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Fundamentals, Macroeconomic Announcements and Asset Prices

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Abstract

The aim of this paper is to study the impact of macroeconomic announcements on asset prices, with the objectives of both measuring the average response of stock returns to macroeconomic news surprises, and explaining the sources of such a reaction. To assess the importance of scheduled French and US macroeconomic announcements, Stock returns are analyzed on the French stock market. It is shown that, according to previous studies, there is little evidence of the reaction of the market to those surprises. News about inflation, U.S consumption and real economic activity are specially expected by investors. It confirms the leading role of the U.S. economy and in particular of U.S. consumers in determining the development of the world economy and the dynamics of stock markets. Results also show that unexpected positive surprise in the unemployment rate causes a cut on future excess returns and future dividends. The opposite reaction is observed from the housing starts indicator. The consumer price index appears to have an impact not only on future excess returns, but also on future real interest rates.

Keywords: Asset Prices; Macroeconomic Announcements, Event-Study.

JEL Classification: E44, G14, G12.

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1 Introduction

Scheduled macroeconomic announcements have received considerable interest in both the financial press and the academic literature. Most studies have tried to test if such information has an impact on financial markets and what the indicators regarded by investors are, especially when valuing stock prices. Understanding the effect of scheduled announcements on equity prices is interesting for both testing market efficiency and anticipating the reaction. Estimating the response of equity prices to macroeconomic announcements is complicated for two main reasons: First, the market is unlikely to respond to anticipated information; distinguishing between anticipated and non-anticipated part (i.e. surprise) of any public information is therefore crucially important in estimating the effect on equity prices. Second, activity in the financial markets is regularly driven by the coming out of new information. Studying the effect of an announcement can be biased by the release of some other information on the same day. One solution to handle the problem of the joint-response has been proposed in Dubreuille (2007) and Jones et al. (2005) by using high frequency data. While the early literature used the event study methodology with US daily stock prices see e.g. McQueen and Roley (1993), Errunza and Hogan (1998) and Flannery and Protopapadakis (2002)), the most recent studies often used high frequency data (Dubreuille (2007), Jones et al. (2005) and tried to test other facts such as state dependence (McQueen and Roley (1993) and Poitras (2004)), or market integration (Nikkinen and Sahlström(2001), Nikkinen and Sahlström(2004)). This paper investigates the extent to which these observations can be generalized to European stock markets. We thus propose to come back to the question, we measure the response of the French stock market to surprises made by the release of macroeconomic news, and test the effect of such announcement on stock returns. This paper is an empirical analysis of the relationship between scheduled macroeconomic announcements and equity markets. According to previous studies, a selected number of macroeconomic indicators which have been shown to significantly affect equities is used. But unlike most studies, we test the effect of both French and American macroeconomic announcements on the French market, taken as a representative European stock markets. First, we measure the average stock market's response to these announcements. Second we try to give some explanations for this response. The first question in this paper has been largely documented in the literature, but very few papers to date have provided an answer to the second question of what can explain this reaction. To our knowledge, McQueen and Roley (1993) is the unique paper which tried to assess if the reaction is due to revisions in cash flows or in the real interest rate used to discount those cash flows. But the

methodology they used does not take into account the dynamic correlation between cash flows and interest rates. In a subsequent paper, Bernanke and Kuttner(2005) have tried to explain the impact of Federal Reserve policy on stock market. The approach in this paper is therefore a generalization for other macroeconomic announcements that give us more information about the state of the economy. The remainder of this paper is as follows: In section 2, we try to estimate the average response of French stock market to scheduled macroeconomic announcements using the event study methodology. Then we try in section 3 to give some details of what explain this reaction. Section 4 concludes.

2 Testing for news impact

This section investigates the average response of French stock market to macroeconomic announcements. As noted in the introduction above, we include the following news which have been found to have an impact on equity prices in recent papers:

- The consumer price index (monthly) and household consumption (monthly) as indicators of inflation;
- Unemployment rate (monthly), one of the more timely indicators of the state of the economy;
- Industrial production (monthly) as an indicator of the state of the economy;
- Consumer confidence index (monthly);
- U.S Housing start (monthly) as a real estate indicator.

