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New measures of monetary policy surprises and jumps in interest rates ☆

Ángel León [a], Szabolcs Sebestyén [b,*]

[a] Dpt. Métodos Cuantitativos y Teoría Económica, Universidad de Alicante, San Vicente del Raspeig, 03080 Alicante, Spain
[b] ISCTE-IUL Business School, Avenida das Forças Armadas, 1649-026 Lisbon, Portugal

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ABSTRACT

We propose new surprise measures to characterise two important dimensions of monetary policy. Our measures outperform the traditional monetary shocks in explaining variation of interest rates in the event-study framework. We also study the extent to which the ECB caused jumps in euro area interest rates. The new surprises still prevail upon the traditional ones. Jumps play a great role in the variation of interest rates and the ECB induced several jumps with its decisions, but its predictability has improved over time. We find that, although the surprise measures become somewhat distorted due to money market tensions during the financial turmoil, our model still provides an interesting insight into interest rate behaviour throughout the crisis.

1. Introduction

If William Shakespeare had lived over the last decade or so, he could have hardly found more interesting characters for his plays than central banks in that their words are at least as effective as their deeds. Modern monetary policy is much more than just changing a specified target rate. Instead, central banking has become rather an art of shaping market expectations across the term structure of interest rates, which henceforth affects the economic agents' investment decisions and the real economy. For an effective implementation of monetary policy, central banks have given a bigger weight on communication than ever before, and are using it as a key tool to manage expectations of future interest rates and inflation. As Woodford (2003) states: *"Not only do expectations about policy matter, but... very little else matters"*.

A monetary policy decision consists of two parts: the first is the decision itself whether or not to change the target rate, and if so, to what extent. The second part is a statement which is released with (or following) the decision, and explains the rationale underlying the decision. Although the first component only affects the policy rate and very short-term market rates, it is part of the whole decision whose aim is to steer market expectations on longer horizons, and this objective is achieved through the statement. Hence, these two parts should not be separated, since they exert influence jointly on the markets. To illustrate, for example, take two 50 basis point increases in the policy rate, one accompanied by a statement of no changes in the near future, while the other accompanied by a statement which considers the current move as a start of a tightening process. The decision component is the same in both cases, but their message and impact on longer horizon interest rates are evidently completely different.

Effective communication implies better predictability of monetary decisions as the markets are able to price the impact of a decision even *before* it actually takes place. As a consequence, only unexpected monetary decisions affect interest rates after the decision is released (see Kuttner, 2001). Measuring monetary surprises and assessing their effects on interest rates provide important information for policy-makers for several reasons. First, they help the understanding of the functioning of financial markets in that policy makers can gauge how investors interpret monetary decisions and revise their expectations, as well as whether decisions are consistent with market expectations. Second, by identifying

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* Corresponding author. Tel.: +351 217 903931.
E-mail addresses: aleon@ua.es (Á. León), szabolcs.sebestyen@iscte.pt (S. Sebestyén).

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the asset classes which are the most sensitive to monetary decisions central banks can examine how effectively the monetary transmission mechanism works.

Following Kuttner (2001) a broad literature has emerged to quantify the impacts of monetary surprises on asset prices. The unexpected component of monetary decisions is usually measured as the daily difference of some very short term interest rate on monetary meeting days.[1] Alternatively, some survey-based measures have also been constructed. While these surprise measures have widely been used in the literature, they have at least two drawbacks. First, Rigobon and Sack (2004, 2008) emphasise the possible endogeneity between the surprise and the asset price on which its effect is to be estimated, and the omitted-variables problem, i.e. that other variables other than the monetary surprise may affect asset prices in the given time interval. On the other hand, survey-based measures may suffer from measurement errors. While they propose estimators which are void of these problems, these are still subject to the second drawback that a surprise measure, based on either approaches, cannot reflect all dimensions of monetary decisions.

Gürkaynak et al. (2005) raise the following question: how many dimensions are necessary to adequately characterise monetary policy decisions? They let the data determine the surprise through principal component analysis and find that two factors are sufficient. While Gürkaynak et al. (2005) greatly recognise that to describe monetary decisions more than one dimension is required, the factors are constructed in a way that they separate the two components of a monetary decision described above. Their first factor only deals with the current target and the other corresponds to longer horizon impacts. Whereas the latter is relevant, the former does not provide much insight into the nature of a monetary decision. It is not surprising then that they find that the second factor plays a great role in explaining the variation of longer term rates.

