Forecasting the Business Cycle in Canada¹

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¹. Update in December 2015.

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Introduction

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Introduction

• Managing an equity portfolio through the expansion and the recession phases of the economy is a challenging task. This is particularly true when there is a high degree of uncertainty about the state of the world economy. It is important to remember that the evolution of the economy does have a major incidence on the performance of the stock market.

• An important task in managing stock market assets is to have information on the near-term outlook for the state of the Canadian economy, notably on the likelihood of a reversal in the business cycle between expansion and recession phases. This is a very difficult undertaking and a time consuming task to do for financial planners and investment dealers, even more so for individual investors.

• The purpose of this document is to present the performance of a probit model in predicting the reversals to expansion and recession phases in the Canadian business cycle over the past five decades. A key feature of the model performance is the prediction (in-sample) of all the reversals in the business cycle since 1962 with no false alarms of a recession. Moreover, an out-of-sample simulation shows that the model can predict the reversals of 2008-2009 in the business cycle.

• Hence, the model predictions of entering a recession in Canada could provide unique insightful intelligence on investment decisions to individual investors, financial planners and wealth portfolio managers.
Description of the Forecasting Model

- In the model, the Canadian business cycle is characterised by two phases: an expansion or a recession. We used a traditional probit regression model (e.g. Estrella and Mishkin (1998)) to quantify the probability for Canada of being in a recession (expansion) at a given point in the future when the actual phase of the business cycle is expansionary (recessionary).

- The model includes a number of economic indicators for Canada, such as building permits, new orders, consumer confidence, and the yield curve.

- The probability is computed for a forecast horizon of one to three months.
  - For example, on September 17, 2013, we computed a probability for the months of August, September, and October November.

- The predicted outcome for the state of the economy is determined using the following 50% rule:
  - When an expansion exists, the model predicts the start of a recession if the probability is equal or greater than 50%. Otherwise, the model predicts that the expansion will continue.
  - When a recession exists, the model predicts the start of an expansion if the probability is equal or less than 50%. Otherwise, the model predicts that the recession will continue.

- Figure 1 (next slide) illustrates the monthly evolution of the probability for Canada of being in a recession (identified by the blue line) along with the recession periods (grey shaded area) since January 1962.

1. It is possible that one or very few explanatory variables of the model could explain the probability from rising from below to above 50%. In the future, when the model will give a signal of a reversal in the business cycle, the source of the change will be investigated in order to reduce as much as possible the risk of a making false signal.
Figure 1: Probability for Canada of Being in a Recession\(^1\): 1962-2015


* See Table 1 for the reference dates of the business cycle. The shaded area corresponds to recessions. The left hand side of a shade area corresponds to the start of the recession and the right hand side the end of the recession.
### Table 1
Forecasting the Reversals in the Business Cycle in Canada since 1962

<table>
<thead>
<tr>
<th>Reference Dates of the Business Cycle</th>
<th>Lead (-) / Lag(+) in Predicting the Start of the Recession (in months)</th>
<th>Lead(-) / Lag(+) in Predicting the Start of the Expansion (in months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak December 1974</td>
<td>Trough March 1975</td>
<td>0</td>
</tr>
<tr>
<td>January 1980</td>
<td>June 1980</td>
<td>0</td>
</tr>
<tr>
<td>June 1981</td>
<td>October 1982</td>
<td>0</td>
</tr>
<tr>
<td>March 1990</td>
<td>March 1991³</td>
<td>0</td>
</tr>
<tr>
<td>October 2008</td>
<td>May 2009</td>
<td>0</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>0.0 months</td>
</tr>
</tbody>
</table>

1. The results are based on the one-month ahead probability model.
Forecasting the Reversals in the Business Cycle: Key Results

- The model performs very well in predicting in-sample since 1962 the reversals in the Canadian business cycle with no false alarms of a recession.

- The model predicts correctly, i.e. with no lead or lag, the start of all the five recessions since 1962 (Table 1).
  - For example, the model predicted correctly the start of the recession in November 2008 when the probability increased from about 10% in October 2008 to 87% in November 2008, well above the threshold of 50% to signal a reversal in the business cycle.

- The model predicts correctly, i.e. with no lead or lag, the start of four of the five expansions since 1962 (Table 1). For the remaining expansion, the model predicts the start with a lead of one month.
  - For example, the model predicted the start of the expansion in May 2009 when the probability fell from 98% in April 2009 to 0% in May 2009, well below the threshold of 50% to signal a shift in the business cycle.

- Its ability to predict future reversals in the Canadian business cycle is evaluated using an out-of-sample simulation.
  - In simulation, the coefficients of the model were estimated using data from 1962 to 1999. Then, we computed the probability from 2000 to 2012.

- The result of the out-of-sample simulation, which are illustrated in Figure 7 in Annex B, shows that the model is remarkably stable and can predict the reversals in the business cycle during the last decade.
Annex A:
Forecasting the Reversals in the Business Cycle in Canada: A Review of Each Episode since 1962
Figure 2: Probability for Canada of Being in a Recession: 2008-2009\(^1\)
(probability, %)

Source: The Forecasting Advisor.
1. One-month ahead probability.
Figure 3: Probability for Canada of Being in a Recession: 1990-1991\textsuperscript{1}

(probability, %)

1. One-month ahead probability.

Source: The Forecasting Advisor.
Figure 4: Probability for Canada of Being in a Recession: 1981-1982
(probability, %)

Source: The Forecasting Adviser.
1. One-month ahead probability.
Figure 5: Probability for Canada of Being in a Recession: 1980\(^1\)
(probability, %)

1. One-month ahead probability.
Figure 6: Probability for Canada of Being in a Recession: 1975
(probability, %)

Source: The Forecasting Advisor.
1. One-month ahead probability.
Annex B: Forecasting the Reversals in the Business Cycle in Canada: Result of an Out-of-Sample Simulation
Figure 7: Probability for Canada of Being in a Recession: In- and Out-of-Sample Probabilities, January 2000 to December 2012

(probability, %)

Source: The Forecasting Advisor.
1. The out-of-sample probabilities are computed with coefficients of the model estimated from January 1962 to December 1999. In-sample probabilities are computed with the coefficients of the model estimated from January 1962 to December 2012.
References


