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Response of Spanish stock market to ECB monetary policy during financial crisis

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ABSTRACT

The present paper analyzes the effects of ECB monetary policy on the Spanish stock market returns. The data sample run all over the euro period: from January 1999 to December 2014. This period is split into two well-defined sub-periods based on the structural change brought about by the financial crisis in August 2007. Spanish stock market returns are approximated by the returns of the selective index Ibex 35 while monetary policy of the Eurozone is measured by the nominal target interest rate on the last day of the month. With regard to the methodology, as I am interested in the long-term relationship between the two variables aforementioned, a structural vector autoregressive (SVAR) model. The results show that monetary policy shocks have a considerable effect on the Spanish stock market returns in the long run. The results also show that monetary policy shocks of the ECB monetary policy lead to a different long-term effect in the pre-crisis period and the post-crisis sample.

1. Introduction

As is well known, European Central Bank (ECB) monetary policy authorities can influence stock market returns via different channels, such as the interest rate channel, the credit channel, the asset price channel, the exchange rate channel and the expectations channel (ECB, 2010). One of these channels, the asset price channel, based on the Ando and Modigliani (1963) and Tobin's *q* (1969) theories, is the focus of the present paper. The great number of changes in financial markets that have changed the existing framework of both the international and national financial fields (Rajan, 2006) and the form in how financial transactions are made, and thus in assuming risk, have led monetary policy decision-makers to analyze how their measures affect financial markets in this new environment. Furthermore, recent research (Gambacorta, 2009; Bekaert et al., 2013; Nave and Ruiz, 2015) suggests that benign economic environments might promote excessive risk taking and might actually make the financial system more fragile. Therefore, since the financial crisis began in mid-2007, monetary policy may have promoted financial markets instability (Altunbas et al., 2010; Gambacorta and Marques-Ibanez, 2011; Mishkin, 2011).

In this context, this study is designed to analyze the relationship between monetary policy and stock prices of the Spanish equity market before and after the financial crisis started. This focus is why the monetary policy of reference is led by the ECB and why the period of analysis is limited to the beginning of the third phase of the Economic and Monetary Union in January 1999. However, in the spirit of Patelis (1997), who found that increases in the federal funds rate have a significant negative impact on predicted stock returns in the short run, but a positive one at longer horizons, I am interested not only in the contemporaneous relation between monetary policy and stock prices, but also in the cumulative long-term effect of monetary policy on stock prices.

Among the usual methodologies applied in this context, a structural VAR approach is adopted as in Crowder (2006), since it is the only method that fits with the research goal. Alternative methodologies as the event study methodology (Bredin et al., 2007; Fiordelisi et al., 2014) and the heteroskedasticity approach (Rigobon, 2003; Rigobon and Sack, 2004; Bohl et al., 2008) are only appropriate to analyze the behavior of stock prices around the monetary policy interventions. Certainly, the short-run market response can be suggestive of policies' long-term effectiveness (Ait-Sahalia et al., 2012), but only that. On the other hand, methodologies based on regression analysis (Angeloni and Ehrmann, 2003; Napolitano, 2009) do not avoid endogeneity problems between monetary policy shocks and stock prices. Instead, the structural VAR is a popular approach among macroeconomists to analyze whether monetary shocks have real effects avoiding endogeneity problems among variables, and the inclusion of asset prices in such models along with other proxies of the underlying economy would

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be useful in settling the issue of measuring the specific long-term effects of monetary policy on financial markets.

The literature that assesses the impact of monetary policy on stock prices is mainly focused on U.S. markets (Patelis, 1997; Thorbecke, 1997; Bomfim, 2003; Ehrmann and Fratzscher, 2004; Rigobon and Sack, 2004; Bernanke and Kuttner, 2005; Gürkaynak et al., 2005; Crowder, 2006; Davig and Gerlach, 2006; Chen, 2007; Bjørnland and Leitemo, 2009; Chuliá et al., 2010; Rangel, 2011; Rosa, 2011; Galí and Gambetti, 2014) with the exceptions of Fiordelisi et al. (2014) that measure a "global" effect, and Angeloni and Ehrmann (2003), Bohl et al. (2008), Napolitano (2009), and Bredin et al. (2009) that are focused on European markets. We can also find several papers that analyze the impact of monetary policy shocks in stock market centered in particular countries, as Bredin et al. (2007) and Gregoriou et al. (2009) for the UK, Vithessonthi and Techarongrojwong (2012) for Thailand, Jain et al. (2011) for Australia, Duran et al. (2012) for Turkey and Koivu (2012) for China, among others.

However, none of the papers that included the ECB policy and Eurozone markets is aimed to analyze the cumulative long-term effect of monetary policy shocks on stock prices. On the other hand, only the works by Fiordelisi et al. (2014) and Galí and Gambetti (2014) deal with the financial crisis period, although those are not related specifically to the ECB policy and Eurozone markets, but are focusing on the short-run market response. Moreover, as their analysis is limited to the financial crisis period, they cannot measure the differences, if any, of the monetary policy effects on stock prices due to the economic turmoil.

