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Consumer confidence indices and stock markets' meltdowns

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Abstract

Consumer confidence indices (CCIs) are a closely monitored barometer of countries' economic health, and an informative forecasting tool. Using European and US data, we provide a case study of the two recent stock market meltdowns (the post-dotcom bubble correction of 2000-2002 and the 2007-2009 decline at the beginning of the financial crisis) to contribute to the discussion on their appropriateness as proxies for stock markets' investor sentiment. Investor sentiment should positively covary with stock market movements (DeLong et al., 1990), however, we find that the CCI-stock market relationship is not universally positive. We also do not find support for the information effect documented in previous literature, but identify a more subtle relationship between consumer expectations about future household finances and stock market fluctuations.

Key words: consumer confidence, investor sentiment, dotcom bubble, financial crisis, behavioural finance

JEL Classification: G02, G15

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1. Introduction

Whether consumer confidence (CC) has 'slipped', 'turned up' or 'held steady' is reported by the press with almost as much passion as the results of baseball, cricket or soccer matches. In many countries consumers are surveyed every month and the ensuing consumer confidence indices are closely watched by governments, the business community and politicians. The indices are treated as barometers of a countries' economic health and commonly used as a forecasting tool (e.g., by the European Commission). Indeed, academic research confirms that consumer confidence indices (CCIs) have predictive power (Acemoglu and Scott, 1994; Carroll et al., 1994; Bram and Ludvigson, 1998). More recently, consumer confidence indices have also found their way into financial research where they have started to be used as a direct proxy for investor sentiment (Qiu and Welch, 2006; Kalotay et al., 2007; Akhtar et al., 2011, 2012; Zouaoui et al., 2011; Bathia and Bredin, 2013; Coakley et al., 2013). This may be somewhat puzzling because while consumer confidence, and therefore indices measuring it, can be expected to be shaped by market fundamentals (Acemoglu and Scott, 1994; Poterba, 2000), investor sentiment, at least in the sense of DeLong et al. (1990), represents the irrational part of the price creation process. Therefore, it is not altogether clear whether there are sound grounds to use CCIs, or their components, as a direct proxy for investor sentiment. This paper studies the time-varying pattern of the stock market – consumer confidence (SM-CC) relationship using European and US data over the 1990-2010 period in order to address this conundrum.

It is well documented that changes in stock markets lead changes in economic conditions (Bernanke et al., 1999; Poterba, 2000; Tobin, 1969). Consumer confidence surveys are constructed to measure consumers' expectations about future economic conditions, hence it is to be expected that changes in stock markets may contribute to the formation of consumers' opinions about the future state of the economy. Consistent with this way of thinking, the literature shows that indeed changes in stock market prices typically Granger cause changes in CCIs (Fisher and Statman, 2003; Jansen and Nahuis, 2003; Otoo, 1999), although this impact is limited to those components of the CCIs which relate to economy-wide conditions. There is no consistent evidence that stock markets impact on households' perceptions of their future financial situation. This is somewhat surprising given that the financial situation at a household level may depend both on economic conditions (e.g., employment prospects), and future stock market returns (if households invest in equity directly, or indirectly via retirement schemes). More recently, however, several papers analysing the short-term impact of CCIs on stock markets have been published (e.g., Kalotay et al., 2007; Ho and Hung, 2009; Akhtar et al., 2011, 2012; Hsu et al., 2011). These papers are, in fact, interested in testing the impact of investor sentiment on stock market movements, however, by using CCIs as a direct proxy for investor sentiment they implicitly test for the explanatory power of CCIs on stock market movements. This seems in contrast with papers which look at the long-term relationship between investor sentiment and stock markets. For instance, Neal and Wheatley (1998), and Brown and Cliff (2005) also use CCIs to infer investor sentiment, however, they extract investor sentiment from CCIs (via orthogonalisation), rather than use CCIs as a direct proxy for it.

