International Journal of Forecasting 32 (2016) 1369–1384

Contents lists available at ScienceDirect

International Journal of Forecasting

journal homepage: www.elsevier.com/locate/ijforecast

Nowcasting Turkish GDP and news decomposition

Michele Modugno[a], Barış Soybilgen[b,*], Ege Yazgan[b]

[a] Board of Governors of the Federal Reserve System, Washington DC, United States
[b] Istanbul Bilgi University, Turkey

ARTICLE INFO

Keywords:
Dynamic factor model
Nowcasting
Gross domestic product

ABSTRACT

Real gross domestic product (GDP) data in Turkey are released with a very long delay relative those of to other economies, between 10 and 13 weeks after the end of the reference quarter. This means that policy makers, the media, and market practitioners have to infer the current state of the economy by examining data that are more timely and are released at higher frequencies than the GDP. This paper proposes an econometric model that allows us to read through these more current and higher-frequency data automatically, and translate them into nowcasts for the Turkish real GDP. Our model outperforms the nowcasts produced by the Central Bank of Turkey, the International Monetary Fund, and the Organisation for Economic Co-operation and Development. Moreover, our model allows us to quantify the importance of each variable in our dataset for nowcasting Turkish real GDP. In line with the findings for other economies, we find that real variables play the most important role; however, contrary to the findings for other economies, we find that financial variables are as important as surveys.

1. Introduction

Policy makers and market participants need to infer the current state of the economy in order to inform their policy decisions and investment strategies. One of the main indicators that they look at is the real gross domestic product (GDP), which shows the overall health of the economy. However, it is usually released with a delay relative to the reference quarter. In particular, for the Turkish economy, GDP is released between 10 and 13 weeks after the end of the reference quarter. This very long delay in the release of the Turkish GDP relative to developed economies is because no early or advance estimates are produced. For example, early estimates of the US and euro-area GDPs are released four and six weeks after the end of the reference quarter, respectively. Therefore, the usual practice in Turkey is to infer the current state of the economy by analyzing data that are released in a more timely manner than GDP, at a higher frequency. For example, two real variables, the industrial production index and the unemployment rate, are released six and 10 weeks after the end of the reference month, respectively, making them more timely than GDP. Moreover, surveys such as the capacity utilization rate, the consumer confidence index, and the real sector confidence index are released a few days before the end of the reference month, while financial data such as the real effective exchange rate are released a few days after the reference month. Inferring the state of the economy by interpreting numerous variables that are characterized by differences in definitions, frequencies, and lags is a difficult task. However, we can overcome this challenge using an econometric framework that translates all sorts

* Corresponding author.
E-mail addresses: michele.modugno@frb.gov (M. Modugno), baris.soybilgen@bilgi.edu.tr (B. Soybilgen), ege.yazgan@bilgi.edu.tr (E. Yazgan).

http://dx.doi.org/10.1016/j.ijforecast.2016.07.001
0169-2070/Published by Elsevier B.V. on behalf of International Institute of Forecasters.

of data into a nowcast of GDP, summarizing scattered information into a unique index of the overall health of the Turkish economy.

Following the seminal paper of Giannone, Reichlin, and Small (2008), this study nowcasts GDP using a dynamic factor model (DFM). DFMs are natural tools for nowcasting variables such as the GDP because they allow us to exploit the more timely variables in order to predict those released with longer delays, by capturing the co-movement among a potentially large set of variables. Indeed, these models have been applied successfully to the nowcasting of GDP for various different countries: Belgium by de Antonio Liedo (2014), Brazil by Bragoli, Metelli, and Modugno (2015), China by Giannone, Agrippino, and Modugno (2013) and Yiu and Chow (2010), the Czech Republic by Arnostova, Havrlant, Rùžièka, and Tóth (2011), France by Barhoumi, Darné, and Ferrara (2010), Indonesia by Luciani, Pundit, Ramayandi, and Veronese (2015), Ireland by D'Agostino, McQuinn, and O'Brien (2013), Mexico by Caruso (2015), the Netherlands by de Winter (2011), New Zealand by Matheson (2010), Norway by Aastveit and Trovik (2012), and the BRIC (Brazil, Russia, India and China) countries and Mexico by Dahlhaus, Guénette, and Vasishtha (2015).[1] Moreover, the same framework has also been applied to the nowcasting of variables other than real GDP; see D'Agostino, Modugno, and Osbat (2015) for euro area trade variables and Modugno (2013) for US inflation, among others.

