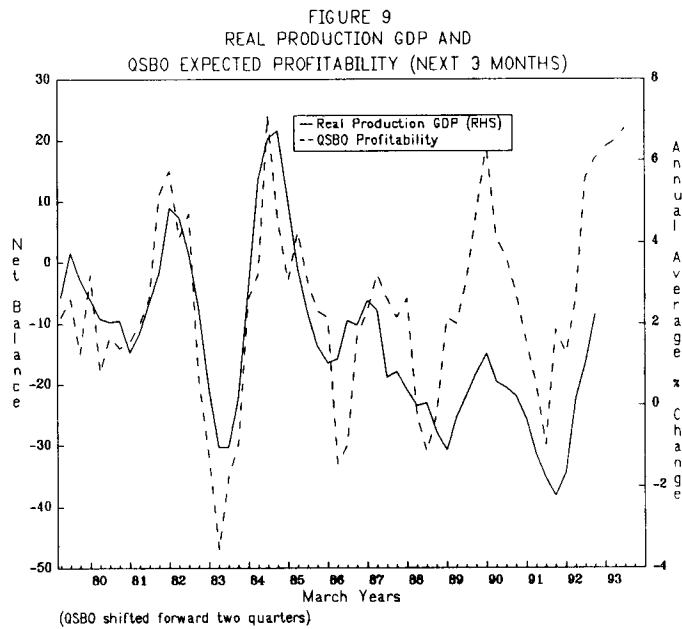
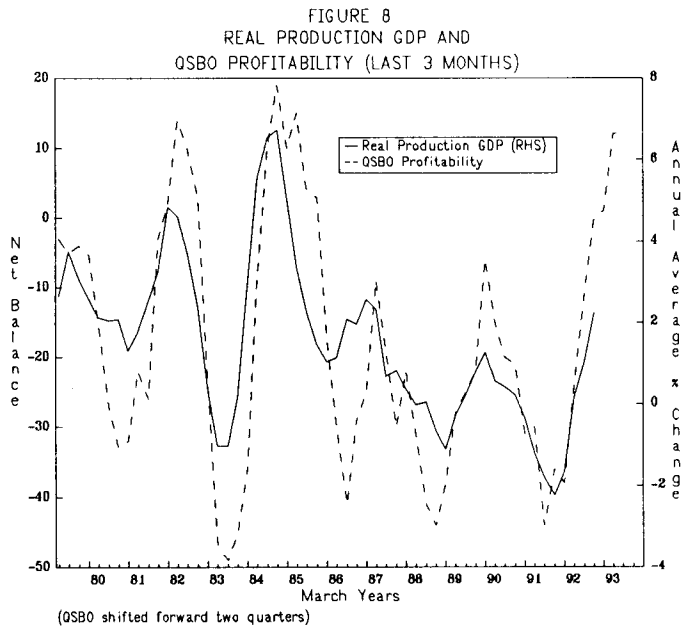
Overtime Worked

Respondents in the economy-wide QSBO series on overtime worked are questioned about past and future overtime levels. From Figure 6 it is evident that an increase (decrease) in overtime is associated with an increase (decrease) in economic activity. Changes in the QSBO overtime series appear to provide both a useful and reliable indicator, with the overtime series leading economic activity in eight out of the ten turning points examined and with only one false call (this false call was made in the third quarter of 1984 - a somewhat atypical quarter). The survey of expected overtime (Figure 7), while leading real production on nine occasions with no lags or false calls, is less able to indicate changes in the *levels* of output. As with the previous surveys, respondents' experiences for the previous three months track actual production GDP more closely than their future expectations.



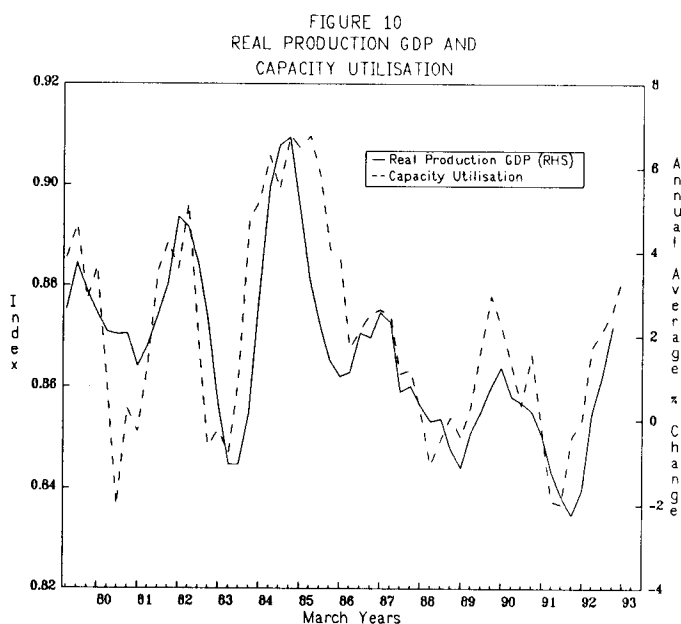
Profitability

Respondents to the economy-wide QSBO profitability survey are also asked to respond to questions regarding past and future trends. The structure of the survey questions is the same as that adopted in the employment, labour turnover, and overtime surveys, with respondents asked about profitability in terms of the last three months and expectations for the next three months. When graphed against real production GDP (Figure 8), the past profitability series is found to be coincident on one and lead on nine occasions. The expected level of profitability survey leads production GDP on ten occasions, and like the previous expectation series is of less use in determining the level of specific quarterly changes.



