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On the influence of expectations over international stock returns and macroeconomic variables

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Abstract: Using confidence and economic variables, expressed by industrial production and stock returns dynamic index information flows are analyzed. Using quarterly data through a Vector Autoregressive procedure, it is showed that stock returns only respond contemporaneously to their own shocks, while leading to strong and significant responses of confidence and industrial production variables. From the eight countries sample, only on three it was found a business confidence index more closely related to industrial production. While most of previous literature concentrates on the relation between consumer confidence, the economy and financial markets, our results suggest stronger relations of the last two variables with business confidence indices as evidenced by higher percentages of uncertainty explained. Moreover, for countries with more market integrity (more informational efficient) results indicate that the impact of confidence on share prices is lower for longer periods. Empirical findings reveal that business confidence turns clearer the existent difference between more or less informational efficient markets in terms of quicker market news incorporation, which are important for financial and macroeconomic policy designs.

JEL classification: C32; E23; F43; G12; G14; G15; O11; O57

Keywords: Consumer and Business Confidence, Economic Uncertainty and Growth, Industrial Production, Investment, Multivariate Time Series (VAR), Stock Prices

1. Introduction

It is an empirical question whether principal economic indicators such as consumer and business confidence, as well as industrial production, impact stock returns. Investor's sentiment has a determining role in stock market price movements (Baker and Würgler, 2007). Also, positive or negative expectations affect economic growth (Ogunmuyiwa, 2010). In the meanwhile, some studies pointed out the existence of both a short and long-run relationship between stock market development and growth (Oke and Mokuolo, 2005). Consumer confidence acts as a proxy for individual investor sentiment. It attempts to gauge consumers' feelings about the current economy condition and their expectations about the economy's future direction. Also, the measurement of business confidence is important as it reliably indicates the current and expected state of the economy. It is widely recognized that business people's subjective individual expectations play a key role in economic developments (Best, 2008; Bierbaumer-Polly, 2010).

In this work, we seek to explore all the information available by constructing a model in which we relate euro-area, US, UK and Japanese production indexes, the Business Confidence Index (BCI), the Consumer Confidence Index (CCI), and the single country share price indices. Using these international stock return data provides a natural out-of-sample test for earlier US and European findings. Our main research question would be: How expectations affect stock market returns and the economic state, measured through industrial production. As there may exist the reverse effect, we also analyze how confidence indexes react to stock market and industrial production innovations. Therefore, we examine the short-run interaction between one real variable (industrial production index), one financial variable (share price index) and two confidence indices (consumer and business, separately), for a sample of eight developed countries where the evidence for interactions among the variables should be more pronounced. For the effect, it has been used vector autoregression (VAR) analysis for the period Q1:1985 until Q4:2009.

This study is expected to be an original contribution for a new set of variables, a new period and a larger set of countries for comparison purposes. Our study is important for three reasons. First, consumer and business index are both used in separate manners and as endogenous variables, employing the analysis of temporal movements. Second, we generalize the results to a larger sample of countries including US, UK, Japan, Portugal, Spain, Germany, France and Italy. Using this broader set of countries, all with developed capital markets, but in distinct development stages (for example, Portugal and Spain on the less developed side

and UK and US on the highest development stage) with respect to liquidity or volume traded, we are trying to test the double effect of confidence (on both the consumption and production side) on the economy and financial markets. Being all these countries developed economies but in different phases and realities with respect to financial markets we wonder if information flows between economic agents, capital markets and real economic activity are distinct or not. Third, we relate three levels of the economy providing a new observation window, as far as we know, gathering together expectations on the psychology economics field, industrial production of the real economy, and share market indices that sustain it.

Higher stock prices mean higher wealth and consequently more optimism in the economy consumption side (Jansen and Nahuis, 2003). Given that investors in Europe invest a lot less in stocks than in the US, this effect should be more pronounced in American markets. But higher stock prices should also sign economic agents of better economic conditions in the future, which should lead to increased business confidence and industrial production. These effects should even be more pronounced in industrialized countries where financial markets are informational more efficient.

Earlier evidence on the effects of sentiment focus on cross-sectional results for the US stock market (Otoo, 1999; Chen, 2011), for value versus growth stocks or small versus large stocks, on results for the European Union (Bodo, Golinelli and Parigi, 2000; Jansen and Nahuis, 2003, for 11 European Union countries), but a few less studies have focused on international evidence. One exception is Schmeling (2009), but he only analyses internationally the effect of investor sentiment (and not consumer confidence) over stock market returns, using 20 years of monthly data (1985-2005). Recently, it has also been given emphasis to emerging countries where some of the relations may fail due to structural and economic reasons (Günes and Çelik, 2009; Çelik, Aslanoglu and Uzun, 2010). Çelik, Aslanoglu and Uzun (2010), for example, focus on 6 emerging countries and use panel unit root and cointegration tests.

Although previous studies emphasize the importance of stock market development in the growth process; or the effect of consumer confidence on economic growth; or even the impact of confidence on stock markets; they do not simultaneously examine confidence indexes, economic growth and stock returns. As far as we know, this is the first study to include simultaneously expectations from both the consumption and production sides of the economy, production and financial variables using time series methodologies. Moreover, the link between

consumer and/or business confidence and industrial production has not been well established despite unemployment being assumed as one of the primary determinants of consumer and business sentiment.

Contrary to the extensively literature that study the relationship between consumer confidence and economic activity, we propose that business confidence could play a significant role for developed economies on economic variables that measure production and financial variables that further relate consumer confidence and stock returns. For stock investors it is important to understand business confidence, because as a leading indicator of the economy (Bodo, Golinelli and Parigi, 2000) it should also lead the stock market, whereas intimately related to increased industrial production. If countries have no business confidence, no additional investments will be performed. Companies will not grow and consequently unemployment raises. But then, economic growth becomes conditioned and the stock market devalues. Conditioned on this, consumers become less confident and stock investment decreases. This type of relations should even be more evident on developed markets.

Producers are more prone to reflect industrial information into their expectations and to reflect these on industrial production for countries with better developed market institutions, or else more informational efficient. As such, information flows among economic agents and capital markets depend on the development stage of the country even if all are classified as developed economies. Due to information efficiency, when some type of industrial or confidence index news comes to these markets they have already incorporated all the necessary information and as such do not respond significantly in the short-run. Results reveal that business confidence is even more important than consumer confidence for both economic and financial variables, being business confidence more contemporaneously affected by stock returns and industrial production in informational more efficient markets, while conditioned more on these two variables in longer periods for less financially developed markets.

The rest of the paper is organized as follows: The next section reviews some existing literature and derives testable hypothesis. Section three describes the data and provides some descriptive statistics. Section four presents the methodology, whose results are presented in section five. Finally, section 6 concludes.

2. Related literature and testable hypothesis

Expectations surveys are primarily designed to signal changes in economic activity being widely used in macroeconomic assessments and forecasts (Otoo, 1999; Zizza, 2002; Jansen and Nahuis, 2003; among others). Respondents are asked about their economic situation now compared with the recent past and their expectations for the immediate future.

Stock markets provide allocation of limited resources from household savings into the corporate sector, to be used in the form of investment, being then rewarded with their returns (Tadesse and Kwok, 2005). Because a stock market's valuation reflects investors' confidence (being consumers or business people) in it and therefore captures perceptions about its future viability, share prices indices have a strong forward-looking component. Although primarily designed as measurements of market performance for use by individual investors and investment fund managers, share price indices are also used as indicators of economic activity by business, consumers and government analysts. Baker and Wurgler (2007) show that investor sentiment impacts stock prices and causes mis-pricing. But this implies that sentiment is negatively correlated with future stock returns (Schmeling, 2009). As such, investor sentiment may exhibit predictive ability for stock returns (Jansen and Nahuis, 2003; Lemmon and Portniaguina, 2006; Günes and Çelik, 2009).

Given that consumers are also investors, when they lose confidence in the economy they also turn out to lose confidence in the stock market. But, when they are confident about the economy, they are also bullish about the stock market (Fisher and Statman, 2003). Otoo (1999) noted that declines in stock prices can lead to declines in consumer confidence for two reasons. First, declining stock prices erode wealth, eroding consumer confidence. Second, declining stock prices are a leading indicator to declining income since the stock market is a leading indicator of the economy.

Up to the moment authors analyze separately the relation consumer confidence and stock returns (Fisher and Statman, 2003; Jansen and Nahuis, 2003; Chen, 2011), consumer confidence and economic activity (Günes and Uzun, 2010), economic activity and stock returns (Mahmood and Dinniah, 2009), business confidence and stock returns (Best, 2008), business confidence and real economic activity (Bodo, Golinelli and Parigi, 2000), consumer confidence, stock returns and economic activity (Çelik, Aslanoglu and Uzun, 2010), but not the 4 variables

interaction simultaneously, despite the relation between both confidence indexes, and of both with the rest of the economy production and financial sides. Or else, let's see: When consumers fear a fall in economic activity, they become afraid of losing money with a consequent fall in the stock market. But the same applies to the production side of the economy which will here be captured by business confidence. As such, both confidence measures should be used to provide a clearer picture on the real state of the country for both financial and economic sides.

Moreover, consumer confidence is useful to understand the current perception among consumers about the state of the economy. But consumer confidence is affected by economic variables like unemployment level, inflation expectations, fuel prices, among many others. Consumer confidence measures how consumers feel about the economy in the coming months (how optimistic or pessimistic), being thus more focused on business. On the other hand, business like banks (on the financial side), retailers and manufacturers (on the production side) use consumer confidence measures to plan their future strategies with respect to investment, spending and levels of unemployment. It is thus expected that when consumer confidence declines, business will diminish production and even cut expansive investment projects, thus turning business confidence more relevant for inference purposes.

Examining consumption confidence impacts, Jansen and Nahuis (2003) study the relationship between stock market developments and consumer confidence in 11 European countries over the years 1986-2001, finding that there is a strong positive correlation between stock returns and changes in consumer sentiment with stock returns causing consumer confidence at very short horizons of 2 weeks to 1 month. They argue that the relationship between stock market and consumer sentiment depend on expectations about economy-wide conditions rather than the conventional wealth effect. Kremer and Westermann (2004) find a unidirectional causality running from stock prices to consumer confidence. Çelik, Aslanoglu and Deniz (2010) argue that in emerging markets like Turkey, consumer confidence should be viewed as an endogenous variable rather than just reflecting the sensitivity of consumers about the future path of the economy. They find cointegration between consumer confidence and financial market variables, using weekly data between January, 2008 and October, 2009. Also for Turkey, Günes and Çelik (2009) show the existence of cointegration between consumer confidence and financial markets (interest rates, exchange rates and the stock exchange index). Schmeling (2009) investigates whether consumer confidence affects stock returns

in 18 countries around the globe finding a positive impact, using monthly returns and panel regressions. However, this isn't a pacific matter, because in the recognition of this relationship, some results arise in a random manner that runs from stock markets to consumer's confidence, but not in the opposite way (Otoo, 1999; Jansen and Nahuis, 2003; Kremer and Westermann, 2004).

