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Macro News and Stock Returns in the Euro Area: A VAR-GARCH-in-Mean Analysis

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Macro News and Stock Returns in the Euro

1 Introduction

The effects of macroeconomic news on stock prices have been analysed extensively in the more recent financial literature. The theoretical motivation comes from asset pricing models according to which factors driving macro series such as consumption and investment should also affect asset prices (e.g., Merton, 1973). In particular, according to the efficient market hypothesis, asset prices should fully reflect all available information and therefore react only to the arrival of new information in the form of "surprises" which can affect agents' expectations about future economic activity, and consequently cash flows and the discounting factor (which is a function of the risk-free interest rate and the risk premium). More specifi

Fourth, it controls for monetary policy and financial globalisation.

The layout of the paper is as follows. Section 2 outlines the econometric modelling approach. Section 3 describes the data and presents the empirical findings. Section 4 summarises the main findings and offers some concluding remarks.

2 The model

We represent the first and second moments of stock market returns and news using a VAR-GARCH(1,1)-in-mean process.[1] In its most general specification the model takes the following form:

$$x = \alpha + \beta x_{-1} + \theta h_{-1} + \delta f_{-1} +$$

effects of the recent financial crisis, we include a dummy variable (denoted by) with a switch on 15 September 2008, i.e. on the day of the collapse of Lehman Brothers. Therefore, the second moment will take the following form[3]:

$$= \begin{matrix} ' \\ 0 \end{matrix} \begin{matrix} \\ 0 \end{matrix} + \begin{matrix} \theta \\ 11 \end{matrix} \begin{bmatrix} \begin{matrix} 2 \\ 1 \end{matrix} & -1 & & & \begin{matrix} 2 \\ 2 \end{matrix} & -1 & 1 & -1 & \begin{matrix} 3 \\ 3 \end{matrix} & -1 & 1 & -1 \\ 1 & -1 & 2 & -1 & & -1 & & & & -1 & 2 & -1 \\ 1 & -1 & 3 & -1 & 2 & -1 & 3 & -1 & & & & \end{bmatrix} \begin{matrix} \\ 11 \end{matrix} + \begin{matrix} \theta \\ 11 \end{matrix} \quad -1 \quad 11 \qquad (3)$$

where

$$\begin{matrix} \\ 11 \end{matrix} = \begin{bmatrix} \begin{matrix} \\ 11 \end{matrix} & & 0 & 0 \\ \begin{matrix} \\ 21 \end{matrix} + \begin{matrix} \\ 21 \end{matrix} & & \begin{matrix} \\ 22 \end{matrix} & 0 \\ \begin{matrix} \\ 31 \end{matrix} + \begin{matrix} \\ 31 \end{matrix} & 0 & & \begin{matrix} \\ 33 \end{matrix} \end{bmatrix}; \quad \begin{matrix} \\ 11 \end{matrix} = \begin{bmatrix} \\ \\ \\ \end{bmatrix} \quad \}$$

12 5 2013, for a total of 5058 observations. Furthermore, as already mentioned, we control for monetary policy and stock market globalisation using domestic interest rates (90-day Treasury Bill rate) and a proxy for the global stock market index (US stock market index). We define daily returns as logarithmic differences of stock indices.

We consider news coverage of four macro economic data series, i.e. GDP, unemployment, retail sales and durable goods (Birz and Lott (2013), and Lott and Hassett (2006)). The average number of stories about unemployment and GDP is very similar; these account for the majority of news articles, whereas there is less coverage of retail sales and durable goods releases. The index we use does not distinguish between different types of macro news, since the focus of this study is to analyse the effects of positive and negative macro news respectively as reported and interpreted by the media.[4] The daily positive (negative) news index is defined as follows:

$$\text{positive (negative) news index} = [e + \text{domestic positive (negative) news} + \text{international positive (negative) news}] \quad (7)$$

We address the issue of national newspaper stories about the status of the economy potentially being politically biased (Lott and Hassett, 2006) by using both domestic and international (within the euro area) news.

Please Insert Table 1 and Figure 1

The descriptive statistics, presented in Table 1, show that on average the number of positive news releases is bigger than that of negative ones. However, since the onset of the 2008 crisis, negative news releases have become more frequent in all countries but France and Germany. The shift has been particularly marked for the PIIGS countries, that have been hit the most by the crisis. Furthermore, the average number of stories, either negative or positive, has increased substantially since 2008. This is not surprising: the euro area has been affected deeply by the recent global crisis, and even small investors have become increasingly aware of the importance of news on the state of the economy after a decade of steadily growing stock markets that did not seem to reflect the underlying economy fundamentals. This growing interest has been captured and fuelled by a rising number of articles commenting on macro news releases. Furthermore, since 2008 there has been an increase in stock market volatility in all countries (Figure 1). This finding supports the inclusion of a switch dummy in the model specification.