So is it sound to use CCIs as a direct proxy for investor sentiment? The lack of a clear definition of an empirical measure of investor sentiment leaves scope for numerous interpretations. However, DeLong et al. (1990) postulate that investor sentiment and stock markets' movements have a positive relationship. Therefore, if CCIs are to be considered as a potential proxy for investor sentiment, they should positively covary with stock markets, too. Following from that, we test whether there is a universally positive relationship between CCIs and stock markets. If there is, it does not prove that CCIs are suitable proxies for investor sentiment. However, if it does not, then we can conclude that CCIs do not have a basic property that investor sentiment should be characterised by and, therefore, they are not suitable proxies for investor sentiment.

It is important to note that some movements of stock markets may carry implications for the whole economy whilst other changes may have implications only for sections of the economy. In other words, some movements of stock markets may be more informative about future economic conditions than others. Consequently, the SM-CC relationship may change over time, and, in particular, it should be stronger/weaker when stock market fluctuations have stronger/weaker implications for the economy. In this paper we study the two most recent big stock market meltdowns, i.e., the 2000-2002 decline of stock markets after the dotcom bubble and the 2007-2009 decline of stock markets at the beginning of the financial crisis, which are particularly apt for testing changes in the SM-CC relationship. In many countries the two crashes resulted in similar (in magnitude) declines in stock markets, but unlike the financial crisis decline of 2007-2009, the post-dotcom correction of 2000-2002 did not result in economic slowdown in all countries. Therefore, these two stock market declines provide a natural experiment to study consumer reactions in both cases and the difference between them. Moreover, the crashes were short in duration (less than two years each) and occurred within a decade which suggests that the observed phenomena cannot be accounted for by long-term changes in stock market characteristics and/or macroeconomic policies. Finally, the stock market crashes occurred in many countries, allowing us to address the issue as an international phenomenon, not as an individual country effect.

We test the SM-CC relationship using data for 12 developed EU countries and the US. In essence, we have two distinct tests although the relevance of the 'test' on the US data would be less useful in the absence of the EU results. First, we argue that because in the EU the post-dotcom crash was not followed by an economic slowdown, the SM-CC relationship should weaken during 2000-2002 but not during the 2007-2009 stock market decline, which was followed by the global economic downturn. Second, since in the US the post-dotcom bubble was followed by economic slowdown, we should not expect to observe a decline in the US SM-CC relationship during 2000-2002.

In brief, we find support for our hypotheses, i.e., we document that the decline in the SM-CC relationship during the post-dotcom stock market meltdown is highly statistically significant in the EU sample both for the CCI and for the individual questions which are used to calculate the index. Moreover, the decline is so severe that the SM-CC relationship stops being positive during the post-dotcom crash. This supports the argument against using CCIs,

or their individual questions, as a proxy for investor sentiment. As hypothesised, no significant decline is observed in the SM-CC relationship for the US data. However, a non-positive co-movement is observed for the question about personal finances and returns of the NASDAQ 100 index during the decline of stock markets at the beginning of the recent financial crisis. We interpret this as an indication that US consumers did not perceive the decline in the high-tech market in 2008-2009 as an indication of 'internal mispricing', so did not find the decline in the market helpful in predicting their future financial situation.

Our results also show that during the post-dotcom decline the co-movement of stock market returns with European consumers' perceptions of their personal financial situation weakened substantially. This suggests that consumer confidence with regard to personal finances may be driven by the, previously not found, indirect effect (consumers expect they will be personally worse off because of the impact of poor future economic conditions on their finances) whilst the largely documented direct 'wealth' effect (personal finances are worse because of the effect of stock market decline on wealth) is comparatively weak.

Therefore, the changes in the SM-CC relationship observed on the EU and the US markets add to the literature on 'financial illiteracy' of the general public and the level of penetration of stock markets into societies. Our results suggest that consumers' awareness of stock markets may be more 'sophisticated' than the literature on financial illiteracy of the general public documents (e.g., Bernheim, 1995, 1998; Lusardi and Mitchell, 2006, 2007; Mandell, 2004; Moore, 2003; van Rooij et al, 2011).