Industrial production for each country can be considered as a reference series for the economic overall state. Moreover, development of industrial production provides valuable information for assessing the outlook for growth in a country. Owing to its merits, industrial production has become a common benchmark series in the academic literature (Chen, Roll and Ross, 1986; Zizza, 2002; Bruno and Lupi, 2004). However, in other empirical works this relationship does not provide strong evidence (Flannery and Protopapadakis, 2002). Also, some studies focus on the possible causality between stock markets and measures of real economic activity (Ahmed and Imam, 2007; Mahmood and Dinniah, 2009; Nowbutsing and Odit, 2009; Antonios, 2010). As argued by Nowbutsing and Odit (2009) stock exchanges are expected to accelerate economic growth through increased liquidity of financial assets. After all, the stock market is important from the industry's and investor's point of view as they are expected to reflect all the available information on stock market prices. Lucey, Nejadmalayeri and Singh (2008), find that, "among all the macro indicators industrial production is the only one that affects stock returns in all countries significantly post announcement". Nowbutsing and Odit (2009) apply VECM to find that stock market development positively affect economic growth in Mauritius in both the short and the long-run. Ahmed and Imam (2007) use VECM to find that the Bangladesh stock market is not cointegrated with the industrial production index. As such, the market is informational inefficient[1].

As far as we know, there are few studies that model consumer confidence as a function of stock exchange index and industrial production index for a group of emerging countries is Çelik, Aslanoglu and Uzun (2010). They use panel data analysis, via conducting panel unit root and cointegration tests, to find that consumer confidence, industrial production and stock exchange have a long-run relationship in emerging economies. Ogunmuyiwa (2010) finds that both investor's sentiment and stock market liquidity Granger-cause economic growth but using only Nigerian data. Not using consumer confidence but business confidence Zizza (2002) estimates simple regressions for EU countries relating production index, business confidence index and their stock indices. Estimations and testing of

[1] In an efficient market the prices of the securities fully reflect all available information.

single-country models and euro-area models allowed them to favour the aggregation of national forecasts, but by doing this analysis separately they lose the main point of variables relation.

Given the existent relation between financial markets and economic indicators, increasing globalization and spillover effects, this investigation intends to test the following hypothesis: First, assuming that stock markets react to expectations, to what extension are expectations translated into share prices? As such, our first testable hypothesis is that expectations predict future aggregate market returns (Schmeling, 2009). As the stock market also plays a role of a leading indicator, reflecting economical conditions, the reverse effect is also being tested as crucial in this assumption. Given previous empirical findings, there is rationality to assume that expectations influence stock market indices in a different manner as markets are still described by national particularities. Therefore, expectations impacts on returns should be stronger for countries that have less well developed market institutions (Schmeling, 2009). We find that this is true for longer periods, while being true contemporaneously for more informational efficient markets like UK and US. Second, industrial production in the real side of the economy, being one of the variables that constitute the measure of a business cycle, is expected to have an effect in share prices evolution, and at the same time, the reverse relation should be explored in the extent that it could also be influenced by stock markets. Our initial prediction is that production has a strong impact on both share price indices and business confidence. Lastly, we test for the possibility of a close link between confidence indicators and industrial production, where the initial prediction is that business confidence affects more industrial production than does consumer confidence[2] in the short-run, while this effect may be reversed for longer periods.

3. Data and Statistical Properties

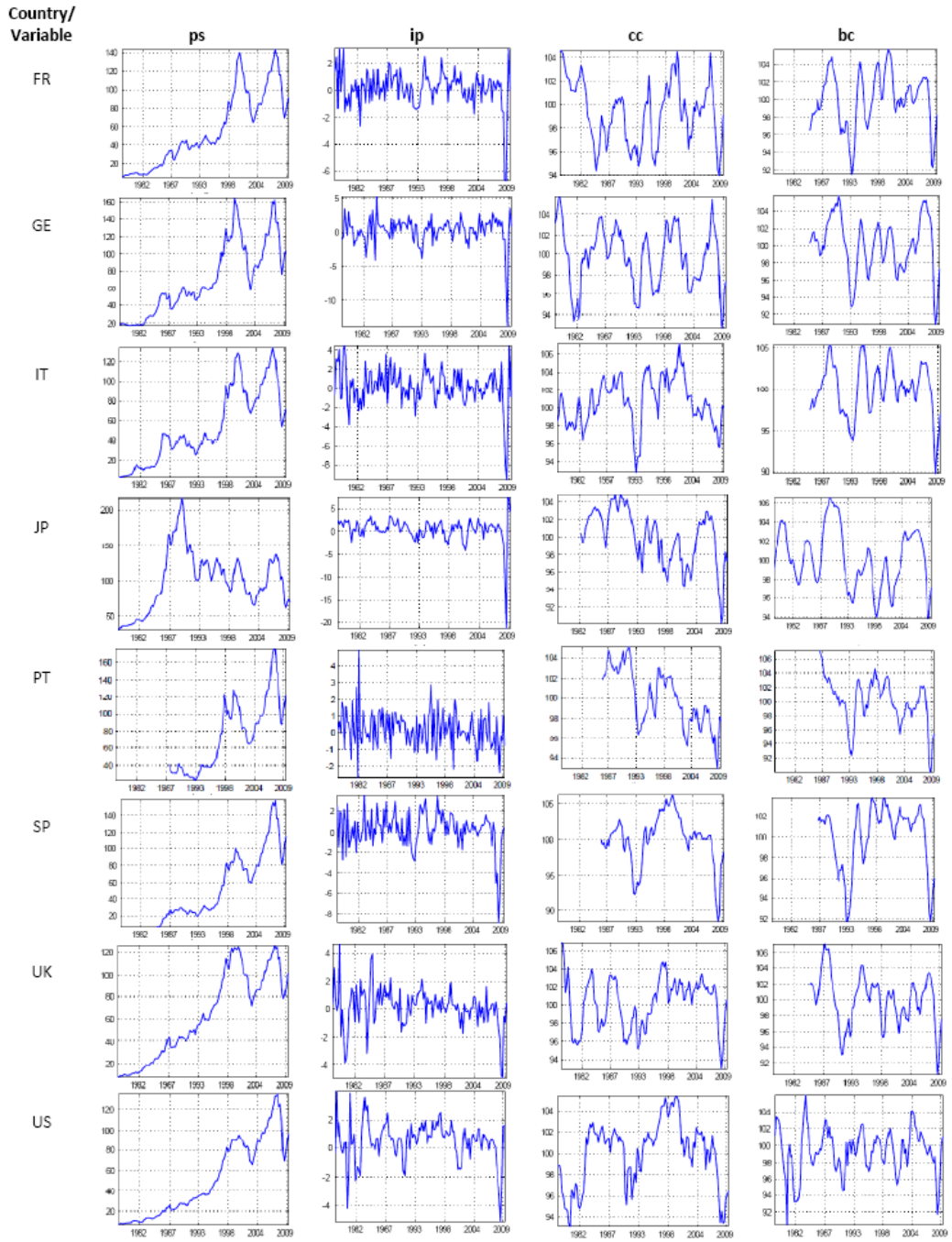
We use quarterly data to show the existence of a relation between financial, production and sentiment variables. The reason for using quarterly data depends on the notion that higher frequency data usually exhibits serial correlation. Many studies use monthly (contemporaneous) returns, which may be influenced by factors other than consumer confidence. Moreover, previous authors also use quarterly data (Arestis, Demetriades and Luintel, 2001; Otoo, 1999) obtaining good performance results.

[2] Consumer sentiment derives from economic conditions, like unemployment, and this impacts industrial production in a negative manner.

Figure 1

Time series behavior plot for each of the analyzed series and countries.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index.



All the relevant data has been compiled from the OECD[3] Main Economic Indicators database for six European (France, Germany, Italy, Portugal, United Kingdom and Spain) countries, and for Japan and United States. Our sample was after adjusted to 1985:Q1 - 2009:Q4.

For stock price, we use the general share price index (ps variable) for each of the countries under analysis. Share prices have the base Index for 2005 (=100) and represent all share indices. Antonios (2010) investigates the causal relationship between stock market development and economic growth for Germany for the period 1965-2007 using VECM, and the general stock market index is also used as a proxy for the stock market development. All data is treated in percentage (log first differences) on a quarterly basis.

The industrial production index data was collected on a quarterly basis which represents the cumulative change in percentage, seasonally adjusted. In other words, the industrial production index (ip variable) is the growth rate of industrial production for each country (base Index is 2005 = 100).

The Consumer (cc variable) and Business (bc variable) confidence indices should be regarded as economic indicators, which derive most of their information content from past and current economic outlook. They are derived from the results of monthly surveys. OECD has decided to fix 100 as mean, representing the long term average and not attached to a specific base year[4]. Being these variables of ending month, we transformed them into quarterly data only using the values of the end of each month of the respective quarter. Consumer confidence is expressed as a net balance (reveals changes in consumer's expectations) in contrast to business confidence, which is depicted as a percentage gross (indicating what the situation is at a specific point in time). Figure 1 shows the variables performance across time, one for each country, namely France (FR), Germany (GE), Italy (IT), Japan (JP), Portugal (PT), Spain (SP), United Kingdom (UK) and United States (US), respectively.

In general, stock market price indices show an increasing trend throughout the years with the highly visible "crashes" during 2003-2004 and 2008-2009. As plotted, decreases in confidence indices occur almost at the same time as those of industrial production and stock market indices. The years of 1987, 1993, 2001,

[3] For more details on the data used please consult http://stats.oecd.org/Index.aspx. Also, OECD already makes quarterly data available for some series.

[4] For more data details please consult OECD data specifications. For each index, data for a given month "t" is published at the beginning of month "t+2" (a two months delay).

2003 and 2008 are time periods that included significant market declines. These events across time contributed essentially to some confidence peaks and some irregularities on stock markets evolution. If we attend some historical date events from the MSCI World Index, we notice that they are very well marked in the graphs, being possible to figure out the variables feedback in a general setting[5].

Table 1

Statistical properties of the variables

Var	Count	Mean	Median	Max.	Min.	St. Dev.	Skew.	Kurt.	J.-B.	prob.	Obs.
ps	FR	0.023	0.038	0.227	-0.325	0.092	-0.836	4.692	26.131	0.000	127
ps	GE	0.013	0.012	0.209	-0.362	0.093	-1.164	5.836	62.863	0.000	127
ps	IT	0.025	0.027	0.348	-0.304	0.112	0.172	3.680	2.199	0.333	127
ps	JP	0.007	0.018	0.197	-0.354	0.086	-0.570	4.807	20.363	0.000	127
ps	PT	0.013	0.022	0.242	-0.279	0.102	-0.166	3.327	0.475	0.789	87
ps	SP	0.027	0.021	0.355	-0.235	0.100	0.163	3.877	2.415	0.299	99
ps	UK	0.020	0.023	0.155	-0.246	0.065	-1.216	6.222	76.047	0.000	127
ps	US	0.020	0.022	0.187	-0.362	0.067	-1.873	11.629	415.409	0.000	127
ip	FR	0.164	0.203	3.209	-6.733	1.381	-1.695	11.267	377.270	0.000	128
ip	GE	0.299	0.623	5.261	-13.850	2.079	-2.893	20.249	1575.546	0.000	128
ip	IT	0.203	0.121	4.476	-9.571	2.009	-1.212	8.428	165.649	0.000	128
ip	JP	0.405	0.663	7.587	-21.280	2.830	-3.926	31.514	4171.060	0.000	128
ip	PT	0.202	0.048	4.929	-2.658	1.106	0.483	4.913	20.484	0.000	128
ip	SP	0.233	0.372	3.482	-8.781	1.763	-1.568	8.613	195.320	0.000	128
ip	UK	0.133	0.289	4.688	-4.903	1.406	-0.521	5.963	44.750	0.000	128
ip	US	0.488	0.661	3.922	-5.134	1.398	-0.982	5.713	52.295	0.000	128
cc	FR	99.304	99.666	104.553	93.951	2.631	-0.013	2.169	4.123	0.127	128
cc	GE	99.752	99.961	105.695	92.647	3.055	-0.273	2.305	4.520	0.104	128
cc	IT	100.644	100.631	107.115	92.875	2.680	-0.322	2.918	2.260	0.323	128
cc	JP	99.993	100.538	104.837	90.159	3.104	-0.716	3.202	9.018	0.011	111
cc	PT	100.017	99.435	105.046	92.929	2.871	-0.097	2.069	4.003	0.135	95
cc	SP	100.008	100.456	106.276	88.458	3.580	-1.059	4.546	23.477	0.000	95
cc	UK	100.246	100.833	106.843	92.963	2.825	-0.301	2.452	3.834	0.147	128
cc	US	100.009	100.974	105.399	93.117	3.047	-0.482	2.474	6.583	0.037	128
bc	FR	100.022	100.070	105.704	91.501	3.141	-0.548	3.046	4.731	0.094	100
cbc	GE	99.987	100.213	105.748	90.836	3.250	-0.533	3.105	4.464	0.107	100
bc	IT	100.014	100.189	105.342	89.791	3.184	-0.534	3.330	4.625	0.099	100
bc	JP	100.213	99.997	106.543	93.880	3.093	0.068	2.330	2.909	0.234	128
bc	PT	99.993	100.335	107.144	90.030	3.304	-0.832	4.075	12.833	0.002	92
bc	SP	100.012	101.325	103.744	91.759	3.129	-1.193	3.525	20.663	0.000	91
bc	UK	100.000	100.464	107.015	90.503	3.231	-0.350	3.290	2.019	0.364	100
bc	US	99.322	99.580	105.931	90.458	2.697	-0.608	3.819	10.019	0.007	128