3.2 Hypotheses Tested

We test for mean and volatility spillovers by placing restrictions on the relevant parameters; specifically we consider the following three sets of null hypotheses[5] $_0$:

1. Tests of no news spillovers to stock market returns

[4] Neutral and mixed news, which have been found not to be significant in previous studies, have not been considered given the aim of this paper.

[5] The joint restrictions $_{05} - _{08}$ are tested by means of a Wald test.

$_{01}$:Positive news to stock markets before the 2008 crisis: $_{12} = 0$
$_{02}$:Positive news to stock markets after the 2008 crisis: $_{12} = 0$
$_{03}$:Negative news to stock markets before the 2008 crisis: $_{13} = 0$
$_{04}$:Negative news to stock markets after the 2008 crisis: $_{13} = 0$

2. Tests of no news volatility spillovers to stock markets volatility
$_{05}$:Positive news volatility to stock markets before the 2008 crisis: $_{21} = {}_{21} = 0$
$_{06}$:Positive news volatility to stock markets after the 2008 crisis: $_{21} = {}_{21} = 0$
$_{07}$:Negative news volatility to stock markets before the 2008 crisis: $_{31} = {}_{31} = 0$
$_{08}$:Negative news volatility to stock markets after the 2008 crisis: $_{31} = {}_{31} = 0$

3. Tests of no news volatility spillovers to stock market returns
$_{09}$:Positive news volatility to stock markets before the 2008 crisis: $_{12} = 0$
:Positive news volatility to stock markets after the 2008 crisis: $_{12} = 0$
$_{11}$:Negative news volatility to stock markets before the 2008 crisis: $_{13} = 0$
$_{12}$:Negative news volatility to stock markets after the 2008 crisis:

VAR-GARCH(1,1) in-adequacy of the residuals, Jarque-Bera squared returns of

Please Insert Tables 2-5 and Figure 2-3 about here

Concerning the conditional variance equations, the estimated "own-market" coefficients are statistically significant and the estimates of $_{11}$ suggest a high degree of persistence. The patterns are not substantially different for the eight countries considered, with positive and negative volatility news having a significant influence on stock returns volatility (note that the sign cannot be established). The magnitude of the causality effect is bigger (in absolute value) for negative than for positive news volatility in all countries examined. Furthermore, there is evidence of the 2008 crisis affecting the causality-in-variance dynamics. In particular, the post-crisis negative news volatility effect doubled at least for the PIIGS countries, with Greece exhibiting the biggest increase ($_{31}$ + $_{31}$ = −0 9492) compared to the pre-September 2008 period ($_{31}$ = −0 0873).

The news GARCH-in-mean coefficients ($_{12}$ and $_{13}$) are negative and significant for all eight countries, showing that any increase

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TABLE 1: Descriptive Statistics

	Pre- September 2008				Post- September 2008			
	Mean	Std. dev	Min	Max	Mean	Std. dev	Min	Max
				Positive News				
Belgium	0 12	0 64	0	14	0 31	2 98	0	98
France	0 69	1 92	0	27	1 94	4 26	0	104
Germany	3 28	3 99	0	25	6 43	9 67	0	106
Greece	0 06	0 04	0	9	1 32	6 26	0	91
Ireland	0 04	0 09	0	8	0 48	2 11	0	57
Italy	0 42	0 29	0	15	0 85	4 77	0	86
Portugal	0 11	0 06	0	10	0 57	3 47	0	74
Spain	0 20	0 18	0	12	0 88	5 05	0	77
				Negative News				
Belgium	0 07	0 50	0	8	0 49	4 23	0	102
France	0 25	0 89	0	11	1 47	5 66	0	106
Germany	0 86	2 14	0	18	2 47	4 61	0	99
Greece	0 05	0 45	0	2	1 81	4 77	0	116
Ireland	0 07	0 09	0	3	0 81	2 11	0	95
Italy	0 35	1 18	0	2	1 92	3 73	0	108
Portugal	0 07	0 52	0	2	0 81	3 62	0	77
Spain	0 12	0 89	0	6	1 29	4 01	0	100
				Stock Returns				
Belgium	0 014	0 011			0 062	0 012		
France	0 023	0 012			0 029	0 014		
Germany	0 024	0 012			0 042	0 017		
Greece	0 036	0 015			−0 035	0 021		
Ireland	0 023	0 013			0 051	0 018		
Italy	0 021	0 012			0 006	0 016		
Portugal	0 018	0 009			0 007	0 013		
Spain	0 035	0 011			0 012	0 017		

Note: Stock market returns are the daily percentage changes in the closing values of the national stock