Capacity Utilisation

The QSBO capacity utilisation variable also provides a reasonably reliable forward indicator of economic activity and benefits from a long history, with data stretching back to the start of the 1960s. The capacity utilisation variable measures the utilisation rate of a stock of capital equipment by asking manufacturers and builders to assess the 'percentage increase in production possible from existing plant and equipment, without raising costs'. A close relationship exists between capacity utilisation and production GDP (Figure 10), with rises (falls) in capacity utilisation associated with increase (decreases) in economic activity, with capacity utilisation leading real production GDP on three occasions.



Capacity Constraining Factors

The NZIER Business Opinion Survey also asks respondents what single factor, if any, is most limiting their ability to increase production. In this case the replies of respondents were placed into the six categories of (i) Orders/Sales, (ii) Materials/Components, (iii) Finance, (iv) Labour, (v) Capacity, and (vi) Other. The economy-wide capacity constraint series (not to be confused with the formal capacity utilisation variable) provides a reasonably good indicator of the turning points in economic activity (Figure 11), leading through six of the ten turning points examined. However, the indicator appears limited in forecasting changes in the level of GDP, as evidenced in the underestimation of economic activity during the 1982-83 period. For the economy-wide sales constraint series (Figure 12), an increase in replies citing sales as the major factor constraint is associated with a tendency for a decline in economic output and vice versa. It therefore proved sensible to graph the inverse of respondents' replies against annual average percentage changes in GDP. In terms of turning points, the economy-wide sales factor constraint series appears reliable, leading production based GDP on nine occasions.

FIGURE 11
REAL PRODUCTION GDP AND
OSBO ECONOMY-WIDE CAPACITY FACTOR CONSTRAINT

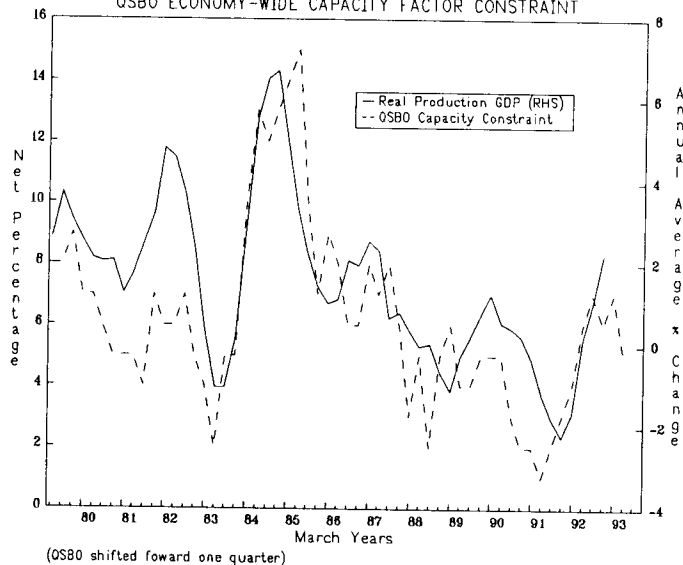
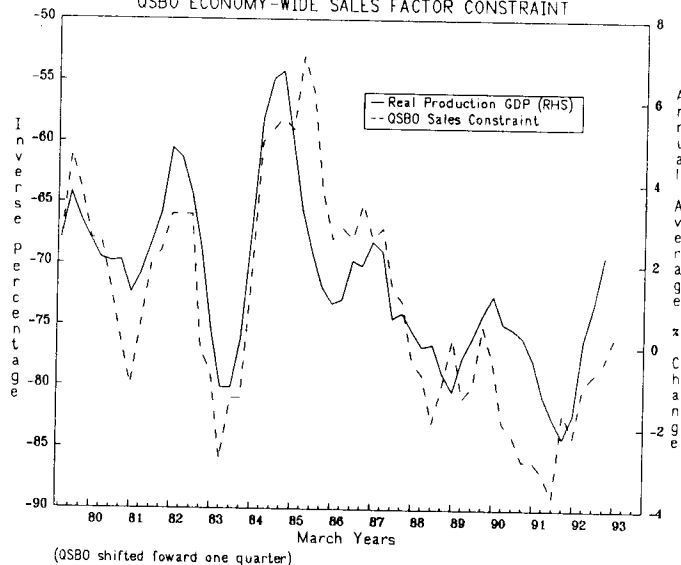