FR – France; GE – Germany; IT – Italy; JP – Japan; PT – Portugal; SP – Spain; UK – United Kingdom; US – United States; ps – share price index; ip – industrial production index; cc – consumer confidence index; bc – business confidence index.

Confidence indices seem to display a strong relationship with real variables like industrial production and share prices. Despite willingness to buy, produce or consume is just consumer and producer's expectations about future income flows,

[5] For historical events consult MSCI World Index.

and these could also account for non-economic factors such as psychological or political factors. For the period under analysis, plots suggest seasonality and non-stationarity to be the main features of these variables over time.

Summary statistics for all of the variables entering in the current model are presented in Table 1, by country.

It's expected to attain for a normally distributed variable a skewness of zero and a kurtosis of three, which by consequence produced a zero value for the JB test. Given the results, we can reject the hypothesis that the residuals are normally distributed. All series exhibit skewness and excess kurtosis despite the country under analysis, being stock markets returns negatively skewed for France, Germany, Japan, Portugal, UK and US.

The average quarterly index returns are positive, being equal for UK and US (0,020) and for Germany and Portugal (0,013). Mean returns are shown to be higher for Spain (0.027) and lower for Japan (0.007), while being similar for France (0.023), Italy (0.025) and Spain (0.027) during the study period. Spain is shown to have higher volatility, as measured by standard deviation, of 16.3%. The markets which show the lowest volatility values are those better established and developed in financial terms, as UK and the US market.

The average index of industrial production in the US market is 0.488. As such, the American industrial production index grew on average 48.8% during the sample period, while the European and the Japanese growth rates were by far more sustained, with the highest for Germany.

Moreover, business and consumer's indices have a very similar volatile behavior among countries, where surprisingly business confidence maximum value is higher for Portugal (107.144) than that of UK (107.015) and US (105.931). In terms of consumer confidence and attaining to max values reported, Italy leads the others.

The correlation matrix for all the variables and for each country is presented in Table 2. Generally, correlation between the variables appears to be relatively weak, with the highest values between share prices and the other variables exhibited in Japan, US and Spain. Germany and Italy display a negative correlation involving share prices and consumer's confidence.

Table 2
Correlation matrix for the variables in VAR for each country

Variable/Country	ps fr	ip fr	cc fr	bc fr	Variable/Country	ps ge	ip ge	cc ge	bc ge
ps fr	1.000				ps ge	1.000			
ip fr	0.290	1.000			ip ge	0.274	1.000		
cc fr	0.094	0.289	1.000		cc ge	-0.010	0.383	1.000	
bc fr	0.096	0.506	0.842	1.000	bc ge	0.180	0.555	0.738	1.000
Variable/Country	ps it	ip it	cc it	bc it	Variable/Country	ps jp	ip jp	cc jp	bc jp
ps it	1.000				ps jp	1.000			
ip it	0.283	1.000			ip jp	0.339	1.000		
cc it	-0.034	0.239	1.000		cc jp	0.326	0.478	1.000	
bc it	0.083	0.508	0.646	1.000	bc jp	0.002	0.241	0.724	1.000
Variable/Country	ps pt	ip pt	cc pt	bc pt	Variable/Country	ps sp	ip sp	cc sp	bc sp
ps pt	1.000				ps sp	1.000			
ip pt	0.079	1.000			ip sp	0.362	1.000		
cc pt	0.023	0.230	1.000		cc sp	0.228	0.590	1.000	
bc pt	0.032	0.208	0.635	1.000	bc sp	0.117	0.530	0.766	1.000
Variable/Country	ps uk	ip uk	cc uk	bc uk	Variable/Country	ps us	ip us	cc us	bc us
ps uk	1.000				ps us	1.000			
ip uk	0.244	1.000			ip us	0.239	1.000		
cc uk	0.185	0.347	1.000		cc us	0.249	0.507	1.000	
bc uk	0.096	0.524	0.489	1.000	bc us	0.254	0.778	0.487	1.000

FR – France; GE – Germany; IT – Italy; JP – Japan; PT – Portugal; SP – Spain; UK – United Kingdom; US – United States; ps – share price index; ip – industrial production index; cc – consumer confidence index; bc – business confidence index.

Stronger correlations are identified between industrial production and the confidence variables in a common scenario for all countries, which confirms that both sides of an economy are effectively linked, and special attention should be given to both channels, which can affect a country. Also, correlation is significant between industrial production and stock markets. Interestingly, and independently of the country, both confidence indexes are more correlated to industrial production than to the stock market. If for bc this should be expected, for cc we should initially expect an higher or similar correlation between cc and ps with respect to that of cc and ip.

Notice that for most of the less financial developed countries, like PT and SP, industrial production index is more correlated with the consumer's confidence index than with business expectations index. As such, producers are more prone to

reflect industrial information into their expectations, and to reflect these on industrial production for countries with better developed market institutions, or else, more informational efficient (higher correlation values for US, UK, Germany, Italy and France).

4. Model Specifications

Motivated by two primary objectives, we choose the vector autoregressive (VAR) model for our analysis. Initially, to be able to explore the short-run relationship between the stock market, expectations from the consumer and production sides of the economy, and industrial production. In doing so, the magnitude of the estimated short-run output elasticity's with respect to the measures of confidence indices, industrial production and stock market development is likely to shed light on the relative importance of the economic variables for the financial system, while allowing to investigate the causal flows of this relationship.

Several features of the VAR model make it appropriate in this context. First, VARs allow for the estimation of a reduced-form dynamic relationship among a system of endogenous variables, conditional on exogenous variables (mostly lagged values of the endogenous one's). Dynamic considerations are also important in explaining the relationship among the series. Second, the method and estimation is simple, and one does not have to worry about determining which variables are endogenous and which are exogenous, being all variables treated as endogenous and the usual OLS method can be applied to each equation. Third, the forecasts obtained by this method are in many cases better than those obtained from the more complex simultaneous-equation model. Finally, from the estimation of VARs, impulse response functions can be derived.

The mathematical representation of a VAR system is:

$$y_t = A_0 + Ay_{t-1} + ... + A' y_{t-k} + \varepsilon_t \quad (1)$$

where p is the number of variables to be considered in the system, k is the number of lags to be considered in the system, $y_t, y_{t-1}, ..., y_{t-k}$ are the 1 x p vector of variables, and the A, ... and A' are the p x p matrices of coefficients to be estimated (a's and b's; see (2) and (3) specifications), being A_0 the vector of constants which will be represented by c; ε_t a 1 x p vector of innovations that may

be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

Since we use two different confidence indices, we will estimate a different VAR model for each index and country, which we will label Model 1 and Model 2. Model 1 contains as endogenous variables the share price index for each country (ps), its own industrial production index (ip) and the consumer confidence index (cc) for that country: $y'_t = (ps_t, ip_t, cc_t)$. Model 2 is estimated on the set of variables share price index for each country (ps), its own industrial production index (ip) and the country's respective business confidence index (bc): $y'_t = (ps_t, ip_t, bc_t)$.

Therefore, Model 1 will be estimated as:

$$\begin{bmatrix} ps_t^i \\ ip_t^i \\ cc_t^i \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} ps_{t-1}^i \\ ip_{t-1}^i \\ cc_{t-1}^i \end{bmatrix} + \ldots + \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix} \begin{bmatrix} ps_{t-k}^i \\ ip_{t-k}^i \\ cc_{t-k}^i \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \quad (2)$$

where i stands for the country, being i = FR, GE, IT, JP, PT, SP, UK and US. In a similar way, Model 2 will be estimated using the specification:

$$\begin{bmatrix} ps_t^i \\ ip_t^i \\ bc_t^i \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} ps_{t-1}^i \\ ip_{t-1}^i \\ bc_{t-1}^i \end{bmatrix} + \ldots + \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix} \begin{bmatrix} ps_{t-k}^i \\ ip_{t-k}^i \\ bc_{t-k}^i \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \quad (3)$$

where the specifications are the same as above. Before estimating the VAR, we have to decide the maximum lag lengths, k, to generate the white noise of error terms (Kremer and Westermann, 2004; Otoo, 1999). We have based the decision on the smallest value of the Akaike (AIC) and Schwartz (BIC) of the VAR to determine the appropriate number of lags. Results pointed out for the following: Italy (IT) and Portugal (PT) have been specified with k = 1; France (FR), Germany (GE), United Kingdom (UK) and United States (US) have been specified with k = 2; Spain (SP) appropriate choice revealed a k = 3; and finally for Japan (JP) results indicated a number of lags equal to 4.

Since the individual coefficients in the estimated VAR models are often difficult to interpret, practitioners of this technique often estimate the so-called

impulse response function (IRF). These trace out the response of the dependent variable in the VAR system to shocks in the error term, and traces out the impact of such shocks for several periods in the future. More precisely, IRFs show how a shock to a given endogenous variable impacts the expected future values of the variables in the system. IRFs to be presented in the empirical estimation results part outline the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. In order to save space we skip the presentation of the VAR estimates and present only impulse response functions plots obtained for each market.

Variance decompositions (VD) are an alternative method to impulse response functions, used for examining effects of shocks on dependent variables. This technique determines how much of the forecast error variance for any variable in a system is explained by innovations to each explanatory variable, over a series of time horizons. The result will be dependent on the order in which the equations are estimated in the model and in this work the ordering was: stock market index, industrial production index and expectations indices (consumer confidence in Model 1, first and business confidence for Model 2, after).

5. Empirical Results

In order to apply VAR methodology we first need to test for stationarity of the system variables. To address the topic of the degree of integration, three unit root tests were used: the Augmented Dickey-Fuller test (ADF), the Phillips-Perron test (PP), as well as the Kwiatkowski-Phillips-Schmidt-Shin test (KPSS). Since results were the same for the three tests, allowing us to reach the same conclusions we end up presenting only the ADF results, in table 3. Line 1 for each country summarizes the ADF test statistic of the variables under analysis, obtained with and without trend, but always with a constant.