Because of the central role of the U.S.A in determining the development of the world economy, the major indicators about the U.S. economy are important for the valuation of firms not only in the U.S.A. but also in foreign countries. Thus, we select here both American and French economic announcements and try to investigate their effect on the French stock market, as represented by the CAC 40 index from July, 2001 to December, 2007. Announcement days of macroeconomic indicators are collected from both INSEE and BLS web sites and checked afterwards through Bloomberg. The expected is distinguished from the unexpected part of the news. The standard way to do this is to compute the surprise as the difference between the real change of the indicator value and the market consensus forecast. To make surprises comparable, one way is

to divide them by their standard deviation, as described in Fleming and Remolona (1997) and Balduzzi et al.(2001). Bloomberg forecasts are used to measure the market median consensus of macroeconomic news. To estimate the average reaction of equities to macroeconomic surprises, we calculate the market's reaction on the announcement day in a standard fashion, by using the event study approach. Formally, the regression format is as follows:

$$H_t = \alpha + \beta S_{i,t} + \epsilon_t \tag{1}$$

Where H_t is the CAC 40 return and $S_{i,t}$ is the standardized surprise for the ith macroeconomic announcement at time t, as defined above. The error term represents factors other than selected announcements that affect equities.

As the entire sample of French macroeconomic indicators is released before 9 a.m. and American indicators between 2:30 p.m. and 4 p.m., and in attempt to separate the effect of the two categories of information, we calculate the return on the event window for French macroeconomic announcements as the log difference between the CAC 40 price at 10 a.m. and the closing price of the preceding day. For American macroeconomic announcements, returns are calculated as the log difference between the price at 4 p.m. and 2 p.m. Results of the regression are summarized in the table 1.

According to these results, there is a little evidence of the market response to macroeconomic announcements. Coefficients are close to zero and the R-Squared value doesn't exceed 15%. we find that CAC 40 index responds significantly to surprises on French CPI, French and U.S. industrial production and finally U.S. consumer confidence index. The table shows that a 1% unexpected increase (decrease) in these announcements affects positively (negatively) asset returns and the R^2 indicates that 10% of the variance in equity prices on event intervals is associated with CPI surprise, 3% with French IP, 7% with U.S. IP and finally 14% with U.S. Consumer confidence. we can consequently confirm the hypothesis that investors on French stock market regard news announcements about domestic and U.S macroeconomic announcements as an important source of information when valuing stock prices, but they are far from being the most regarded news. News about inflation, U.S consumption and real economic activity are especially expected by investors. It confirms the important role of the U.S. economy and in particular U.S. consumers in determining the development of the world economy. Let us now discuss the significant effect of each announcement and make a comparison with the recent literature. The CPI seems to have a positive effect on stock prices returns. Theoretically, in a standard valuation

Table 1: **The average response of equity prices to macroeconomic announcements**

The table reports results of the regression from equation 1. The sample consists of 5 French macroeconomic announcements (Consumer price index(CPI), Household Consumption, unemployment rate, industrial production and consumer confidence index) and 6 American macroeconomic announcements (Consumer price index(CPI), household consumption, unemployment rate, industrial production, consumer confidence index and housing starts). The full sample of the data is from July, 2001 to December, 2007. *, ** and *** indicate significance at the 10, 5 and 1 percent level. Standard errors of estimation are in parentheses and they are corrected for heteroskedasticity by using White's procedure.

French Macro-economic announcements	CPI	household consumption	unemployment rate	industrial production	consumer confidence
Intercept	0.0007	0.0016	0.0019**	0.0021**	-0.0005
	(0.0012)	(0.0012)	(0.0009)	(0.001)	(0.001)
Surprise change	0.0036***	-0.0012	0.0037	0.0017*	0.0006
	(0.0013)	(0.001)	(0.005)	(0.001)	(0.001)
R^2	0.1	0.01	0.008	0.03	0.006