The rest of the paper is organised as follows. Section 2 provides a brief literature review. Section 3 outlines our hypotheses. Section 4 describes the data, while Section 5 presents the methodology and empirical results. Section 6 closes with conclusions.

2. Brief literature review

Numerous papers show that stock market fluctuations contribute to changes in economic conditions through the consumption channel (Poterba, 2000), the investment channel (Tobin, 1969) and the balance sheet channel (Bernanke et al., 1999). Given that the speed with which stock markets incorporate new information is faster than the speed with which macroeconomic conditions change, stock markets are often used as a forecasting tool in predicting future economic conditions.

Obviously, stock markets are not the only source of information that is relevant when predicting future economic conditions. Consumer confidence is perceived as an important and informative predictor of forthcoming economic changes, alongside typical macroeconomic variables like interest rate spreads and money supply.[1] For instance, in the US, the Consumer Confidence Index published by the Conference Board is officially referred to as "a barometer of the health of the US economy from the perspective of the consumer".[2] In Europe, the Business and Consumer Survey data are widely used by the European Commission for economic surveillance, short-term forecasting, and business cycle analysis

(DG ECFIN, 2006). For instance, DG ECFIN (Directorate-General for Economic and Financial Affairs) considers the survey as "an essential tool to monitor the economic situation in the Member States, the euro area and the EU".[3]

This perception that consumer confidence conveys relevant information for predicting future economic conditions is confirmed by academic research. Carroll et al. (1994) find that consumer confidence forecasts future changes in household spending in the US in the post-1954 period. Acemoglu and Scott (1994) come to a similar conclusion using UK data, and argue that the predictive ability of confidence indicators is consistent with forward-looking behaviour and not with the existence of imperfect capital markets. Bram and Ludvigson (1998) confirm the predictive power of consumer confidence indices for total personal consumption growth in the US, and Throop (1992) finds that movements in consumer sentiment significantly influenced expenditures on consumer durables, but not spending on nondurables and services, suggesting that consumer sentiment measures the degree of uncertainty held by households, rather than just optimism or pessimism about the future.

Since both stock prices and confidence indicators lead future economic conditions, the causal relationship between them has been subject to many empirical studies. Overall, research shows that stock prices and confidence are contemporaneously correlated and that changes in stock prices Granger cause changes in confidence (Bathia and Bredin, 2013; Fisher and Statman, 2003; Jansen and Nahuis, 2003; Kim and Oh, 2009; Otoo, 1999).[4] It is argued that stock prices can affect confidence through the traditional wealth effect (higher stock prices mean higher wealth and thus greater optimism) or through an information effect (higher prices are a sign of favourable economic conditions in the future). Otoo (1999) using US data, Hsu et al. (2011) using a sample of 21 countries worldwide, and Jansen and Nahuis (2003) using a sample of 11 EU countries find support for the information effect. There is also some evidence that the contribution of stock markets to shaping consumer confidence displays long-run trends. Fisher and Statman (2003) and Milani (2008) report that the impact of stock market returns on agents' expectations about future economic output in the US declined over time.

Consumer confidence has also found applications in the finance literature studying the impact of investor sentiment on stock market price formation. Since the seminal paper of DeLong et al. (1990), which defines 'noise trader sentiment' as the component of expectations about asset returns not warranted by fundamentals, many papers have been written on how to measure investor sentiment[5] and recently consumer confidence indices have started to be used as a proxy for it (e.g., Lemmon and Portniaguina, 2006; Kalotay et al., 2007; Barsky and Sims, 2012; Ho and Hung, 2009; Schmeling, 2009; Akhtar et al., 2011, 2012; Hsu et al., 2011; Yu and Yan, 2011; Stambaugh et al., 2012; Zouaoui et al., 2011; Bathia and Bredin, 2013 Coakley et al., 2013). Consumer confidence is being surveyed in many countries, so it may appear as a convenient way to pass-by the hurdles of investor sentiment measurement, especially since Qiu and Welch (2006) argue that CCIs and investor sentiment indices are highly correlated, at least in the USA.

