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Green shoots and double dips in the euro area: A real time measure

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ABSTRACT

In order to perform real-time business cycle inferences and forecasts of GDP growth rates in the euro area, we use an extension of the Markov-switching dynamic factor models that accounts for the features of the day-to-day monitoring of economic developments, such as ragged edges, mixed frequencies and data revisions. We provide examples that show the nonlinear nature of the relationships between data revisions, point forecasts and forecast uncertainty. Based on our empirical results, we think that the real-time probabilities of recession inferred from the model are an appropriate statistic for capturing what the press call *green shoots*, and for monitoring *double-dip* recessions.

1. Introduction

In 2008/09, the euro area faced the most serious economic recession it has experienced since its creation. To stimulate the economic situation, a comprehensive set of aggressive fiscal stimulus measures and accommodative monetary policies were implemented, either at the European level or by the State Members, within the framework of the European Action Plan and the subsequent Commission Communications and ECB (European Central Bank) guidelines. These emergence measures led to a subsequent recovery period, the early signals of which were monitored by analysts, policy makers, and journalists with unprecedented levels of interest. In those days, the term *green shoots* became popular as a way of referring to the signs of the economic recovery. However, the counter-cyclical measures adopted in the course of the recession gave way to a progressive deterioration of public finances in the euro area, which, along with a wave of downgrading of the government debts of some Member States, created an increasing loss of confidence among investors. As a result, the combination of tight credit conditions and fiscal austerity measures which occurred in 2010 and 2011 put significant downward pressures on the euro area's GDP growth. At the end of 2011, the media started to suggest that the euro area had probably entered a *double-dip* recession.

Needless to say, the use of the terms 'green shoots' and 'double-dip recessions' has not always been based on scientific criteria, for two main reasons. First, the terms are very imprecise, leaving the users of the terms to identify where, when and how the recovery starts and ends, basically depending solely on their own beliefs. Since the signals of recoveries do not appear in all of the economic indicators with the same intensities at the same times in different sectors, skeptical users will be inclined to accentuate the negative signals of some indicators, while optimistic users will tend to stress the positive signals of some others. Possibly this imprecision of the definitions also takes away from the meaning of international

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comparisons among these so-called green shoots and double-dip recessions. Second, in the search for green shoots and double-dip recessions, the recent advances in information technology mean that the number of indicators with relevant information about the economic evolution is growing exponentially and with an unprecedented updating frequency. The cost of checking the publication calendar of these indicators, with their latest releases and their subsequent revisions in real time, makes it very difficult for the analysts to check whether the shoots are actually green or the recession is coming back.

The aim of this paper is to provide economic agents with statistical definitions of the terms 'green shoots' and 'double-dip recessions' which are very easy to interpret, and can be timely and updated automatically. In particular, we define the term 'green shoot' as the existence of a low probability of being in a recession at time t, based on the information from a set of key economic indicators available up to this period after a period of recession. In the same way, we consider that a region enters a double-dip recession when a short period of low recession probabilities observed after a recession is followed by high recession probabilities again. These definitions overcome the two previously-stated problems associated with the increasing use of the terms 'green shoots' and 'double-dip recessions'. First, the probability of recession is a precise term. The inferences about the state of the cycle are computed from a statistical model applied to data, which are then transparent and objective. In addition, since recession probabilities are free of units of measurement, international comparisons can be allowed easily. Second, since the inference is performed based on a set of economic indicators that are considered to be representative of the overall economic activity, the resulting recession probabilities become "sufficient statistics" for the analysts who benefit from the subsequent time-savings and cost reductions in monitoring the euro area business cycles.

In order to compute recession probabilities in the euro area in a timely manner, we use an extension of the Markov-switching dynamic factor model. These models were initially developed by Chauvet (1998), Kim and Nelson (1998) and Kim and Yoo (1995) for combining the dynamic-factor approach, which captures the notion of comovements across economic indicators, and the Markov-switching framework, which captures the regime shifts observed in the dynamics of these indicators. Camacho, Perez-Quiros, and Poncela (2012a) found that this fully nonlinear multivariate specification outperforms the "shortcut" of using a linear factor model to obtain a coincident indicator, which is then used to compute the Markov-switching probabilities from univariate nonlinear models. Chauvet and Hamilton (2006), Chauvet and Piger (2008), and Hamilton (2011) examined the empirical reliability of these models in computing real-time inferences of the US business cycle states. Camacho, Perez-Quiros, and Poncela (2012b) extended the Markov-switching dynamic factor model in order to deal with the typical difficulties of the timely day to day monitoring of the economic activity, such as mixed frequencies and ragged ends.

Along the same lines, we extend the linear Euro-STING dynamic factor model suggested by Camacho and Perez-Quiros (2010) to be able to deal with Markov-switching dynamics. Using Camacho et al.'s (2012b) suggested nonlinear extension of the approximate linear Kalman filter proposed by Mariano and Murasawa (2003), the model is able to handle quarterly and monthly indicators, and to fill in the gaps that characterize the publication of such asynchronous data. Notably, this paper provides strong evidence of the nonlinear nature of the data generating process.

The model is applied to euro area data in order to obtain an indicator of the overall economic activity and to compute business cycle inferences. We find that the model exhibits a remarkable ability to track the CEPR (Center for Economic Policy Research) Business Cycle Dating Committee chronology, as captured in the state probabilities for the overall economic indicator. Unlike the CEPR committee, our method dates in terms of months rather than quarters. However, in dating the euro area business cycles, our method should be treated as complementary to other dating methods, such as those reviewed by Anas, Billio, Ferrara, and Lo Duca (2006), not as replacing them.

In spite of its outstanding performance in dating the historical euro-area business cycles, the model's chief usefulness lies in its significant improvements over the Dating Committee in terms of the speed with which business cycle peaks and troughs are identified. In order to examine the timeliness of the model in providing automatic early warning signals about economic downturns in the euro area, we construct a real-time dataset, the vintages of which were collected for this article and have not previously been applied in any other analysis of real-time business cycle dating. This dataset is used in several forecasting exercises, which lead to the following interesting results. First, we show that the model provides a significant improvement in the speed with which turning points in the euro area business cycle are identified. Although the Committee's mission is to establish the chronology of the euro area business cycle, it is probably more concerned with establishing the correct turning point dates than with establishing these dates quickly, and therefore, peak and trough dates are often determined with a substantial lag.[1] Notably, our model is able to identify the euro area turning points almost in real time, while exhibiting a low rate of false signals.

In addition, the Committee members may base their decisions partly on their own judgements. Consequently, the Committee's decisions represent a consensus of the individuals, and cannot be replicated easily. In contrast, our proposal seeks to avoid these problems by using a simple algorithm which, while retaining the speed necessary for the real-time monitoring of turning points in the euro area, has the advantage of computing inferences from a

[1] For instance, the Committee concluded on March 31th, 2009, that economic activity in the euro area peaked in the first quarter of 2008, and determined on October 4th, 2010, that a trough in economic activity occurred in the second quarter of 2009.