U.S Macro-economic announcements	CPI	household consumption	unemployment rate	industrial production	consumer confidence	housing starts
Intercept	-0.0002	0.0012**	0.00035	-0.0004	-0.0016*	-0.0005
	(0.0005)	(0.0007)	(0.0008)	(0.00075)	(0.00088)	(0.0006)
Surprise change	-0.0002	0.0003	0.0035	0.0018***	0.003***	-0.0005
	(0.0007)	(0.0006)	(0.0035)	(0.00083)	(0.00097)	(0.0005)
R^2	0.0008	0.003	0.02	0.07	0.14	0.008

model, a positive surprise on inflation implies a positive effect on rates but as it doesn't contain any information about economic growth, it should not affect future cash flows and thus, asset prices should fall. Our finding is not in line with the results of Rigobon and Sack(2006) and Schwert (1981) who founnd an empirical fact for this presumption, but confirms the results of Fair (2002) who argues that "price events" can also have a positive impact on future cash flows, that's why asset prices can respond positively to inflation surprise. This result will be discussed in some detail in the next section. The second finding is that real economic announcements are entirely expected by investors. This is also the finding of Jones et al. (2005), Rigobon and Sack (2006) and McQueen and Roley (1993) and nearly all the entire literature. It seems that these announcements are good indicators of the business cycle and the economic situation and hence, they help investors in revising the expected cash flows. Anyway, all these presumptions can not be confirmed in the absence of any empirical study. This is what we try to investigate in the next section.

3 What explains stock prices reaction to macroeconomic announcements?

In this section, we attempt to answer a more difficult question: what are the sources of change in asset prices after the release of macroeconomic surprises? In a standard fashion, an unexpected increase (decrease) in asset prices may be related to a rise (fall) in future expected dividends, a decrease (increase) in future expected real interest rates used to discount those cash flows or a decrease (decrease) in future expected excess returns associated with holding stocks (Bernanke and Kuttner (2005)). Unfortunately, the standard event-study methodology doesn't allow us to test this effect. One way to answer the question empirically is to use Campbell and Ammer (1993) linearization. This method has also been extended in Bernanke and Kuttner (2005) and Bredin et al. (2007) to show the impact of monetary policy shocks on asset prices. In brief, their method consists in decomposing the unexpected excess return into three components that we call hereafter news about future excess returns, news about future dividends and news about futures real interest rates, then using a one lag VAR model to proxy those components. The one period excess return, denoted y t+1, is defined as the total return on equities minus the risk free rate. Campbell and Ammer (1993) show that the innovation in current excess return can be decomposed into the following[1]:

$$e^y_{t+1} = \tilde{e}^d_{t+1} - \tilde{e}^r_{t+1} - \tilde{e}^y_{t+1} \tag{2}$$

I.e. the unexpected excess return $e^y_{t+1}$is equal to the news about future dividends, $\tilde{e}^d_{t+1}$, minus news about future real interest rates, $\tilde{e}^r_{t+1}$, and news about future excess returns,$\tilde{e}^y_{t+1}$. These components are defined as:

$$\tilde{e}^d_{t+1} = (E_{t+1} - E_t) \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} \tag{3}$$

$$\tilde{e}^r_{t+1} = (E_{t+1} - E_t) \sum_{j=0}^{\infty} \rho^j r_{t+1+j} \tag{4}$$

$$\tilde{e}^y_{t+1} = (E_{t+1} - E_t) \sum_{j=0}^{\infty} \rho^j y_{t+1+j} \tag{5}$$

Here, ρ refers to the discount factor equal to the steady-state equity price divided by the equity price plus dividend and E is the expectations operator. Implementing this decomposition requires empirical proxies for the expectation terms appearing in the above equation. Campbell and Ammer (1993) model expectations based on a forecasting vector autoregression that includes the

[1] A sketch of the linearization is reported in the appendix

variables of interest, excess returns and the real rate, and any other variables that may be useful in forecasting these two variables. Suppose we represent the forecasting vector autoregression as:

$$z_{t+1} = Az_t + \omega_{t+1} \tag{6}$$

where z consists of a measure of excess returns, the real rate and any other variables that are useful in forecasting the variables of interest. Based on the estimates from the VAR one can then calculate the following:

$$e^y_{t+1} = s_y\omega_{t+1} \tag{7}$$

$$\tilde{e}^y_{t+1} = s_y\rho A(1-\rho A)^{-1}\omega_{t+1} \tag{8}$$

$$\tilde{e}^r_{t+1} = s_r\rho A(1-\rho A)^{-1}\omega_{t+1} \tag{9}$$

$$\tilde{e}^d_{t+1} = e^y_{t+1} + \tilde{e}^y_{t+1} + \tilde{e}^r_{t+1} \tag{10}$$