Assessing whether CCIs are a suitable proxy for investor sentiment is not as straightforward as a comparison of the correlations between indices measuring consumer and investor moods. First, high correlation does not indicate causality. Second, given that it is not clear how to measure investor sentiment, and that there is no convincing argument that indices of investor sentiment correctly measure investors' expectations about returns not warranted by fundamentals, a direct comparison of CCIs and investor sentiment indices may not be the right way to assess the suitability of CCIs. Therefore, the approach adopted in this paper of looking at the properties of consumer confidence and, in particular, assessing whether changes in CCIs are characterised by a positive relationship with stock market movements (i.e., low sentiment generates downward price pressure), as DeLong et al. (1990) postulate for investor sentiment, may be a more suitable approach.

3. Hypotheses statement

We link the changes in the strength of the SM-CC relationship to whether stock market crashes were followed by economic slowdown or not. The last two big stock market crashes, the post-dotcom bubble burst (2000-2002) and the post-credit crunch stock market decline (2007-2009) create a natural experiment situation to study whether the SM-CC relationship was similar or different during these stock market declines. This is because the two crashes were similar in size but had different economic consequences in many countries.

Figure 1 shows stock market indices for nine European markets (Panel A), stock market indices for the two US stock markets, NASDAQ100 and NYSE Composite, along with the equally-weighted average for the nine EU stock market indices (Panel B), GDP figures for the nine EU countries (Panel C), and the US GDP and equally-weighted GDP for the nine EU countries (Panel D) over the period January 1990–December 2010.[6] All stock market indices are monthly and normalised to 100 in January 1990. All GDP statistics are quarterly, seasonally adjusted and normalised to 100 in 1990 Q1 for ease of comparison.

********** insert Figure 1 here **********

The European stock market indices display a similar pattern, they experienced a sharp decline after the dotcom bubble ended and when the credit crunch hit the markets (Panel A). Even though both crashes were similar in magnitude, there is a substantial difference in the nature of these two stock market meltdowns. Whilst the collapse of the share prices of high-tech companies caused severe disturbances on many European stock markets, these effects were somewhat concentrated on specific sectors and did not cause strong economy-wide repercussions.[7] However, although the financial crisis started in the banking sector it quickly spread across other sectors and developed into a broad economic downturn (Panel C). Turning to the US, its stock markets show a similar pattern to the one observed for the EU (Panel B), however, in contrast to the EU countries, the US economy experienced downturns following both stock market meltdowns (Panel D). Although the magnitude of the economic slowdown was much higher during the financial crisis, the outlooks for the US economy in 2000 were pretty bleak. Federal Reserve Chairman Alan Greenspan has said repeatedly in

2000 that the last firewall between the US economy and a recession was consumer confidence.[8] In January 2001, US confidence dropped. The index published on 31 January 2001 reported that consumer confidence in the nation's economic health had taken its biggest single-month plunge since late 1990, when the last recession was under way.

In light of this, if consumers do not discriminate in terms of the implications of stock market changes for future economic conditions, then the SM-CC relationship during the two stock market meltdowns should be expected to be similar both in the USA and in the EU. However, if consumers discriminate in terms of the informative power of stock market changes for future economic conditions, then we would expect to observe changes in the SM-CC relationship for the EU countries but not for the USA during the post-dotcom correction. More precisely, we would expect that for the EU sample the SM-CC relationship weakened during the post-dotcom correction (as the decline in share prices was not to be followed by an economic slowdown) while no significant difference in the SM-CC relationship between the post-dotcom and the financial crisis stock market meltdowns should be observed for the USA.

