Now-casting the Japanese economy

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ABSTRACT

This paper proposes a formal statistical framework for the real-time monitoring of current economic conditions in Japan. We identify the 'market moving' indicators that are monitored constantly by market participants, statistical offices, newspapers, and policy makers. This results in the selection of around 30 variables. We track the release calendar and use vintages of real-time data in order to reconstruct the exact same information set that was available at the time when the forecasts were made. These variables are used to estimate a dynamic factor model (DFM) which is updated continuously at each new data release over a historical period of 11 years. Our results show that the proposed now-casting model tracks GDP realizations well throughout the evaluation period. The forecasts produced by the sophisticated yet transparent model are comparable with both the markets and the professional forecasts.

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1. Introduction

Japan is the third largest economy in the world in terms of the nominal gross domestic product (GDP), and the second largest developed economy (IMF, 2015). It is the world's third largest automobile manufacturing country (OICA, 2016), has the largest electronic goods industry, and is a leading nation in scientific research, particularly machinery and biomedical research. However, there is little information on the data flow, which is necessary for our understanding of current Japanese economic conditions.

Given that preliminary GDP data are released by the Japanese Cabinet Office with a delay of around 6 weeks,[1] market participants and policy makers need to make predictions regarding the current state of the economy relying on the information that they have available. The markets monitor the most relevant data series daily and update their view on the economy; for example, Bloomberg and Forex Factory publish a calendar of data releases assigning a measure of importance to each variable

according to the emphasis that the market places on those variables.

This article proposes a formal statistical framework for the real-time monitoring of current economic conditions in Japan. The first aim of the paper is to reconstruct the relevant information set, in order to identify the 'market moving' indicators for the Japanese economy. We investigate the economic variables monitored by the markets and the headline numbers identified by the Japanese Cabinet Office, the Bank of Japan, newspapers and other media, and create a list of 27 variables (including both hard and soft data, but also financial data and prices). The data selection process indicates that a relatively large number of surveys are monitored in Japan: indicators of the confidence of consumers, workers, and purchasing managers, but also surveys related to small businesses and the tertiary sector. However, not all of them are timely, with only the Purchasing Manager Index and the Economy Watchers' Survey being released within the first 10 days of the following month. We learn that production variables, such as industrial production and machine orders, are rated as important by the markets, even though their publication lags are around 30 and 38 days after the end

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[1] The delay for the US and the UK is around 4 weeks.

of the reference month, respectively. Financial data and prices, which are very timely, are also monitored, but are considered less relevant.[2]

Once the set of relevant variables has been identified, the second aim of this paper is to determine whether an automated model that is updated continuously at each new release is able to process this information as well as the markets and the professional forecasters, from the Japan Center for Economic Research (JCER).

It is only in recent years that academia has moved towards the incorporation of the more timely information from high frequency data into formal econometric forecasting models (Evans, 2005; Giannone, Reichlin, & Small, 2008), and this literature indicates that it is worthwhile to update the economic predictions often, as the incorporation of the continuous data flow makes the forecasts increasingly more accurate.

Following this literature, we estimate a dynamic factor model (DFM), taking into account the ragged-edged shape of the dataset as per Giannone et al. (2008). By tracking the release calendar and using vintages of real-time data, we reconstruct the exact information set that was available at the time when the forecasts were made, and we mimic what the model would have produced as outputs if it had been used continuously over a historical time period of 11 years (2005–2015).

There has been a lot of interest to date in applying this statistical environment to various countries. The most commonly studied countries are the US (Lahiri & Monokroussos, 2013) and the euro area (Angelini, Bańbura, & Rünstler, 2010; Angelini, Camba-Méndez, Giannone, Reichlin, & Rünstler, 2011; Camacho & Perez-Quiros, 2010), though there are also studies of individual European countries, including France (Barhoumi, Darné, & Ferrara, 2010), Germany (Marcellino & Schumacher, 2010), Ireland (D'Agostino, McQuinn, & O'Brien, 2008; Liebermann, 2012), and Norway (Aastveit, Gerdrup, Jore, & Thorsrud, 2012; Luciani & Ricci, 2014), to cite a few. More recently, studies have been published in the now-casting literature on developing countries including China (Giannone, Agrippino, & Modugno, 2013; Yiu & Chow, 2010), Indonesia (Luciani, Pundit, Ramayandi, & Veronese, 2015), Brazil (Bragoli, Metelli, & Modugno, 2015) and Mexico (Caruso, 2015).

Surprisingly, though, very little attention has been devoted to Japan. Previous studies have limited their analysis to the forecasting of monthly series, such as industrial production, but omitting GDP developments (Fukuda & Onodera, 2001; Shintani, 2005). Godbout and Lombardi (2012), on the other hand, use a mixed frequency factor model to forecast Japanese GDP, assessing the relative importance of factor models over different samples and including a long list of input variables.

Unlike the aforementioned literature on now-casting in Japan, the main contribution of this paper is the construction of a list of 'market moving' indicators. Fukuda and Onodera (2001) and Shintani (2005) select a small number of indicators arbitrarily, while Godbout and Lombardi (2012) feed their model with a vast list of variables without rationalizing their choices. This paper, on the other hand, identifies the variables that are important for decision makers who can be viewed as now-casters; that is, who update their predictions about the economy in real time as new market data become available. In addition, the model that we present not only updates the prediction of current quarter real GDP growth each time a new variable is released, but also calculates 'the news' for each input variable, i.e., the surprise relative to the model's expectation. Only if the new release is different from what was expected will the now-cast be revised. This feature allows each data release to be interpreted in terms of the signals that it gives about current economic conditions. We show the forecast performance and impact in improving the accuracy of the model's predictions for each input series used in the model.

Our results show that the proposed now-casting model tracks GDP realizations well throughout the evaluation period (from 2005:Q1 to 2015:Q4), in spite of the different economic events that have characterized the Japanese economy in the sample considered: low growth in the first period, the Great Recession in 2009 and the Great Earthquake in 2011. The forecasts produced by our sophisticated, yet transparent, model are comparable with both the markets (Bloomberg Survey) and the professional forecasts produced by the JCER. The inclusion of financial variables and prices, even if very timely, does not add much to the now-casting performance of the model. In terms of evaluation performances, the results for Japan are similar to those found by the now-casting literature for the US and the euro area.

The remainder of the paper will focus on understanding how the now-casting model works for the Japanese economy. We will begin by considering the calendar of the most important 'market moving' indicators. The model will then be described, together with the now-cast updating mechanism. Finally, we will present some of the results from the evaluation exercise and the comparison with the professional forecasters.

2. Variable selection

We follow Bańbura, Giannone, Modugno, and Reichlin (2013) and consider only the variables that are monitored by the markets and the headline numbers that are identified by national statistical offices, central banks, local newspapers, and other media.[3]

The rationale for this approach is that market participants can be viewed as now-casters. They monitor macroeconomic data and use them to form their expectations about the state of the economy in order to allocate their investments. Since we believe that market participants know the series that it is relevant to monitor, it makes sense to

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[2] Similar patterns of releases are present in other developed economies. For example, in the US, financial data are disseminated around the end of the current month, PMI manufacturing in the first days of the following month, and industrial production 15–17 days after the end of the reference month.

[3] The only exception is the Tankan Survey, which we exclude because its sample length is too short.