Where s_y and s_r are the appropriate selection matrices. This methodology has been tested in U.S. and European markets: Campbell and Ammer (1993) show that the variance in U.S. expected future excess returns accounts for the majority of the variance of the current equity return: 101%. Dividends make a contribution of 24.5% and the contribution of the real interest rate is negligible. This result is confirmed by Cuthbertson et al (1999) in the U.K market but it is not consistent with the findings of Malliaropulos (1998) in French stock market. The latter finds that 94% of the total variance of the current equity return is attributable to the variance of innovations in dividends.

3.1 Data

To obtain a long term time series, as required in the VAR regression, and for comparability with Malliaropulos (1998)[2], we choose to report the same data as the latter. All the series are monthly and extracted from Datastream. It consists of excess returns, dividend yields and real one-month interest rates for France from December, 1975 to December, 2007. Excess stock returns are computed as stock returns including dividend payments in excess of the one-month Eurocurrency interest rate on an annual basis. Datastream index is used to proxy the stock market return, as in Malliaropulos (1998), because this index allows us to have a long term time series and also to compare our findings with the latter. Dividend yields are monthly gross

[2]To our knowledge, there are no other studies in the literature that tested the VAR decomposition used here on the French market.

dividends divided by total market capitalization as reported by Datastream. Real interest rates are one-month Eurocurrency interest rates minus one-month ahead consumer price index. Excess stock returns and real interest rates are measured in percentage points per month, whereas dividend yields are measured in percentage points per year. Using this data, we then propose to estimate a VAR(1) model from equation (6) to capture the dynamic correlation between excess return and real interest rate and calculate the three components: news about future excess return, news about future dividends and news about future real interest rate, as defined above. we include in the VAR system our two variables of interest i.e. excess stock return and real interest rate and any other variable that may be useful in forecasting them. Hence, we include also dividend yields, the change in the nominal one-month interest rate and the long-short yield spread[3]. The(5×1)vector of state variables is chosen following Malliaropulos (1998) for the sake of comparability with his findings.

3.2 Variance decomposition

Table II reports the variance decomposition for excess stock returns between December, 1975 and December, 2007. According to equations (3),(4) and (5), excess stock returns can be decomposed into three components that may be correlated with one another. we can therefore calculate the variance of the current excess return into the sum of the three variances plus the relevant three covariances,

$$Var(\tilde{e}^d_{t+1}) = Var(\tilde{e}^r_{t+1}) + Var(\tilde{e}^y_{t+1}) - 2Cov(\tilde{e}^d_{t+1}, \tilde{e}^r_{t+1}) - 2Cov(\tilde{e}^d_{t+1}, \tilde{e}^y_{t+1}) + 2Cov(\tilde{e}^y_{t+1}, \tilde{e}^r_{t+1}) \tag{11}$$

The table shows that most of variance is attributable to the variance of innovations in dividends. This term explains 124% of the variance of excess returns in the French stock market, compared with Malliaropulos' 94%. All other components are not statistically different from zero. Real interest rate seems to have very little contribution for the total variance of excess returns. This result is in line with Malliaropulos (1998) which concludes that this may be due to unforecastability of excess returns in French stock market based on the information set used in the vector autoregression. The unexpected excess return seems to be moved entirely by the coming out of news about future dividends.

[3]The long-short yield spread is defined as the yield differential between long-term government bond yields and one-month Eurocurrency interest rates.

Table 2: **A variance decomposition of excess returns**

The table reports the decomposition of the variance of excess stock returns into the variances of revisions in expectations of dividends, real interest rates, future excess returns, and the covariances between these three components. The sample period is from December, 1975 to December, 2007. ** indicates significance at the 5 percent level. Standard errors are in parentheses.