Moreover, it can be expected that changes in the SM-CC relationship as described above should be observed for questions which directly ask about the predictions of economic conditions. However, it is not clear whether they directly extend into questions about future household financial situation. Past literature suggests that this might not be the case (e.g., Jensen and Nahuis, 2003). However, there is a good argument that the personal finances questions may respond in the same way as the questions about economic conditions.

The decline in share prices has a direct negative effect on household finances to the extent households hold shares. In this respect, the direct effect resembles the wealth effect if wealth is restricted to stock market returns. However, there is also what we can think of as an indirect effect, since the decline in the stock market may be informative about future prospects of household income from employment, etc. That is, if the decline in stock markets is informative about future adverse economic conditions, then this decline may in turn affect what households believe their future financial position will be. However, if the decline in stock markets is not perceived to be informative about the future economic slowdown, household expectations should not be 'indirectly' affected by the decline in stock markets. Which effect, direct or indirect, is stronger will depend on what proportion of household finances directly and indirectly depends on stock markets.

Grout et al. (2009) report that in the majority of EU countries share ownership of individuals is low. Moreover, on average those who hold shares have only a small fraction of their wealth invested in stock markets, and, on average, rarely modify their portfolios. Therefore, we can expect that the direct wealth effect of stock markets may be relatively small. If for the EU sample we observe that during the post-dotcom correction the informative power of stock markets on the perceptions of household finances was lower, then we can attribute it to the indirect effect.

4. Data

To test the SM-CC relationship we need a sample of countries which have consumer confidence data collected well before the burst of the dotcom bubble, and have well established and sizable stock markets to have grounds to expect that their movement may be indicative about economic conditions. We were able to identify 12 EU countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden and the UK) and the US which satisfied these requirements.[9] For each country we collected monthly data on CCIs, stock market indices and macroeconomic variables over the period January 1990–December 2010.[10] These are described below.

4.1. EU sample

For all 12 EU countries we use (Composite) CCIs of the European Commission. National CCIs are calculated using information collected from surveys that ask the same questions across all EU countries. The CCI of each country is based on four forward-looking questions: (Q_i) Ability to save: Over the next 12 months, how likely is it that you save any money? (Q_{ii}) Personal finances: How do you expect the financial position of your household to change over the next 12 months? (Q_{iii}) Economic situation: How do you expect the general economic situation in this country to develop over the next 12 months? (Q_{iv}) Unemployment: How do you expect the number of people unemployed in this country to change over the next 12 months? We collected scores calculated for the CCI and each individual question, and calculated their first differences, further denoted by Δ.

For each EU country we also collected monthly observations of the main stock market index: ATX (Austria), BEL20 (Belgium), OMX Copenhagen 20 (Denmark), OMX Helsinki 25 (Finland), CAC40 (France), DAX30 (Germany), ATHEX Composite (Greece), FTSE MIB (Italy), the AEX (Netherlands), IBEX35 (Spain), OMX Stockholm 30 (Sweden) and FTSE 100 (the UK). To account for the fact that the CCI responses are collected over the first two weeks of each calendar month, stock market returns, R, are calculated as mid-month log returns.[11]

Thus, the EU data creates a panel of 12 cross-sections and 252 time observations. Using this panel we calculate the time series of averages across countries to which we refer to as EU12. The first two columns of Table 1 show summary statistics for this EU12 average.

**********insert Table 1 here**********

4.2. US sample

The US Consumer Sentiment Index (CSI) is published by the University of Michigan's Institute for Social Research[12] and is based on answers to the following questions: (Q_i) Would you say that you (and your family living there) are better off or worse off financially than you were a year ago? (Q_{ii}) Do you think that a year from now you (and your family living there) will be better off financially, worse off, or just about the same as now? (Q_{iii}) Now turning to business conditions in the country as a whole, do you think that during the

next twelve months we'll have good times financially, or bad times, or what? *(Q_{iv})* Which would you say is more likely: that in the country as a whole we'll have continuous good times during the next five years or so, or that we will have periods of widespread unemployment or depression, or what? *(Q_v)* Do you think now is a good or bad time for people to buy major household items (e.g., furniture, refrigerator, stove, television, and things like that)?