TABLE 2: Estimated VAR-GARCH(1,1)-in-mean model

	Belgium		France	
	Coefficient	S.E.	Coefficient	S.E.
		Conditional Mean Equation		
1	0 0019	(0 0001)	0 0011	(0 0004)
2	0 0168	(0 0103)	0 0351	(0 0081)
3	0 1032	(0 0169)	0 1443	(0 0271)
11	−0 1726	(0 0399)	−0 0279	(0 0137)
12	0 0009	(0 0002)	0 0032	(0 0013)
12	0 0012	(0 0003)	0 0006	(0 0002)
13	−0 0010	(0 0004)	−0 0003	(0 0001)
13	−0 0001	(0 0001)	−0 0003	(0 0001)
12	−0 0029	(0 0011)	−0 0007	(0 0003)
12	−0 0048	(0 0021)	−0 0033	(0 0015)
13	−0 0111	(0 0046)	−0 0042	(0 0019)
13	−0 0015	(0 0005)	−0 0012	(0 0005)
11	0 3281	(0 0366)	0 0254	(0 0137)
12	−0 0482	(0 0191)	−0 0033	(0 0016)
		Conditional Variance Equation		
11	0 0001	(0 0001)	0 0001	(0 0001)
22	0 0775	(0 0162)	0 0233	(0 0107)
33	0 5505	(0 0574)	0 0257	(0 0175)
11	0 9474	(0 0374)	0 9337	(0 0161)
21	0 0155	(0 0062)	−0 1571	(0 0614)
21	0 0084	(0 0037)	−0 0302	(0 0112)
22	0 9631	(0 0209)	0 9852	(0 0326)
31	0 0941	(0 0423)	−0 1578	(0 0543)
31	−0 6748	(0 2251)	−0 1901	(0 0871)
33	0 9846	(0 1377)	0 9895	(0 0018)
11	0 3076	(0 0763)	0 2884	(0 0475)
21	−0 0516	(0 0231)	0 3701	(0 1541)
21	−0 0026	(0 0011)	0 1834	(0 0752)
22	0 2376	(0 0113)	0 1757	(0 0257)
31	−0 2140	(0 1012)	0 4075	(0 2017)
31	-0 3028	(0 1291)	0 7049	(0 3435)
33	0 1395	(0 0846)	0 1568	(0 0167)
LogLik	26499 96		18467 53	
$_{(10)}$	7 1261		8 4563	
^{2} $_{(10)}$	9 2298		7 1351	

Note: Standard errors (S.E.) are calculated using the quasi-maximum likelihood method of Bollerslev and Wooldridge (1992), which is robust to the distribution of the underlying residuals. Parameters not statistically significant at the 10% level are not reported. LB $_{(10)}$ and LB^2 $_{(10)}$ are the Ljung-Box test (1978) of

TABLE 3: Estimated VAR-GARCH(1,1)-in-mean model

	Germany		Greece	
	Coefficient	S.E.	Coefficient	S.E.
		Conditional Mean Equation		
1	0 0033	(0 0011)	0 0006	(0 0005)
2	0 3058	(0 0369)	0 0007	(0 0014)
3	0 1568	(0 0294)	0 0188	(0 0095)
11	−0 0405	(0 0182)	0 0758	(0 0243)
12	0 0001	(0 0001)	0 0006	(0 0002)
12	0 0016	(0 0002)	0 0112	(0 0046)
13	−0 0008	(0 0003)	−0 0007	(0 003)
13	−0 0009	(0 0004)	−0 0054	(0 0026)
12	−0 0062	(0 0029)	−0 3547	(0 1274)
12	−0 0023	(0 0011)	0 3312	(0 1563)
13	−0 0026	(0 0009)	−0 0045	(0 0012)
13	−0 0112	(0 0462)	−0 5332	(0 2219)
11	0 3365	(0 0211)	0 1169	(0 0312)
12	−0 0008	(0 0002)	−0 0003	(0 0001)
		Conditional Variance Equation		
11	0 0001	(0 0001)	0 0017	(0 0003)
22	0 0508	(0 0136)	0 0044	(0 0017)