One crucial point when using DFMs for nowcasting is the choice of an estimation methodology that suits the needs of the task at hand: dealing with a dataset that is characterized by different frequencies, time spans, and delays. We follow the procedure proposed by Bańbura and Modugno (2014); i.e., a modified version of the expectation–maximization (EM) algorithm for maximum likelihood estimation.[2] This procedure has two important advantages over competing procedures for estimating a DFM. First, the methodology of Bańbura and Modugno (2014) can easily address mixed-frequency datasets with an arbitrary pattern of data availability, exploiting their information content fully for both the parameter estimations and the signal extraction. Second, maximum likelihood estimation is more efficient for small samples. Turkey is a young, newly industrialized economy, so institutions have only recently started collecting economic data. As a result, our dataset is short and contains data that cover different time periods.

We nowcast both seasonally adjusted (SA) quarter-on-quarter (QoQ) GDP growth rates and non-SA (NSA) year-on-year (YoY) GDP growth rates between 2008:Q1 and 2013:Q4 with a medium-scale mixed frequency dataset that includes 15 variables. The dataset is constructed using publicly available time series that are followed by the media, economists, and financial sector practitioners. We perform two out-of-sample exercises. In the first exercise, we nowcast the SA QoQ GDP and NSA YoY GDP. We abstract from data revisions, but require our dataset to replicate the data availability as it was at the time when the forecast would have been generated. This is a "pseudo real-time" exercise, and we show that the GDP nowcasts obtained with our model in this context outperform those obtained with univariate and "partial" models.[3] In the second exercise, we nowcast NSA YoY GDP growth rates and compare our predictions with those produced by (1) the International Monetary Fund (IMF), available in the World Economic Outlook Database (WEOD); (2) the Organisation for Economic Co-operation and Development (OECD), available in the Economic Outlook (EO), and (3) the Central Bank of Turkey (CBRT), collected in the survey of expectations (SoE). This comparison shows that our DFM outperforms the professional forecasters. In order to have a fair comparison with the nowcasts produced by these institutions, we construct a "partial" real-time dataset to account for the effects of data revisions on the nowcast accuracy. The dataset is a "partial" real-time one because we have vintages for the sample that we analyze for only eight of the variables included in our dataset. The other series are included following the "pseudo" real-time approach.[4]

Only two studies in the literature have nowcasted Turkish GDP growth rates. Akkoyun and Günay (2012) used a dynamic one-factor model with a small-scale dataset, including three real variables and one survey, to nowcast SA QoQ GDP growth rates between 2008:Q1 and 2012:Q2, and compare their model with an autoregressive (AR) model. They find that their model outperforms the benchmark model. We use a more comprehensive dataset than Akkoyun and Günay (2012), which allows us to understand which variables are informative for nowcasting Turkish GDP. We find that financial variables such as the REER and financial accounts, which are monitored closely by both policy makers and the market practitioners, are as important as surveys such as the CCI, the RSCI, and the CUR for nowcasting SA QoQ GDP growth rates. None of these financial and survey variables are considered by Akkoyun and Günay (2012).[5] Ermişoğlu, Akçelik, and Oduncu (2013) nowcast QoQ GDP growth rates for the period between 2011:Q1 and 2012:Q4 by forming bridge-type single equations that include the purchasing manufacturing index (PMI) and credit data. To form bridge equations, monthly variables are converted into quarterly variables. Then, a regression or series of regressions that includes the GDP as a dependent variable and other

1 See Bańbura, Giannone, Modugno, and Reichlin (2013) for a survey of the literature on nowcasting.

2 The EM approach for maximum likelihood estimation in the case of small-scale DFMs was first proposed by Shumway and Stoffer (1982) and Watson and Engle (1983). Later, Doz, Giannone, and Reichlin (2012) proved that maximum likelihood estimation is also feasible for large-scale DFMs, and Bańbura and Modugno (2014) modified the EM algorithm to account for arbitrary patterns of missing data and the serial correlation of the idiosyncratic component. Jungbacker and Koopman (2015) and Jungbacker, Koopman, and Van der Wel (2011) further showed how the computational efficiency of the methodology could be improved.

3 See Bańbura et al. (2013) for a definition of "partial" models.

4 We do not do the same with SA real GDP because it has been being published for only a short time, and real time vintages are not available.

5 Our model does not include the purchasing managers index (PMI) used by Akkoyun and Günay (2012) because the PMI is provided by a private company for a fee, and, as a result, is not available to the larger public.