The retrospective element of the CSI and the way it is calibrated (possible answers, method of aggregation, etc.) do not make it directly comparable with the CCIs. However, given that the CSI can be seen as a linear transformation of the CCIs, the first difference of the CSI (also further denoted by Δ) can be compared with the first difference of the CCI (subject to a multiplier).[13]

The choice of the US stock market indices was less straightforward than for the EU countries. The US is the only country in the world having a stock market dominated by high-tech companies. Since the impact of the dotcom bubble on the American confidence is one of the questions of this study it seems natural to use the NASDAQ100 Index. In addition, to balance the analysis we also use the NYSE Composite Index, which covers stocks listed on the New York Stock Exchange.[14] We use mid-month monthly log returns to allow for a direct comparison with the EU sample. The summary statistics of the US time series are shown in the last two columns of Table 1.

4.3. Macroeconomic control variables

It is impossible to control for all potentially important sources of information but, as previous research shows, macroeconomic conditions are important in shaping consumers' moods (e.g., Acemoglu and Scott, 1994; Lemmon and Portniaguina, 2006; Milani, 2008). Moreover, it can be expected that people are more likely to pay attention to current and forecast macroeconomic conditions than to stock market analysts' forecasts, especially if the level of share-ownership is low.[15]

Following past literature and subject to availability and compatibility of the data (e.g., we are restricted to using monthly frequency to match the CCIs and the CSI) four macroeconomic variables have been collected from DataStream. These are: the harmonized (OECD) Consumer Prices Index for the EU countries and the All Items CPI Index for the US (for both indexes 2005=100), seasonally adjusted monthly average Industrial Production Volume Index, seasonally adjusted monthly average unemployment, and finally, 1-month interbank interest rate. Where convenient, rather than list the macroeconomic variables we refer to them as *Macro*, however, when reporting the results we provide coefficients for each variable. The difference in logarithm of CPI is referred to as *infl*, the difference in logarithm of Industrial Production is referred to as *Δind-prod*, and the differences in the unemployment rates and in the interest rates are referred to as *Δunempl* and *Δint-rate*, respectively. There is evidence that each of these variables impacts on consumer confidence (Acemoglu and Scott, 1994; Lemmon and Portniaguina, 2006; Milani, 2008).

5. Empirical results

We begin with a brief discussion of Granger causality between stock market returns and changes in consumer confidence for each EU country in our sample, the EU12 average, and the US. Even though testing for Granger causality is not central to this research, and Granger causality will be implicit when cointegration is found, we present correlations and Granger causality results to create a base for a discussion of selected EU countries in Section 5.3.3, and to show the differences across countries.

The Schwarz criterion identified that one-month lag is optimal for all the variables of interest and the Augmented Dickey-Fuller and Phillips-Perron tests showed that the stock market indices, the EU12 average of the stock market indices, the CCI (or CSI) for individual countries and for the EU12 averages are I(1) processes.[16] Hence we test for Granger causality using the following equation specification:

$$\Delta CC_t = \alpha_C + \beta_C \Delta CC_{t-1} + \gamma_C R_{t-1} + \varepsilon_{C,t}$$
$$R_t = \alpha_R + \beta_R \Delta CC_{t-1} + \gamma_R R_{t-1} + \varepsilon_{R,t}$$

where ΔCC_t is the change in a CCI (CSI) or in the individual component questions between month t and month t-1 and R_t is the corresponding mid-month stock market return. The results for individual European countries and the EU12 average are presented in Table 2, and for the US CSI, are shown in Table 3.