All the variables turned out to be stationary in the way they are studied: ps in its first log difference (returns); ip in log first differences (growth rate); despite cc and bc being in levels, they revealed to be I(0). Therefore, all series are stationary, leading us to carry on the analysis in the form the variables time-series are considered.

Table 3
Results of unit root tests for first difference variables

Variables		ps		ip		cc		bc	
Country	Test	constant + trend	constant	constant + trend	constant	constant + trend	constant	constant + trend	constant
France	ADF	-7.544***	-7.779***	-7.836***	-8.093***	-8.131***	-8.254***	-4.771***	-4.761***
	Lags	0	0	0	0	0	0	1	1
Germany	ADF	-8.199***	-8.304***	-8.313***	-7.977***	-8.084***	-8.075***	-5.075***	-5.068***
	Lags	0	0	0	0	0	0	1	1
Italy	ADF	-6.786***	-6.995***	-7.238***	-7.400***	-7.428***	-7.722***	-4.686***	-4.667***
	Lags	0	0	0	0	0	0	1	1
Japan	ADF	-7.479***	-7.470***	-7.697***	-7.495***	-7.574***	-7.681***	-4.479***	-4.556***
	Lags	0	0	0	0	0	0	1	1
Portugal	ADF	-6.030***	-6.111***	-6.071***	-14.776***	-15.434***	-16.244***	-3.816***	-4.030***
	Lags	0	0	0	0	0	0	1	1
Spain	ADF	-6.907***	-7.284***	-7.402***	-4.723***	-4.778***	-4.878***	-3.314***	-3.323***
	Lags	0	0	0	1	1	1	1	1
UK	ADF	-8.208***	-8.774***	-9.056***	-7.435***	-7.452***	-7.690***	-4.018***	-4.125***
	Lags	0	0	0	0	0	0	1	1
US	ADF	-7.677***	-8.153***	-8.195***	-1.887	-2.668***	-2.623*	-4.377***	-4.580***
	Lags	0	0	0	12	12	12	10	10

ADF stands for Augmented Dickey Fuller test statistic. The critical values for the case with constant are -3.455, -2.872 and -2.573 for 1, 5 and 10 percent significance levels, and for the case with constant and a trend are -2.624, -1.761 and -1.345 for 1, 5 and 10 percent significance levels, respectively. The lag length structure of the dependent variable is determined using the recursive procedure in the light of a Lagrange multiplier (LM) autocorrelation test (for orders up to two), which is asymptotically distributed as a chi-square distribution. ps – share price index; ip – industrial production index; cc – consumer confidence index; bc – business confidence index. ***, **, * significance at 1%, 5% and 10%, respectively.

We proceed by analyzing the results attained by the two different estimated models (Model 1 - (2) and Model 2 - (3)). Impulse Response Functions plots can be observed in figure 2, considering countries by alphabetic order, using the consumer's confidence index as endogenous variable; plots on figure 3 are those for a shock in the business confidence index and its effect in all endogenous variables; figure 4 plots impulse response functions or effects of a unit shock in the industrial production index an its effect in all endogenous variables; finally, plots on figure 5 are for the effects from a shock in the share price (ps) index and its effect in all endogenous variables.

Figure 2

Impulse response functions, effect of one unit shock (one standard deviation confidence band) of consumer confidence index.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index. We set the truncation horizon at j = 20 quarters, or a five-year period, believing that this truncation horizon is both long enough to capture medium run forces and short enough to provide fairly reliable results. The grey shadows represent 1% or 99th percentile confidence bands, which gives the deviation of the variable from its long-run equilibrium j quarters ahead, responding to a one-off shock in a certain variable in time j = 0. The confidence band is obtained through a standard bootstrapping procedure, similar to the one obtained when Monte Carlo methods are used.

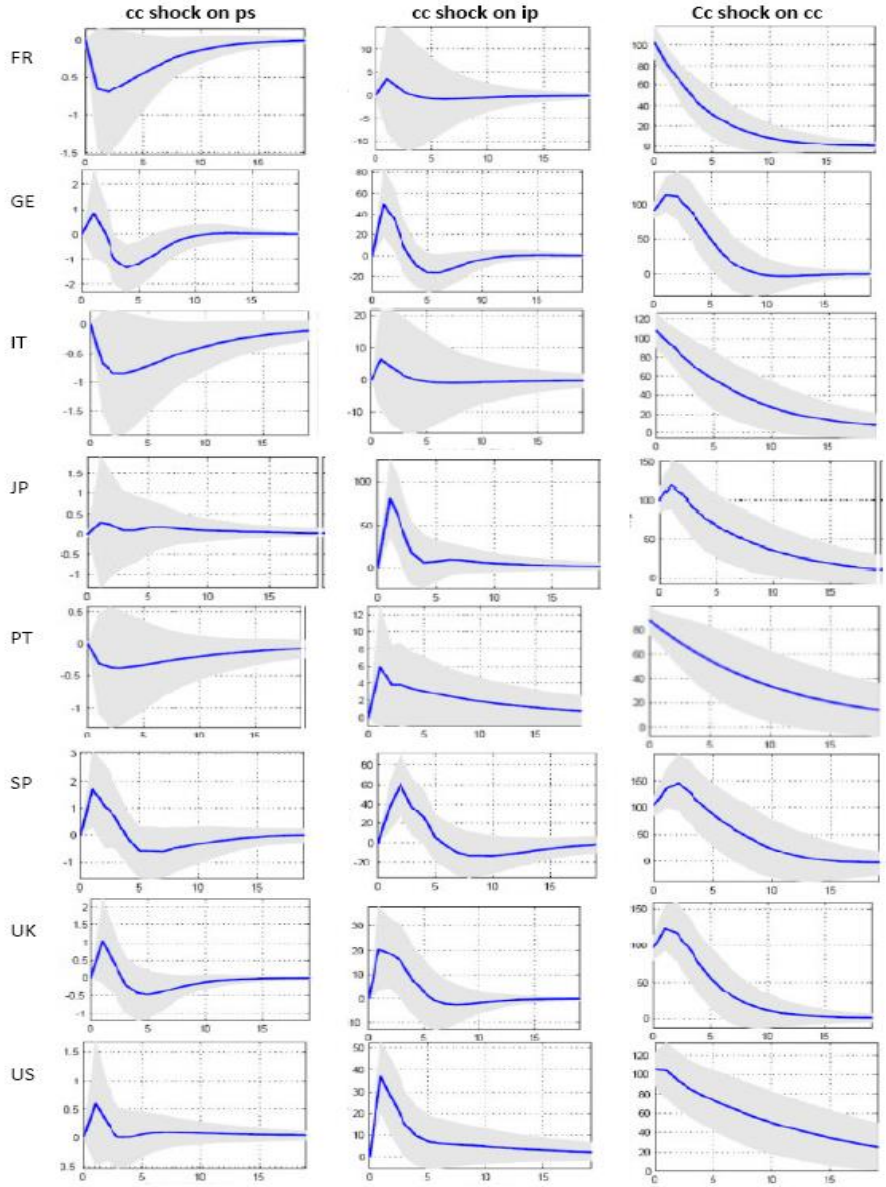
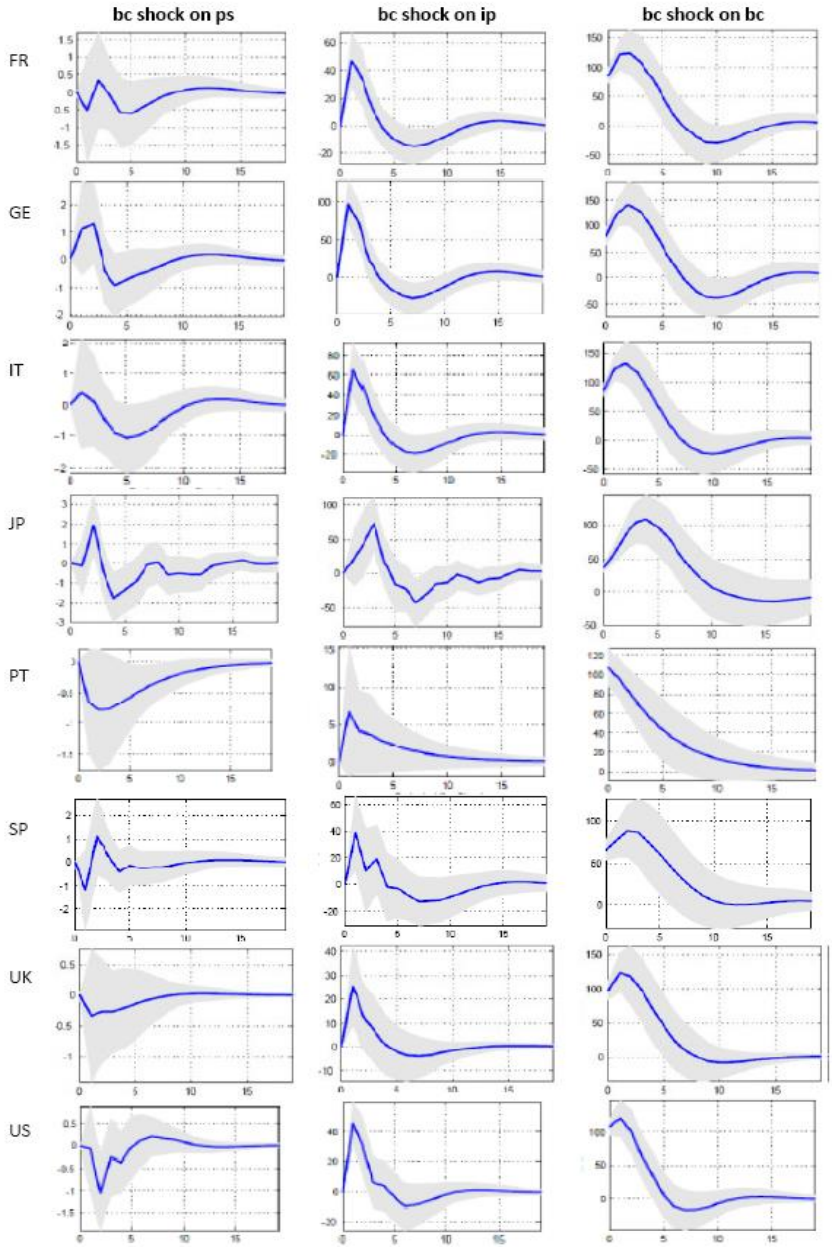


Figure 3

Impulse response functions, effect of one unit shock (one standard deviation confidence band) of business confidence index.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index. We set the truncation horizon at j = 20 quarters, or a five-year period, believing that this truncation horizon is both long enough to capture medium run forces and short enough to provide fairly reliable results. The grey shadows represent 1% or 99th percentile confidence bands, which gives the deviation of the variable from its long-run equilibrium j quarters ahead, responding to a one-off shock in a certain variable in time j = 0. The confidence band is obtained through a standard bootstrapping procedure, similar to the one obtained when Monte Carlo methods are used.



Each series response to its own shock is positive, significant and strong in the short-run, up to 5 quarters, for each of the countries under examination. We can even observe that all initial shocks last approximately 1 to 2 quarter periods decreasing or increasing, depending if we are observing a positive or a negative shock, but after 5 or 10 quarters these shocks converge towards zero. Dynamic responses of share prices and industrial production to a positive standard deviation (shock) in the consumer's confidence are, in general, statistically significant, although the power reflected in the first variable evidences a weaker behavior. Industrial production index responses to consumer confidence index shocks are positive for all countries, being higher in Japan, although not statistically significant in France (FR) and Italy (IT).