VAR Lag Length	1
Sample Period	1975:12-2007:12
shares of	
$\mathrm{Var}(\tilde{e}^d_{t+1})$	1.236**
	(0.456)
$\mathrm{Var}(\tilde{e}^r_{t+1})$	0.000
	(0.000)
$\mathrm{Var}(\tilde{e}^y_{t+1})$	0.027
	(0.054)
$-2\mathrm{Cov}(\tilde{e}^d_{t+1},\tilde{e}^r_{t+1})$	0.007
	(0.006)
$-2\mathrm{Cov}(\tilde{e}^d_{t+1},\tilde{e}^y_{t+1})$	-0.268
	(0.506)
$2\mathrm{Cov}(\tilde{e}^y_{t+1},\tilde{e}^r_{t+1})$	-0.003
	(0.003)

3.3 Explaining the reaction to macroeconomic news

To answer the question of what explain the stock reaction to macroeconomic news, we use the three components calculated above (news about future excess returns,$\tilde{e}^y_{t+1}$, news about future dividends,$\tilde{e}^d_{t+1}$, and news about futures real interest rates,$\tilde{e}^r_{t+1}$) and regress these variables on macroeconomic surprise from January, 1996 to December, 2007. This allows us to determine the sources of the reaction. The results from the regression appear in table III. Only three macroeconomic announcements appear to have an impact at least on one component: unemployment rate, Consumer price index and housing starts. The table shows that unexpected positive surprise in the unemployment rate causes a cut in the term of future excess return and in future dividends. The opposite reaction is observed from the housing start indicator. The consumer price index appears to have an impact on future excess retruns and future interest rates. These results show that surprises from real estate indicators are observed by investors as information about future cash flows and therefore affect both dividends and future excess returns. They however have no significant effect on real interest rates. On the other hand, inflation surprises affect not only the future cash flows, but also real interest rates. This result does not confirm our assumption on section 1, but is in line with Rigobon and Sack (2006).

Table 3: **results of regression**

The table shows results of regression of Future excess returns, future real interest rate and future dividends on selected macroeconomic surprises. The regression is from January, 1996 to December, 2007.The data of macroeconomic surprises is available from 1996 to 2007 for French and US unemployment rate (UNEMP), consumer price index (CPI), French and US. indust. Prod. (IP) and U.S. Consumer confidence(CONF). Housing starts (H.S), household consumption (HCONS) and consumer confidence from 1998 to 2007 and US CPI from 2001 to 2007. *, ** and *** indicate significance at the 10, 5 and 1 percent level. Standard errors of estimation are in parentheses and they are corrected for heteroskedasticity by using White's procedure.

	Future excess returns	Future real interest rate	Future dividends
Constant	0.00063	-0.00011	-0.0034
French macroeconomic announcements:			
UNEMP	-0.001*	-0.00001	-0.01228 **
	(0.00063)	(0.00003)	(0.00528)
HCONS	0.0008	-0.00004	0.0029
	(0.00082)	(0.00005)	(0.00557)
CPI	-0.0016***	0.00011***	-0.00085
	(0.0006)	(0.00003)	(0.00458)
IP	-0.00018	0.00003	0.00396
	(0.00055)	(0.00003)	(0.00473)
CONF	0.00082	-0.00003	0.00735
U.S macroeconomic announcements:			
UNEMP	-0.00067	0.00002	-0.00378
	(0.00076)	(0.00003)	(0.00650)
HCONS	-0.00063	0.00001	-0.00735
	(0.00056)	(0.00002)	(0.00518)
CPI	-0.000063	0.00002	-0.00018
	(0.000071)	(0.00004)	(0.00539)
IP	0.00052	-0.00002	0.00414
	(0.0007)	(0.00003)	(0.00542)
CONF	0.0009	-0.00001	0.00705
	(0.00062)	(0.00003)	(0.00507)
H.S	-0.00063***	-0.00005	0.00902*
	(0.00056)	(0.00004)	(0.00509)
R^2	0.16	0.12	0.11

This may be due to the difference in data frequency and can be explained by the fact that the inflation surprise has an immediate positive impact on stock returns but this effect disappears when using monthly data. Investors seem to react positively to inflation surprise, but the positive reaction is short-lived.