FIGURE 12
REAL PRODUCTION GDP AND
OSBO ECONOMY-WIDE SALES FACTOR CONSTRAINT



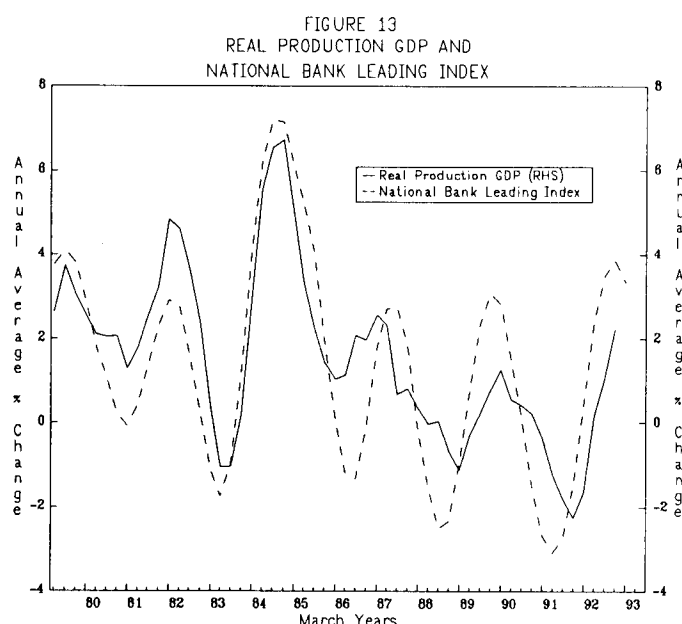
Leading Indicator Index

New Zealand has no official leading indicator indices, however, some institutions produce their own. The National Bank leading index is a device which brings together a selection of forward looking economic indicators in order to predict turning points in economic activity. Eight economic indicators⁵ are used in the construction of the National Bank leading index; four of these are quarterly, the other four being monthly. The National Bank leading index tends to lead current activity by approximately two

5 Indicators included in the Index (m=monthly, q=quarterly): (i) Share price Index, (ii) Building Permits for New Dwellings (m), (iii) Building Permits for New Non-Dwellings (m), (iv) Real Money Supply M3 (m), (v) Change in Producer Prices (q), (vi) Changes in Stocks, (vii) Ratio of Prices to Labour Costs (q), (viii) Average Hours Worked (Manufacturing) (q).

months, however, given the delay in the compiling and publishing economic statistics, the most recent index is typically two months old. Consequently, the National Bank leading indicator is closer to being an indicator of current economic conditions rather than an indicator of future economic conditions. Nevertheless, it remains a useful monthly indicator, as the official GDP data is published with a 3-4 month lag.

Movements in the National Bank indicator appear to be reasonably closely related to movements in real production GDP (Figure 13), with the two sharpest expansions in real GDP corresponding with major growth in the National Bank leading indicator, and with the major contraction in GDP over 1990-91 following a large fall in the National Bank leading indicator. In terms of turning points, the leading indicator leads GDP through five of the ten turning points and is coincident in four other cases, suggesting that this indicator provides a reasonably useful indicator of economic activity. There were no false calls.



Conclusion

The graphical results suggest that the QSBO surveys of employment, labour turnover, overtime, profitability, and sales constraint are useful as indicators of changes in real production GDP one to two quarters ahead - particularly given the publication lags in the availability of GDP data (3-4 months). Firms' experiences of employment, overtime, and labour turnover over the past three months appear to have a closer relationship to changes in the levels of output than do respondents' expectations of these factors. However, even the respondents' expectations of future trends in these series still correctly 'predict' most of the major upturns and downturns in GDP. Overall, the results suggest the QSBO indicators are probably more suited to indicating turning points in economic activity, rather than predicting specific growth rates.

Appendix 1

Table 1
 QSBO Data
 Comparisons of Turning Points

Production GDP	Employment		Profitability		Overtime	
	last 3 months	next 3 months	last 3 months	next 3 months	last 3 months	next 3 months
1979:3	-2	-4	-3	-5	-2	0
1981:1	-2	-3	-3	-5	-2	-3
1982:1	-1	-2	-1	-2	-1	-3
1983:2	-1	-2	-1	-2	-1	-2
1984:4	0	-3	-2	-3	0	-3
1986:1	1	-1	0	-1	1	-1
1987:1	-1	2	-1	-1	-1	-2
1989:1	-2	-4	-3	-4	-2	-5
1990:1	-1	-2	-2	-2	-1	-2
1991:3	-1	-3	-2	-2	-1	-2

Note: Tables 1 and 2 show the relative timing of turning points in the unshifted QSBO series examined, relative to that of GDP. A minus indicates a turning point which preceded that of GDP in annual average terms.

Table 2
 QSBO Data
 Comparisons of Turning Points

Production GDP	labour turnover		capacity factor constraint	sales factor constraint	expected business situation	capacity utilisation
	last 3 months	next 3 months				
1979:3	0	-1	0	-1	-4	0
1981:1	-1	-2	1	-1	-5	-2
1982:1	0	-2	-2	-1	-3	1
1983:2	-1	-2	-1	-1	-2	0
1984:4	2	2	1	1	-5	0
1986:1	3	-1	1	-1	0	1
1987:1	0	1	-1	-2	-2	0
1989:1	-2	-4	-3	-3	-5	-3
1990:1	-2	-2	-2	-2	-2	-1
1991:3	-2	-2	-2	-1	-2	0