TABLE 4: Estimated VAR-GARCH(1,1)-in-mean model

	Ireland		Italy	
	Coefficient	S.E.	Coefficient	S.E.
		Conditional Mean Equation		
1	0 0048	(0 0007)	0 0021	(0 0002)
2	0 0041	(0 0017)	0 0048	(0 0046)
3	0 1468	(0 0126)	0 1357	(0 0327)
11	0 1356	(0 0524)	0 1124	(0 0273)
12	0 0072	(0 0038)	0 0011	(0 0004)
12	0 0104	(0 0051)	0 0010	(0 0003)
13	−0 0134	(0 0049)	−0 0015	(0 0005)
13	−0 0129	(0 0023)	−0 0049	(0 0016)
12	−0 0036	(0 0015)	−0 0011	(0 0003)
12	0 0024	(0 0009)	0 0006	(0 0001)
13	−0 0236	(0 0098)	−0 0013	(0 0004)
13	−0 0224	(0 0083)	−0 0008	(0 0002)
11	0 4706	(0 0272)	0 1289	(0 0364)
12	−0 0005	(0 0001)	−0 0007	(0 0003)
		Conditional Variance Equation		
11	0 0001	(0 0001)	0 0001	(0 0001)
22	−0 0005	(0 0002)	0 0109	(0 0053)
33	0 0087	(0 0012)	−0 3449	(0 0852)
11	0 9924	(0 0023)	0 9438	(0 0096)
21	−0 0077	(0 0022)	0 0826	(0 0342)
21	0 0465	(0 0196)	−0 3596	(0 1293)
22	0 6732	(0 0131)	0 9757	(0 0033)
31	0 0332	(0 0111)	0 0889	(0 0342)
31	0 1474	(0 0653)	0 2789	(0 1125)
33	−0 9428	(0 0247)	0 9823	(0 0271)
11	0 1198	(0 0151)	0 3657	(0 0245)
21	0 0019	(0 0008)	−0 0892	(0 0056)
21	−0 4845	(0 1896)	0 9796	(0 4431)
22	0 1973	(0 0872)	0 2095	(0 0284)
31	−0 4841	(0 2196)	−0 1216	(0 0542)
31	−1 6122	(0 5543)	−0 9487	(0 3494)
33	0 0955	(0 1185)	0 1441	(0 0251)
LogLik	32471 62		24773 97	
(10)	12 453		11 329	
^{2} (10)	9 775		10 764	

Note: See the notes to Table 2.

TABLE 5: Estimated VAR-GARCH(1,1)-in-mean model

	Portugal		Spain	
	Coefficient	S.E.	Coefficient	S.E.
		Conditional Mean Equation		
1	−0 0011	(0 0004)	0	

Figure 1: Stock Market Returns

Figure 2: Conditiona . Negative News and S kets Returns

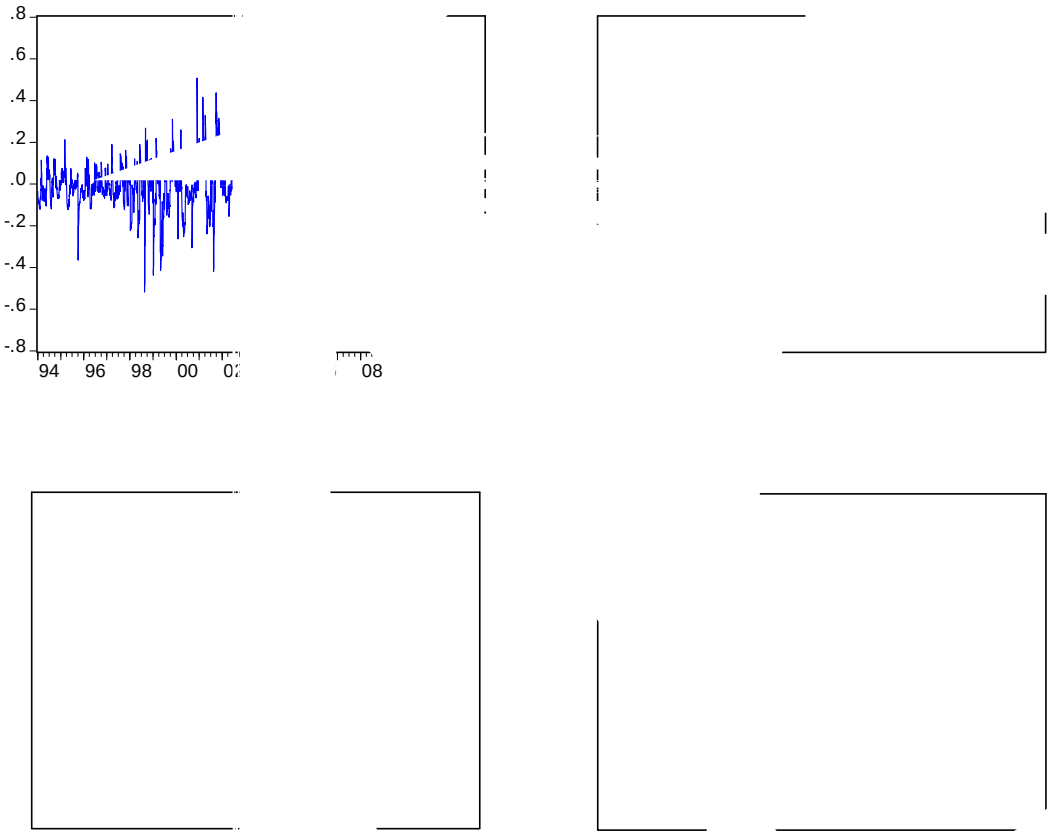

Figure 3: Conditional Correlations between Negative News and Stock Markets Returns