4 Conclusion

This paper presents a study of the impact of macroeconomic announcements on asset prices. French market is chosen to test the effect of both French and macroeconomic surprises on the stock returns. The first section documents the average response of stock returns to macroeconomic news. According to previous studies, there is little evidence of the reaction of market to those surprises. We demonstrate that surprises about inflation, U.S consumption and real economic activity are specially expected by investors. This confirms the important role of the U.S. economy and in particular U.S. consumers in determining the development of the world economy. The second section asks a more delicate question: what explains the stock market reaction? We have tried to make progress in this way. Results show that unexpected positive surprise in the unemployment rate causes a cut on the term of future excess return and in future dividends. The opposite reaction is observed from the housing starts indicator. The consumer price index appears to have an impact on future excess returns and future real interest rates.

A Appendix

This appendix provides a brief sketch of the derivation of the log-linearized relationship between the current excess return, expected future excess returns, dividend growth, and real interest rates given in equation (2), as in Campbell and Shiller (1988) and Campbell (1991).
The starting point is the definition of the stock return, H_{t+1}

$$1 + H_{t+1} = \frac{P_{t+1} + D_t}{P_t} \tag{A1}$$

Where P is the stock price and D is the dividend. Taking logs and letting

$$h_{t+1} = ln(1 + H_{t+1}) = ln(P_{t+1} + D_t) - ln(P_t) \tag{A2}$$

The next step is to derive a log-linear approximation to $ln(P_{t+1} + D_t)$. One way to do this is to first-difference and express the change in the log of the sum as the weighted sum of the log differences:

$$\Delta ln(P_{t+1} + D_t) \approx \rho \Delta p_{t+1} + (1 - \rho)\Delta d_t \tag{A3}$$

Where ρ is the discount factor. It is approximated by the sample mean of $1/(1 + exp(\delta_t/12))$, where $\delta_t = ln(D_t/P_t)$ is the dividend yield, measured in percentage points per year. Calculating the integral of (A3), we find

$$ln(P_{t+1} + D_t) \approx k + \rho p_{t+1} + (1 - \rho)d_t \tag{A4}$$

Substituting this into equation (A2),

$$h_{t+1} \approx k + \rho p_{t+1} + (1 - \rho)d_t - p_t \tag{A5}$$

Imposing the terminal condition that $\lim_{j \to \infty} E_t \rho^j p_{t+j} = 0$ equation (A5) can be solved forward to give:

$$p_t = \frac{k}{1 - \rho} + (1 - \rho) E_t \sum_{j=0}^{\infty} \rho_j d_{t+j+1} - E_t \sum_{j=0}^{\infty} \rho_j h_{t+j+1} \tag{A6}$$

Campbell (1991) shows that it is possible to obtain a decomposition of the unexpected stock return as:

$$\tilde{h}_{t+1} \equiv h_{t+1} - E_t h_{t+1} = (E_{t+1} - E_t) \left\{ \sum_{j=0}^{\infty} \rho_j \Delta d_{t+j+1} - \sum_{j=0}^{\infty} \rho_j h_{t+j+1} \right\} \tag{A7}$$

by substituting p_t and p_{t+1} out of equation (A5). Although equation (A7) is written in terms of real log stock returns, it is possible to define the excess stock return over a short term interest

rate as $e^y_{t+1} \equiv h_{t+1} - r_{t+1}$ where h_{t+1} is the expected return and r_{t+1} is the real interest rate, such that the innovation in the excess return is given by:

$$e^y_{t+1} = (E_{t+1} - E_t) \left\{ \sum_{j=0}^{\infty} \rho_j \Delta d_{t+j+1} - \sum_{j=0}^{\infty} \rho_j h_{t+j+1} - \sum_{j=1}^{\infty} \rho_j e_{t+j+1} \right\} = \tilde{e}^d_{t+1} - \tilde{e}^r_{t+1} - \tilde{e}^y_{t+1} \quad \text{(A8)}$$

This states that the unexpected excess return e^y_{t+1} is equal to the news about future dividends, $\tilde{e}^d_{t+1}$, minus news about future real interest rates, $\tilde{e}^r_{t+1}$, and news about future excess returns, $\tilde{e}^y_{t+1}$.

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