Results confirm the fact that industrial production is highly correlated with the consumer confidence index, but share price results cannot be generalized in this simpler way given that results change for the country under analysis.

As can be also observed by these plots impact of business confidence index on share prices are negative for SP, PT, UK and US, although not statistically significant for any of these markets. Despite this, in France the effect is unstable as it is for Japan, while once again the effect of confidence indexes is higher for this country. As for stock market indices responses to shocks on the business confidence and consumer confidence indices, these change depending on the country under analysis.

Each ip response to its own shock is positive, significant and strong in the short-run, up to five quarters, for each country. But in general a cc and bc response to an ip shock only converge to zero at the end of a 10 quarters period, being positive the initial responses for both confidence indexes.

In Japan, UK and US, ip shocks on share prices and bc index are not statistically significant but positive, while for those same countries ip shocks on ps using cc as endogenous variable, are positive for UK, but negative for JP and US, and again not statistically significant[6].

[6] UK and US markets are more financially evolved than the other markets under analysis, and will be used as benchmark references throughout the analysis.

Figure 4

Impulse response functions, effect of one unit shock (one standard deviation confidence band) of industrial production index.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index. We set the truncation horizon at j = 20 quarters, or a five-year period, believing that this truncation horizon is both long enough to capture medium run forces and short enough to provide fairly reliable results. The grey shadows represent 1% or 99th percentile confidence bands, which gives the deviation of the variable from its long-run equilibrium j quarters ahead, responding to a one-off shock in a certain variable in time j = 0. The confidence band is obtained through a standard bootstrapping procedure, similar to the one obtained when Monte Carlo methods are used.

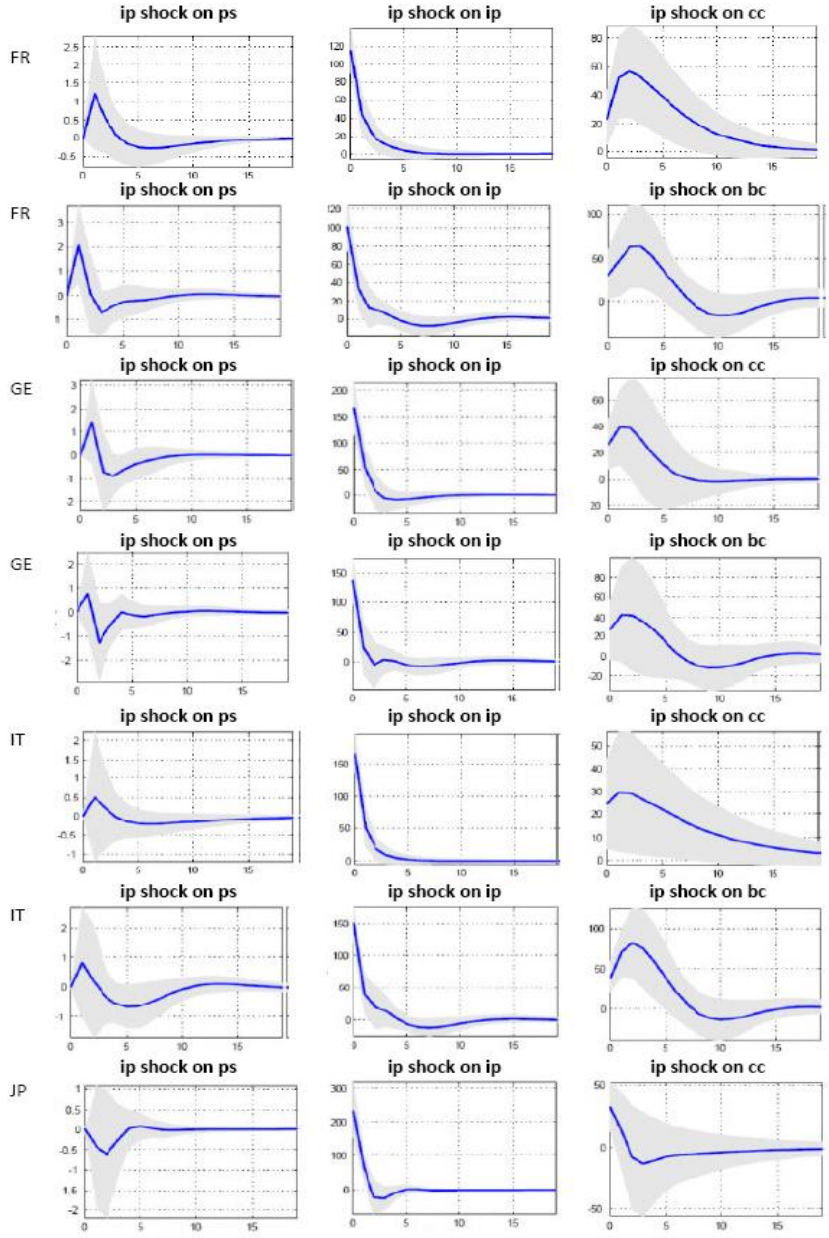


Figure 4 (continued)

Impulse response functions, effect of one unit shock (one standard deviation confidence band) of industrial production index.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index. We set the truncation horizon at j = 20 quarters, or a five-year period, believing that this truncation horizon is both long enough to capture medium run forces and short enough to provide fairly reliable results. The grey shadows represent 1% or 99th percentile confidence bands, which gives the deviation of the variable from its long-run equilibrium j quarters ahead, responding to a one-off shock in a certain variable in time j = 0. The confidence band is obtained through a standard bootstrapping procedure, similar to the one obtained when Monte Carlo methods are used.

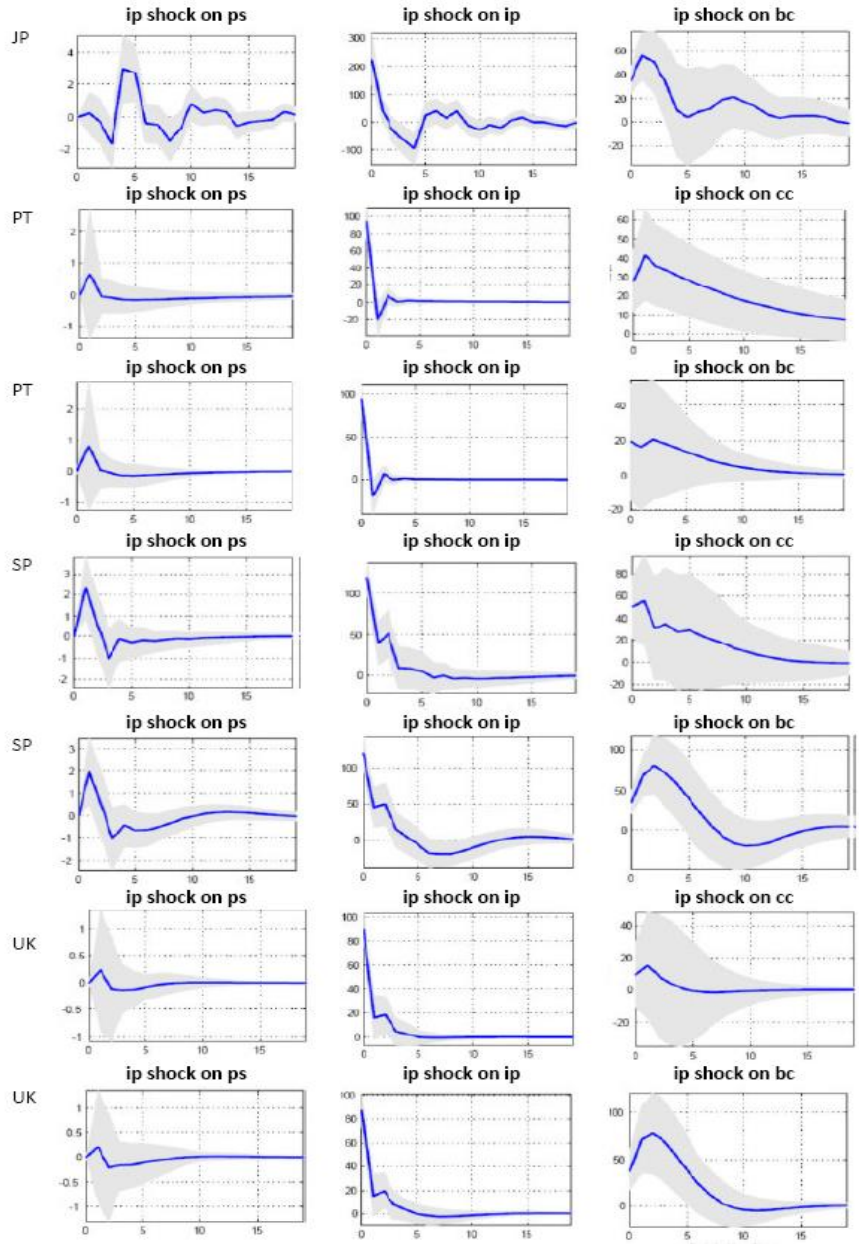
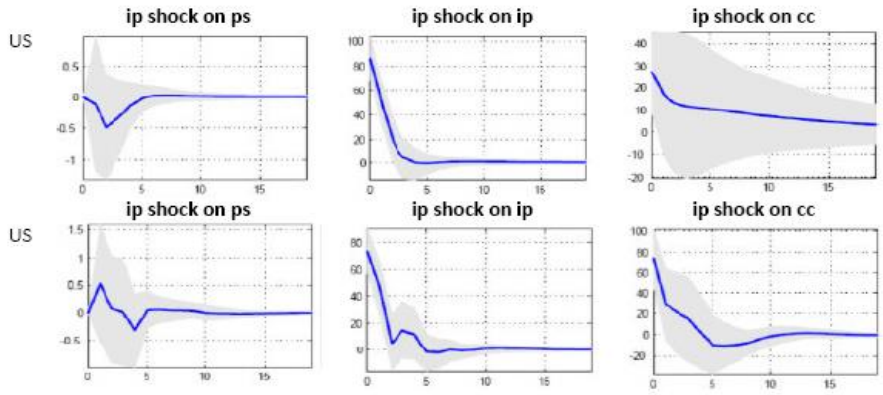


Figure 4 (continued)

Impulse response functions, effect of one unit shock (one standard deviation confidence band) of industrial production index.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index. We set the truncation horizon at j = 20 quarters, or a five-year period, believing that this truncation horizon is both long enough to capture medium run forces and short enough to provide fairly reliable results. The grey shadows represent 1% or 99th percentile confidence bands, which gives the deviation of the variable from its long-run equilibrium j quarters ahead, responding to a one-off shock in a certain variable in time j = 0. The confidence band is obtained through a standard bootstrapping procedure, similar to the one obtained when Monte Carlo methods are used.



In fact, ip shocks on ps when cc and bs are both used are positive, although not statistically significant. This could indicate that these markets are informational efficient, or in other words we can think of these results as indicative that when some type of industrial shock, or even confidence shocks hit the market, these two markets have already incorporated all the necessary information, not responding significantly in the short-run. These will be further analyzed in the variance decompositions section, but we need to retain that confidence indices are published with a delay, which reinforces our conclusions.

As with ip shocks, ps shocks converge to 0 before 5 quarters when we analyze their effect on ip, but only after 10 quarters when the variable shocked is cc. A share price shock on industrial production indices, consumer confidence and business confidence indices are positive and statistically significant for France, Germany, Italy, Japan, Spain, UK and US. The market where these types of shocks are mostly felt in magnitude terms is the Japanese market.