The objective of this paper is twofold. First, we propose new monetary surprise measures which describe important dimensions of monetary policy. We rely on the methodology of Gürkaynak et al. (2005), but our factors supply two dimensions of monetary decisions which are more useful in the understanding how central banks shape market expectations across the yield curve than the previously proposed factors in the literature. Particularly, the *level* factor corresponds to decisions which shift the yield curve level, while the *slope* factor reflects monetary decisions causing changes in the slope of the term structure. Both are key variables, since the level of the yield curve is consistent with the markets' long-term inflation expectations and the slope appears to be a good predictor of the business cycle (see Estrella and Hardouvelis, 1991). Moreover, we discuss methodological problems in Gürkaynak et al. (2005) and provide improvements.

We find, in the standard event-study framework, that the structural interpretation of our level and slope factors is adequate, they considerably outperform the traditional surprises and explain much more of the daily variation of interest rates on the European Central Bank (ECB)'s meeting days. The estimation results provide compelling evidence that the two factors represent important dimensions of the ECB's monetary policy.

The second objective is to evaluate the impacts of monetary surprises on euro area interest rates and assess the ECB's predictability in a novel way. Central banks prefer to steer expectations in a smooth way and thus avoid to induce abrupt movements in interest rates. We build an econometric model which disentangles diffusive and jump information flows and examine the extent to which monetary decisions are related to jumps. Both the jump arrival process and the jump distribution evolve over time as a function of monetary surprise variables. Our model produces time series of jump probabilities, which allow us to analyse whether the ECB's monetary decisions were incorporated smoothly into interest rates of different maturities or instead induced sharp adjustments. Moreover, we can study how the ECB's predictability changed over time since the introduction of the euro in 1999, and which decisions caused the biggest jumps in interest rates.

We find that our new monetary surprise measures still prevail upon the traditional surprises in most cases. In addition, our results show that the ECB caused jumps mostly in the first half of the sample period, a learning period for both the ECB and the markets, and that the jump frequency reduced considerably when the ECB switched to hold meetings less frequently. We also find that the contribution of jumps to total volatility is substantial, especially in the short term, suggesting that jumps play a great role in the daily variation of euro area interest rates. Moreover, monetary surprises associated with jump innovations are incorporated more quickly into current rates than those associated with normal innovations. Our model also appears to be robust to additional variables other than monetary surprises, particularly macroeconomic news surprises and monetary surprises of other central banks, as the response coefficients of monetary surprises are essentially unchanged, and the model-implied jump characteristics change only slightly.

Although we estimate our model over the sample period which ends on December 29, 2006, we also consider a longer sample including the recent financial turmoil both to study how our surprise measures are affected by the crisis and to check the performance of our monetary-jump model. We find that the monetary surprise measures involving Euribor rates are somewhat distorted due to money market tensions in 2008–2009. The impacts of this distortion are evident from our estimation results. Nonetheless, the estimates are similar to those of the shorter sample.

On the other hand, our findings warn against a blind use of conventional monetary policy surprises in times of serious money market tensions. The recent crisis has required the implementation of unconventional monetary measures and the relevance of target rate changes has considerably reduced, whereas other – formerly much less important or completely irrelevant – factors, such as quantitative and credit easing, have been brought into limelight. These factors, jointly with the increased and volatile spread between unsecured and secured rates, must explain to a great extent the distortions of our surprise measures. This issue is beyond the scope of our paper, although it is an important direction for our future research. Moreover, our sample period mainly consists of "calm" times (so does the history of monetary policy) when monetary policy is pursued in a conventional way, and our paper can provide important lessons for central banks regarding predictability and measurement of the effects of unexpected decisions.

The paper is structured as follows. Section 2 discusses the statistical properties of the data used. In Section 3 we briefly overview the literature on monetary surprises, we analyse the possible caveats, and also introduce the principal component methodology. The section then provides the details of our new monetary surprise measures and the interpretation and descriptive analysis of the new factors. Section 4 deals with the econometric framework. It describes first the event-study setting and presents the estimation results. The second part of the section introduces our monetary-jump model in detail and reports some preliminary results. Section 5 presents and discusses the results of the monetary-jump model. Finally, Section 6 concludes.

2. Descriptive statistics of the interest rate data

The interest rate data analysed here consist of daily observations in euro area interest rates. Since the euro area is a currency

[1] Or, if intraday data is available, the variation over a narrow window surrounding the decision.