Previous studies in an international finance context (Andersen et al., 2007; Ammer and Wongswan, 2007; Craine and Martin, 2008; Albuquerque and Vega, 2009) suggest that national equity markets are positively correlated to macroeconomic global factors. Others (Wongswan, 2006; Ammer et al., 2010; Laeven and Tong, 2012; Jinjarak, 2013) used the Fed monetary policy stance as a global macroeconomic factor or examined the effect of Fed monetary policy shocks on foreign equity indexes. To take into account this global factor is the reason why I also include the US monetary policy in the analysis.

Thus, to the best of my knowledge, this paper contributes to the previous literature in two ways: It is the first one focused on measuring the cumulative long-term effect of the ECB monetary policy shocks on Spanish stock prices; secondly, it is the first one focused on measuring differences on that effect, if any, due to the recent financial crisis.

The remainder of this paper is structured as follows: Section 2 gives a short introduction to the methodology used. Section 3 describes the factors, variables and data used in the analysis. Section 4 presents the main results. Finally, in Section 5 the conclusions are summarized.

2. Methodology

A SVAR model is a system of simultaneous equations that allows us to analyze interactions among the variables that compose the model, where the contemporary values of the variables appear as explicative variables in different unrestricted equations. That is, the same group of explicative variables appear in each of the equations. Each variable, being all considered endogenous, is then explained by its own lagged values and by the current and past values for the rest of the variables in the system. The VAR model is a generally accepted way to analyze relationships within a group of variables and is used extensively in the literature on monetary policy, where shocks in this policy are interpreted as represented by the shocks in the monetary policy equation included in the model.

In the SVAR model I consider five endogenous factors presented in the next section are considered, that is, the direction of ECB monetary policy (ecbmp), the Spanish stock market return (spsr), the European business cycle (eubc), the domestic inflation as target in the domestic monetary policy (inf), and the direction of FED monetary policy (fedmp) to control for the effects of US monetary policy on the other factors considered (Rigobon, 2003; Nave and Ruiz, 2015). These factors are collected using vector $X_t = (\text{fedmp}_t,;\text{eubc}_t, \text{inf}_t, \text{ecbmp}_t, \text{spsr}_t)$.

Without losing generality, we can consider the following structural VAR without constants:

$$AX_t = \Phi X_{t-1} + \varepsilon_t \quad (1)$$

where A is a matrix containing the parameters of contemporary relationships between the endogenous variables of the model; X_{t-1} is a matrix of the endogenous variables lagged for one period; Φ is a matrix of the model parameters; and ε_t is the vector of structural shocks, i.e., the components of the endogenous variable that are not explained by the model.

To estimate the above SVAR model I must formulate it as a reduced VAR and rewrite (1) in the following way:

$$X_t = BX_{t-1} + C\varepsilon_t \quad (2)$$

where B is $A^{-1}\Phi$, and C is A^{-1}.

To correctly identify the structural relationship, I must add restrictions in the SVAR; to do this the Cholesky decomposition of the estimation of the covariant variances matrix is used. This decomposition places restrictions on matrix A, which gathers contemporary relationships. Now the order of variables becomes especially relevant because depending on their position within vector X the variable values are to be explained by the contemporary values of the other variables or not.

We can order variables taking into account both the economic logic confirmed by empirical evidence and the final objective of the analysis. Namely, I allow that the Spanish stock market return responds instantaneously to FED and ECB monetary policy shocks. The direction of ECB monetary policy also responds instantaneously to the direction of FED monetary policy without the same happening in reverse, although in this case, this restriction would have little importance given the objective of this study.

3. Factors, variables, sample and data

The period of analysis considered in this study begins in January 1999, the date when the Euro was introduced along with the common monetary policy run by the ECB (Fahr et al., 2013), and ends in December 2014. Thus, the whole sample covers 192 observations of monthly data. The period includes two well-defined sub-periods based on the well-known structural change brought about by the financial crisis in August 2007. The pre-crisis sub-period sample covers the first 103 monthly observations, and the post-crisis (start) sub-period sample covers the following 89 months.

The five factors involved in the analyses are: (i) the stance of the domestic monetary authority policy; (ii) the domestic inflation as target in the domestic monetary policy; (iii) the Spanish stock market return; (iv) the business cycle in the domestic currency area; and (v) a global monetary policy factor. The five factors included in the SVAR model are measured as follows.

To measure the domestic business cycle I use one of the several proxies usually employed in literature. Specifically, to proxy Eurozone business cycle variations, I employ the monthly growth rate of the Eurozone industrial production index (IPI). Later, to analyze the robustness of our results, I replace this rate by the Eurozone unemployment rate at the end of the month and the Eurozone monthly growth rate of the gross domestic product (GDP). Domestic monetary policy is measured by the stance of the domestic monetary authority, through the nominal target interest rate on the last day