Figure 5

Impulse response functions, effect of one unit shock (one standard deviation confidence band) of share price index.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index. We set the truncation horizon at j = 20 quarters, or a five-year period, believing that this truncation horizon is both long enough to capture medium run forces and short enough to provide fairly reliable results. The grey shadows represent 1% or 99th percentile confidence bands, which gives the deviation of the variable from its long-run equilibrium j quarters ahead, responding to a one-off shock in a certain variable in time j = 0. The confidence band is obtained through a standard bootstrapping procedure, similar to the one obtained when Monte Carlo methods are used.

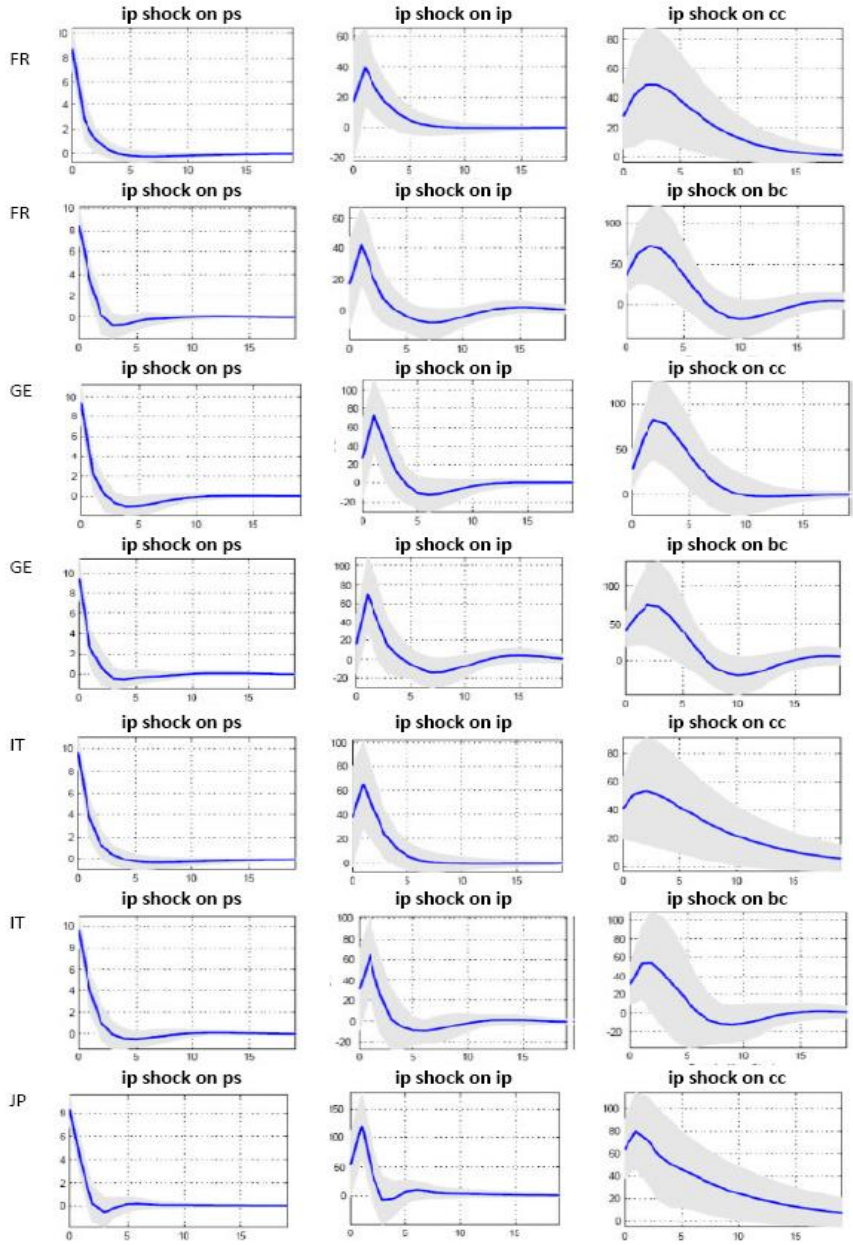


Figure 5 (continued)

Impulse response functions, effect of one unit shock (one standard deviation confidence band) of share price index.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index. We set the truncation horizon at j = 20 quarters, or a five-year period, believing that this truncation horizon is both long enough to capture medium run forces and short enough to provide fairly reliable results. The grey shadows represent 1% or 99th percentile confidence bands, which gives the deviation of the variable from its long-run equilibrium j quarters ahead, responding to a one-off shock in a certain variable in time j = 0. The confidence band is obtained through a standard bootstrapping procedure, similar to the one obtained when Monte Carlo methods are used.

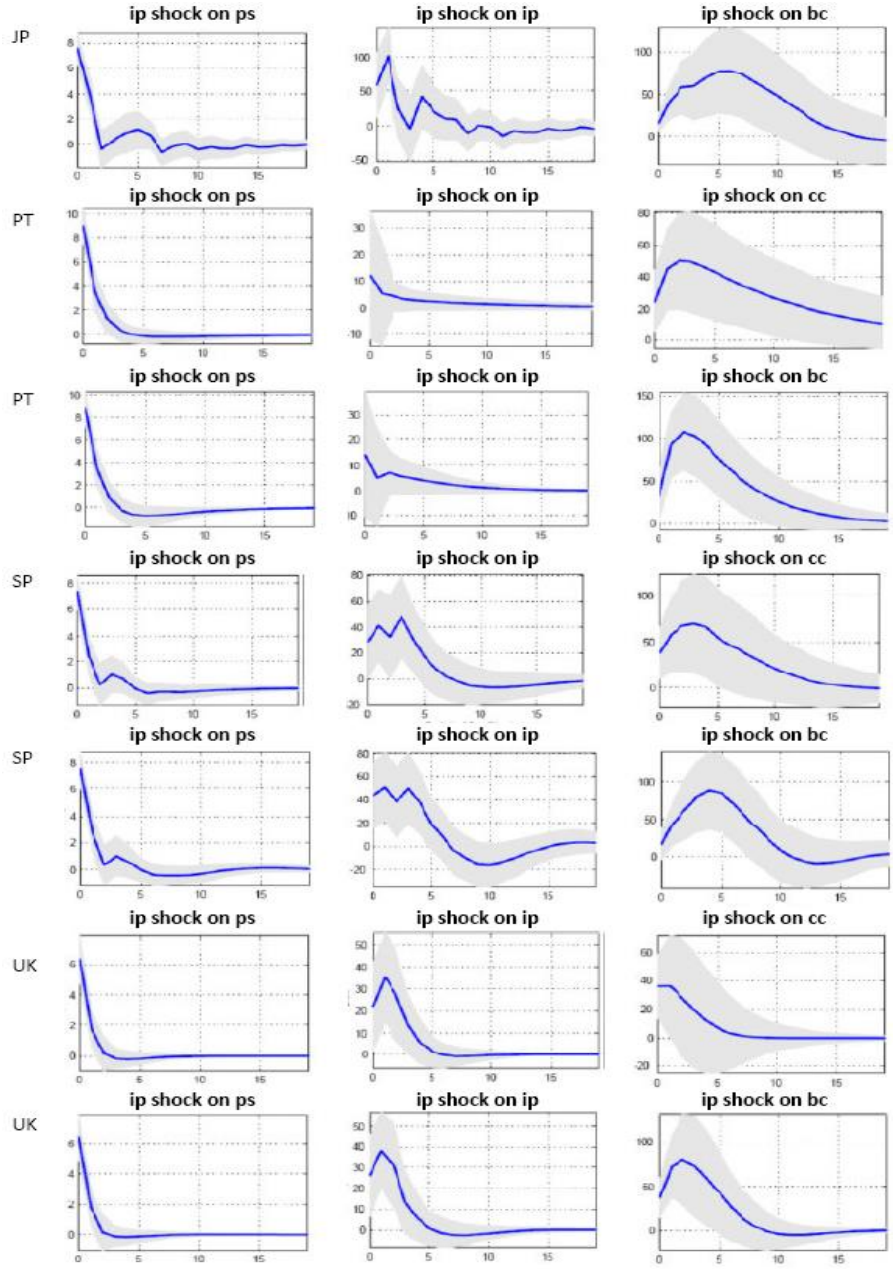
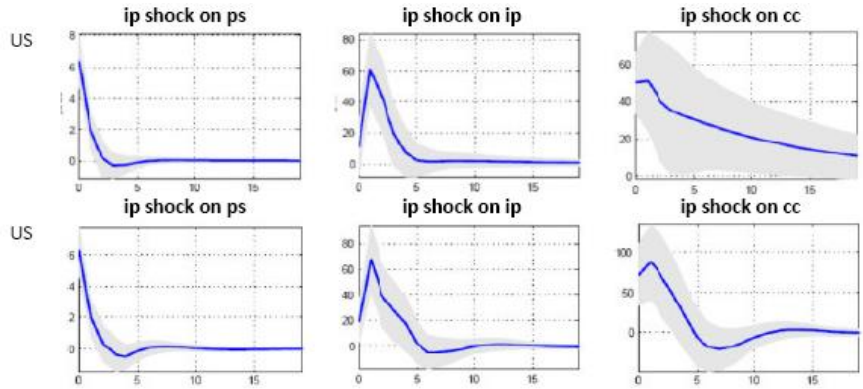


Figure 5 (continued)

Impulse response functions, effect of one unit shock (one standard deviation confidence band) of share price index.

FR - France; GE - Germany; IT - Italy; JP - Japan; PT - Portugal; SP - Spain; UK - United Kingdom; US - United States; ps - share price index; ip - industrial production index; cc - consumer confidence index; bc - business confidence index. We set the truncation horizon at j = 20 quarters, or a five-year period, believing that this truncation horizon is both long enough to capture medium run forces and short enough to provide fairly reliable results. The grey shadows represent 1% or 99th percentile confidence bands, which gives the deviation of the variable from its long-run equilibrium j quarters ahead, responding to a one-off shock in a certain variable in time j = 0. The confidence band is obtained through a standard bootstrapping procedure, similar to the one obtained when Monte Carlo methods are used.



Still, for all markets under analysis a shock in share prices have a positive and statistically significant effect on confidence indexes. However, for UK and US while the immediate impact on cc is positive and statistically significant, it decreases since the start of the data period. But for bc index positive ps shocks are felt in a statistically significant positive way for both countries, being these responses higher in value than those of cc responses. This reinforces the idea that in more developed markets, financial markets are also more informational efficient.

Coefficients in the VD can be interpreted as price elasticity's, implying, for instance that a 1% rise in industrial production for France would, in equilibrium, be associated with a stock market price rise of 15.12% for a 4 quarters periods (see table 4). Each sub-panel of the table gives the percentage of uncertainty in each series that is accounted for by previous information arising from its own past and that of the other two series. In contemporaneous time (in our case, within one quarter) there is about 97.8% (first row in the ip panel and fourth column in table 4) of uncertainty in industrial production (ip) index for France. In other words, the variation in the ip index that cannot be attributed to surprises in ps and cc, is 97.8%.

The only other variable that contributes to ip growth rate uncertainty in contemporaneous time is share price index (accounting for just 2% of the uncertainty in ip). However, in the long-run (meaning 20 quarters here), both ps and cc become important in explaining ip variations.

Table 4

Forecast error variance decomposition by country using consumer confidence, share prices and industrial production as endogenous variables: Model 1 results

FEDV	Period	ps fr	ip fr	cc fr	ps ge	ip ge	cc ge	ps it	ip it	cc it	ps jp	ip jp	cc jp
FEDV of ps i	1	100.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00
FEDV of ps i	4	96.41	2.09	1.50	94.76	3.44	1.80	98.06	0.28	1.66	99.07	0.73	0.19
FEDV of ps i	8	95.39	2.35	2.26	90.35	3.73	5.92	96.34	0.39	3.26	98.94	0.74	0.32
FEDV of ps i	12	95.12	2.51	2.37	90.22	3.72	6.06	95.71	0.48	3.82	98.89	0.74	0.37
FEDV of ps i	16	95.08	2.54	2.38	90.21	3.72	6.07	95.50	0.50	3.99	98.87	0.74	0.39
FEDV of ps i	20	95.07	2.55	2.38	90.21	3.72	6.07	95.44	0.51	4.05	98.86	0.74	0.40
FEDV of ip i	1	2.19	97.81	0.00	2.45	97.55	0.00	5.03	94.97	0.00	5.03	94.97	0.00
FEDV of ip i	4	15.12	84.80	0.08	18.60	72.75	8.66	21.01	78.87	0.14	21.43	68.08	10.49
FEDV of ip i	8	15.56	84.35	0.09	18.92	70.85	10.23	21.40	78.46	0.15	21.53	67.71	10.75
FEDV of ip i	12	15.56	84.34	0.10	19.09	70.39	10.53	21.39	78.45	0.15	21.56	67.53	10.92
FEDV of ip i	16	15.56	84.34	0.10	19.09	70.38	10.53	21.40	78.45	0.15	21.57	67.46	10.98
FEDV of ip i	20	15.56	84.34	0.10	19.09	70.38	10.53	21.40	78.45	0.16	21.57	67.43	11.00
FEDV of cc i	1	6.46	4.54	89.00	7.77	7.31	84.92	12.25	4.28	83.46	26.42	7.16	66.42
FEDV of cc i	4	17.99	22.49	59.52	26.96	7.36	65.68	21.04	6.69	72.27	29.33	2.32	68.35
FEDV of cc i	8	22.76	26.35	50.90	30.09	6.52	63.39	24.53	7.32	68.15	29.84	1.97	68.18
FEDV of cc i	12	23.51	26.86	49.63	30.12	6.52	63.36	25.43	7.47	67.10	29.99	1.87	68.14
FEDV of cc i	16	23.61	26.92	49.47	30.13	6.52	63.36	25.70	7.51	66.79	30.04	1.84	68.12
FEDV of cc i	20	23.62	26.93	49.45	30.13	6.52	63.36	25.78	7.53	66.70	30.06	1.82	68.12

FEDV	Period	ps pt	ip pt	cc pt	ps sp	ip sp	cc sp	ps uk	ip uk	cc uk	ps us	ip us	cc us
FEDV of ps i	1	100.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00
FEDV of ps i	4	99.16	0.44	0.39	84.44	9.30	6.26	96.95	0.18	2.87	98.27	0.80	0.93
FEDV of ps i	8	98.65	0.53	0.82	83.11	9.33	7.56	95.46	0.23	4.32	98.18	0.85	0.98
FEDV of ps i	12	98.39	0.58	1.02	82.42	9.31	8.27	95.25	0.23	4.53	98.11	0.85	1.04
FEDV of ps i	16	98.28	0.61	1.11	82.34	9.31	8.35	95.23	0.23	4.54	98.07	0.85	1.08
FEDV of ps i	20	98.23	0.62	1.16	82.34	9.31	8.35	95.23	0.23	4.54	98.06	0.85	1.10
FEDV of ip i	1	1.63	98.37	0.00	5.43	94.57	0.00	5.58	94.42	0.00	1.61	98.39	0.00
FEDV of ip i	4	2.16	97.17	0.67	18.92	60.06	21.01	21.69	70.24	8.08	32.53	55.15	12.33
FEDV of ip i	8	2.39	96.59	1.02	21.68	56.23	22.08	21.79	69.63	8.58	32.38	54.30	13.32
FEDV of ip i	12	2.48	96.34	1.18	21.47	55.16	23.37	21.77	69.53	8.70	32.25	53.95	13.81
FEDV of ip i	16	2.52	96.22	1.26	21.53	54.61	23.86	21.76	69.53	8.71	32.18	53.75	14.07
FEDV of ip i	20	2.54	96.17	1.29	21.57	54.52	23.92	21.76	69.52	8.71	32.15	53.64	14.21
FEDV of cc i	1	6.45	8.72	84.83	9.79	16.96	73.25	12.02	0.85	87.13	17.26	5.09	77.66
FEDV of cc i	4	20.58	13.66	65.77	15.93	8.69	75.38	7.28	0.79	91.93	16.84	2.82	80.34
FEDV of cc i	8	24.86	13.82	61.32	19.59	7.95	72.46	6.31	0.66	93.03	15.94	2.47	81.58
FEDV of cc i	12	26.03	13.85	60.12	20.46	7.95	71.58	6.31	0.66	93.03	15.70	2.38	81.93
FEDV of cc i	16	26.46	13.86	59.68	20.57	7.95	71.48	6.23	0.66	93.11	15.60	2.33	82.07
FEDV of cc i	20	26.64	13.87	59.50	20.57	7.95	71.48	6.23	0.66	93.11	15.55	2.31	82.14

FR – France; GE – Germany; IT – Italy; JP – Japan; PT – Portugal; SP – Spain; UK – United Kingdom; US – United States; ps – share price index; ip – industrial production index; cc – consumer confidence index; bc – business confidence index. The index i is meant to be i = fr, ge, it, jp, pt, sp, uk, us; as the column we are reading.

Furthermore, since all the coefficients are strongly significant, all the variables are important to define the equilibrium vector. In this sense, industrial production and confidence indices are important to define the level to which the share price is attracted over time and vice-versa to all of them, but for periods greater or equal to 4 quarters (1 year) and not contemporaneously as initially expected.

By inspecting all the values at once we can say that for all countries, the main driver of the source of randomness for each variable is in fact their own innovations, as should be clearly expected. And this is true independently of the country or variable under analysis.

Stock returns contemporaneous growth rate uncertainty depends on factors other than ip and confidence indices, while contributing in a small percentage to ip contemporaneous uncertainty, being also not affected by confidence. As time goes by, then both confidence indices become important to explain both ip and ps variations.

Consumer confidence indices have higher uncertainty explanatory effect on ps for all periods than does the business confidence index in share price indices for France, Germany, Spain and UK, being higher for Spain (8.3% explanation for 5 years). On the contrary, bc (see table 5) explains more ps uncertainty than cc for all periods for Japan, Portugal and US. Only for Italy, bc has a greater explanatory effect up to quarter 12, but in the longer run it is the cc index that accounts for more of its variation.

Considering one year and above periods, consumer confidence indices have higher uncertainty explanatory effect on stock returns than on industrial production except for France. However, the contemporaneous impact of ps over cc is higher for more informational efficient countries like UK (12.02) and US (17.26) than for countries with less financial developed markets like Portugal (6.45) and Spain (9.79). Moreover, for the latter's (as well as for France, Germany, Italy and Japan) a 1% rise in consumer confidence over time increases more the stock market price, while for UK and US the positive impact decreases (for example, 12.02 contemporaneously and 6.31 in 2 years in UK).

Moreover, bc explains more of ip uncertainty than cc for US (17.45% in the maximum length), for Japan, Italy, France and Germany, explaining more (from 35.64% to 38.93%, between 4 and 20 quarters) in Germany, while cc accounts for more ip uncertainty than bc for Spain (the highest percentage, [21%, 23.9%]), Portugal and UK.

For the generality of the countries, ps explain more of bc and cc uncertainties than do confidence indices on stock markets. In more financially developed markets like UK and US it is reasonable that expectations are already implicit at the time of the confidence indices release, meaning that these markets are simultaneously more informational efficient. This is noticed by the fact that in UK and US, bc and cc confidence indices explain solely a residual part of ps variation (0.7% and 3%, respectively for each country using bc as endogenous variable; and 4.5% and 1%, respectively for each country, when cc is used).

Between the times when confidence indices are released, it is expected that most efficient markets include expectations in share price responses more quickly than those that are not. As such, at the moment the confidence indicator is released to the market, in the more efficient ones, share prices will be less sensitive to these new information releases, since they had already incorporated this information previously. For countries with less developed markets it should be expected a slower rate of new information incorporation into share prices, and thus a higher uncertainty explanation percentage related. The fact that they seem to incorporate information before confidence indices have been published is also an effect of the gap between the period that goes from the collection and survey data treatment until it is publicly published. More credible results are to be expected when survey data starts to be published with a lesser time delay.

Therefore, we can say that expectations influence share price indices in a different manner as markets are still described by national particularities, especially at the development stage of their financial markets. But then, confidence effects on returns, independently if these come from the production or the consumption sides of the economy are stronger for countries that have less well developed market institutions, for longer time periods. This result favors' the third testable hypothesis of Schmelling (2009), being in accordance to those obtained by the author for a sample of 18 countries around the globe[7].

For both confidence indices, ps uncertainty is mostly explained by himself than by the other economic factors under analysis. This indicates that share price indices are influenced by other factors other than industrial production and confidence index, independently of the consumer or business economic index used for the investigation. As such, our initial prediction that confidence is a

[7] The author investigates whether consumer confidence affects stock returns, using monthly data and panel regressions, finding a positive impact.

fundamental driver of share prices is not confirmed by the results. However, this should not come at a surprise given previous empirical findings. While running causality tests, Otoo's (1999) investigation supports the idea that changes in stock prices are assumed as a leading indicator, which is in fact the case for the majority of the countries used in the current work. Similar to Çelik, Aslanoglu and Uzun (2010) we can say that confidence indices, industrial production and stock exchanges have an increasing long-run relationship, which resets us to the consideration of delayed effects among the variables.

In fact, for more financially developed countries bc and cc revealed to only explain a residual part of ps uncertainty, while bc and cc, both explain more ps uncertainty for countries like Japan, Spain, Portugal and Italy.

For all countries and in contemporaneous time (1 quarter), the uncertainty in ps arises solely from information discovered in its own series. However, also in contemporaneous time, the uncertainty in ip arises from information discovered in its own series, and the only other variable that contributes to this uncertainty is ps. Similarly, Kremer and Westermann (2004) results suggest that stock market shocks are contemporaneously (linearly) independent from all other shocks, whilst consumer's confidence shocks seem to respond contemporaneously to shocks in all other variables.

In sum, bc and cc both have a null contemporaneous explanation for ps and ip, only becoming important in the longer run, generally, explaining more uncertainty for both financial and production indices as time goes by (up to 5 years). As such, we could consider bc and cc confidence indices to be exogenous in contemporaneous time (that for the present study represents one quarter). Thus, to some extent our results contradict those of Otoo (1999), where he finds that sentiment and stock prices share a strong contemporaneous relationship. In fact this is true for UK and US, but for all the other markets we see a contradictory result.

Fisher and Statman (2003), using US data concluded for the existence of a "negative relationship between consumer's confidence and future stock returns" although that "there is a positive and statistically significant relationship between changes in consumer's confidence and contemporaneous stock returns: high stock returns boost consumer's confidence". While we are able to confirm their first empirical finding for some countries (see IRFs analysis) we are not able to agree with the second one.

Table 5

Forecast error variance decomposition by country using business confidence, share prices and industrial production as endogenous variables: Model 2 results

FEDV	Period	ps fr	ip fr	bc fr	ps ge	ip ge	bc ge	ps it	ip it	bc it	ps jp	ip jp	bc jp
FEDV of ps i	1	100.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00
FEDV of ps i	4	94.16	5.43	0.41	94.49	2.44	3.06	98.94	0.71	0.35	91.21	3.76	5.02
FEDV of ps i	8	92.87	5.69	1.44	92.90	2.44	4.66	94.61	1.87	3.52	72.60	18.26	9.14
FEDV of ps i	12	92.83	5.70	1.47	92.83	2.44	4.73	94.15	2.01	3.84	69.83	20.55	9.61
FEDV of ps i	16	92.76	5.71	1.52	92.74	2.45	4.81	94.03	2.04	3.93	69.27	20.91	9.82
FEDV of ps i	20	92.76	5.71	1.52	92.74	2.45	4.82	94.01	2.05	3.94	69.14	21.04	9.82
FEDV of ip i	1	2.83	97.17	0.00	1.27	98.73	0.00	4.01	95.99	0.00	6.27	93.73	0.00
FEDV of ip i	4	15.09	65.21	19.71	16.74	47.62	35.64	15.44	67.01	17.54	18.16	71.68	10.16
FEDV of ip i	8	15.26	63.15	21.60	16.80	45.70	37.50	15.61	65.38	19.01	17.48	71.17	11.35
FEDV of ip i	12	15.53	61.84	22.63	17.07	44.21	38.72	15.44	64.67	19.88	17.14	70.71	12.15
FEDV of ip i	16	15.54	61.73	22.74	17.08	44.07	38.86	15.45	64.62	19.93	17.19	70.48	12.33
FEDV of ip i	20	15.55	61.65	22.80	17.09	43.98	38.93	15.45	64.60	19.95	17.23	70.44	12.33
FEDV of bc i	1	13.36	10.11	76.53	19.89	7.85	72.27	9.65	14.97	75.38	9.65	43.33	47.02
FEDV of bc i	4	19.93	14.99	65.08	20.09	6.88	73.03	10.58	22.81	66.61	22.24	19.92	57.85
FEDV of bc i	8	20.98	16.78	62.24	21.31	6.35	72.34	9.59	23.95	66.46	33.00	8.91	58.09
FEDV of bc i	12	20.98	16.71	62.31	21.22	6.40	72.39	9.77	23.89	66.33	39.00	8.88	52.11
FEDV of bc i	16	21.02	16.79	62.18	21.27	6.37	72.35	9.75	23.92	66.33	39.56	8.80	51.64
FEDV of bc i	20	21.02	16.79	62.19	21.27	6.38	72.36	9.75	23.92	66.33	39.36	8.78	51.85

FEDV	Period	ps pt	ip pt	bc pt	ps sp	ip sp	bc sp	ps uk	ip uk	bc uk	ps us	ip us	bc us
FEDV of ps i	1	100.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00	100.00	0.00	0.00
FEDV of ps i	4	97.61	0.67	1.72	89.06	7.16	3.79	99.20	0.26	0.55	96.80	0.64	2.56
FEDV of ps i	8	96.43	0.71	2.86	87.34	8.57	4.09	98.94	0.36	0.70	96.18	0.87	2.95
FEDV of ps i	12	96.22	0.73	3.05	87.19	8.68	4.13	98.94	0.36	0.70	96.06	0.88	3.06
FEDV of ps i	16	96.19	0.73	3.08	87.06	8.78	4.16	98.94	0.36	0.70	96.06	0.88	3.06
FEDV of ps i	20	96.18	0.73	3.08	87.05	8.78	4.17	98.94	0.36	0.70	96.06	0.88	3.06
FEDV of ip i	1	2.22	97.78	0.00	11.55	88.45	0.00	8.27	91.73	0.00	6.39	93.61	0.00
FEDV of ip i	4	3.21	96.02	0.77	28.36	65.07	6.57	26.54	66.46	7.00	40.50	42.76	16.74
FEDV of ip i	8	3.79	95.25	0.95	31.43	61.83	6.73	26.64	66.11	7.26	40.91	41.91	17.18
FEDV of ip i	12	3.89	95.13	0.98	32.11	60.37	7.52	26.64	65.93	7.43	40.83	41.73	17.43
FEDV of ip i	16	3.90	95.11	0.99	32.42	60.07	7.52	26.64	65.93	7.43	40.84	41.71	17.45
FEDV of ip i	20	3.91	95.11	0.99	32.43	60.04	7.52	26.64	65.93	7.43	40.84	41.71	17.45
FEDV of bc i	1	8.09	2.86	89.05	4.29	20.97	74.74	10.76	11.57	77.66	22.92	24.81	52.28
FEDV of bc i	4	49.13	2.12	48.75	22.28	31.62	46.11	21.18	20.63	58.19	29.97	10.40	59.63
FEDV of bc i	8	56.40	2.16	41.44	36.55	24.04	39.41	23.16	21.87	54.96	30.31	10.37	59.32
FEDV of bc i	12	57.37	2.17	40.46	37.28	24.12	38.61	23.16	21.87	54.97	30.56	10.32	59.11
FEDV of bc i	16	57.52	2.17	40.31	37.30	24.29	38.40	23.17	21.88	54.96	30.58	10.32	59.10
FEDV of bc i	20	57.54	2.17	40.29	37.28	24.32	38.40	23.17	21.88	54.96	30.58	10.32	59.10

FR – France; GE – Germany; IT – Italy; JP – Japan; PT – Portugal; SP – Spain; UK – United Kingdom; US – United States; ps – share price index; ip – industrial production index; cc – consumer confidence index; bc – business confidence index. The index i is meant to be i = fr, ge, it, jp, pt, sp, uk, us; as the column we are reading.

There is also the tendency for ip to explain more of ps uncertainty than do bc and cc, while ps explains an higher percentage of ip uncertainty or variation for each country, than do confidence indices (for France and Italy it is the opposite when accounting for business confidence). In fact, and attending to our initial hypothesis raised, we see that ps affects more bc than ip, except for Italy, and cc

than ip except for France. Therfore, stock price indices explain more of ip uncertainty in general, but bc provides higher explanation percentages for ip in France, Germany and Italy, while this happens for cc in Spain (table 4).

Given VD results, we can say that for both, ip explains a high fraction of bc uncertainty and bc also contributes to ip uncertainty in a considerable manner. However, we cannot say that bc always explains more than ps of ip uncertainty (for Portugal, Spain, US and UK this is not the case). Moreover, we cannot say that ip explains more uncertainty of bc than does ps because in France, Germany, Japan, Portugal, Spain, UK and US this is not true. It turns out to be a reality only for Italy.

While most of previous literature concentrates on the relation between consumer confidence, the economy and financial markets, our results suggest stronger relations of the last two variables with business confidence indices as evidenced by higher percentages of uncertainty explained. The only exceptions have been for Germany and Italy for ps uncertainty explanation and France, Germany and Portugal accounting for ip.

Also, the response of industrial production to a consumer's confidence shock is a positive common relationship, especially in the first quarters (short-run), with the effects tending to maintain a persistent evolution, which is in accordance with our perspective results. In the overturn, the evidence suggests an identical perspective.

The finding that share price indices has an higher impact on confidence indices than expectations have on share prices is also interesting in terms of the country whose relations are verified. To see this easily, let's consider the case of US as our benchmark. When considering the business confidence index we see that share prices explain from 22.9%, in contemporaneous time, to 30.58%, in the long run, of bc uncertainty. But it is also visible that industrial production accounts for more contemporaneous uncertainty of the bc index than for its same uncertainty in the long run (considering the long run the time occurring from 1 year up to 5 years).

Given these results, we may establish a time period responses between these three variables. First, ip responds positively to bc shocks, and vice-versa; Second bc influences the stock market (response starts after quarter 1); Third, this positive influence in the stock market will then explain the variation in the industrial production index (in the first quarter almost no variation is explained, 6.39%; but

from quarter 4 onwards, 40.9% of ip variation is accounted by the ps market index); Fourth, this effect will then turn out to be also reflected in the business confidence index (from 23% in contemporaneous time, up to 30.6% in the long run, or up to 5 years), and the process is repeated on and on.

About the relationship regarding the effect that consumer's confidence has on the real economy, our empirical findings confirm the positive link (Kremer and Westermann, 2004), but the magnitude of the link continues to be a controversial issue and revealed not to be reasonably strong in the present setting.

Finally, we may also infer from the results that the markets under examination are not linked to the extent that each market has its own effect of confidence indices on share price discovery. As shown by the long-run forecast error variance decompositions, these vary between the markets, leading then to these differences, which confirm individual market specificities or characteristics, and the importance of analyzing this type of links for each country individually.

6. Conclusions

In this work we test for the degree of a possible relation between share prices behavior and indicators used as proxies of the economic evolution. The purpose of this study is thus to investigate whether expectations, as measured by consumer and business confidence indicators, independently, and industrial production, are useful to explain share prices in the short run horizon.

We choose to work with VAR for a sample of eight countries: US, Japan and 6 European (France, Germany, Italy, Portugal, Spain and UK), where two different specifications of the model for each country was used. Model 1 used as endogenous variables the consumer confidence index, share prices and the industrial production index, while Model 2 considers the last two variables as endogenous and the business confidence index, using quarterly data for the period 1985:Q1 until 2009:Q4.

Empirical evidence suggests that consumer and business confidence both assume a responsibility in stock markets evolution, although with a weaker impact, in the way they reflect expectations. On the other hand, and assuming a key role, stock markets present a clear pattern of influence in sentiment results as signaling the future evolution of the economy. In this sense, it was found that expectations

have a null contemporaneous effect on share prices, only becoming important for periods of up to 1 quarter.

Industrial production is found to assume a more impact positioning when reflecting its effects into stock markets, if compared with consumer and business sentiment indices. In the inverse direction, a crucial role is also observed, advising the investors to pay the closest attention to this reference market. In what concerns the overturn situation, it is however much more clear that stock markets cause a positive and increasing response of industrial production, with a similar pattern in all countries.

We also found that share prices and changes in sentiment are positively correlated, except for Germany and Italy (consumer confidence index), where in more developed countries their financial markets are informational more efficient. Also, the share market - confidence relationship seems to be driven by expectations about economy-wide conditions rather than personal ones. Still, share price indices are influenced by other factors, other than industrial production and confidence indices, and these last two may be considered as exogenous, at least contemporaneously.

Empirical findings also indicate that industrial production explains a higher fraction of business confidence uncertainty and vice-versa, but in countries like UK, US, Germany, France and Japan, share prices explain more of business confidence uncertainty than does industrial production. As such, given that results change depending on the country, countries under examination are not closely linked. Industrial production is also not contemporaneously affected by neither of the confidence indices under analysis. Reinforcing the results of Çelik, Aslanoglu and Uzun (2010) we can argue that real world changes impact both consumers and business confidence measures, while most of the attention has been given over the consumption side.

Results indicate that industrial production explains a high fraction of business confidence uncertainty and vice-versa, but in some countries share price indices seem to explain more of business confidence, than does industrial production, leading us to say that results change depending on market specificities and development stage.

Finally, in more financially efficient markets results indicate that share prices will be less sensitive to expectation indices releases for longer periods of time. In fact, given the gap between the collection of the data and their release to the

markets, countries with more developed financial institutions appear to reflect in share prices this newly coming information, even before their public knowledge. As such, these markets are also more informational efficient, and share price indices, although more explained by industrial production than by confidence indices, seem to be influenced by factors other than these, which we leave for a future research. Another possible extension would be the inclusion of more countries to have a clearer picture of world globalization.

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