********** insert Table 2 here **********

********** insert Table 3 here **********

Consistent with previous literature we find evidence that stock markets Granger cause consumer confidence. The results are much stronger for the US than for the individual EU countries, although the EU12 average is highly statistically significant. There is no evidence of Granger causality in the opposite direction for the US, but it is detected for a few European countries, and the EU12. This reversed Granger causality is, however, weak, i.e., four out of five statistically significant coefficients indicating causality from ΔCC to stock market returns are significant at 10% only. For three countries no Granger causality is detected. Interestingly, in Germany, one of the biggest EU economies, there is no statistical evidence of causality in either direction for the CCI and every individual question.

The differences observed across the EU sample cannot be attributed to using inadequate lags given that all the EU individual country CCIs are being collected over the same periods of time. The differences in sensitivity of changes in CCIs and stock market returns, and vice versa, may therefore reflect differences in individual countries' levels of stock market development (liquidity, volume of trading, capitalisation, etc.), stock markets' significance for raising investment capital, individual investors' stock market participation (direct and indirect), and other country-specific effects.

5.1. EU sample

To test whether the SM-CC relationship weakened during the post-dotcom crash relative to the financial crisis crash we need to define the period of the post-dotcom and of the financial crisis stock market declines. Given that one could argue that the results can be sensitive to the choice of the periods of stock markets' distress, we begin by investigating the SM-CC relationship using time-varying regressions. Using the Kalman Filter allows observing changes in coefficients without prior restrictions on the timing of these changes. This flexibility comes at a price, the Kalman Filter is a time series, not a panel, estimator, so we use EU12 averages in the Kalman Filter specification. More precisely, we define the following measurement equation:

$$\Delta CCI_{EU12,t} = \alpha_t + \beta_t \Delta CCI_{EU12,t-1} + \gamma_t R_{EU12,t} + \varepsilon_t \quad (1)$$

with the transition equations defined as

$$\alpha_t = \alpha_{t-1} + \eta_t$$
$$\beta_t = \beta_{t-1} + \xi_t$$
$$\gamma_t = \gamma_{t-1} + \varsigma_t .$$

where ΔCCI_{EU12} denotes the change in the EU12 consumer confidence index, R_{EU12} denotes the EU12 monthly stock market returns, and error terms are normally distributed with zero means, and constant variances.[17]

Figure 2 shows that indeed the co-movement between the stock market returns and ΔCCI varies over time and that it was lowest in the period mid 2000–end of 2001. The γ coefficient decreased from 0.17 in 1990 (significantly positive) to about 0.05 in the second half of 2000 (statistically insignificantly different from zero). It increased again from 2002 onwards. The period of the financial crisis is characterised by relatively high values of the γ coefficient. Indeed, the highest values are estimated for 2008.

********** insert Figure 2 here **********

Does a similar pattern characterise the relationship between ΔCCI and the macro variables? It is not central to the paper to establish what shapes consumer confidence, but as we aim to prove that the SM-CC relationship declined during the post-dotcom bubble crash, it is important to check whether this decline can be observed for other, not-stock market related, variables. To do so, we run specification (1) four times, each time *R* being replaced by the first difference of one of the *Macros*. All estimated time-paths of the γ_t coefficient are considerably flat and none of them has a statistically significant change (decline or increase) during the post-dotcom crash. For the sake of space, we show the time-path obtained for the industrial production variable, Δ*ind-prod*, only. This particular variable is chosen because industrial production is potentially least sensitive to direct central banks' and governments' policies and potentially most representative of the state of the economy (Figure 3).

********** insert Figure 3 here **********

Having established that the decline in the co-movement of stock market returns and change in consumer confidence occurred during the period of interest we now perform the analysis with time dummies. For each EU country *i* we define the post-dotcom dummy (DC_i) and the financial crisis dummy (FC_i) as equal to one a month after the highest value of the national stock market index is recorded till the lowest value of the index is reached in the corresponding period of stock market declines, and zero otherwise. Obviously, the *DC* and the *FC* dummies are similar across countries.

When estimating the relationship between stock market returns and ΔCCI, we have to account for the fact that in levels CCIs, stock market indices and macroeconomic variables are cointegrated.[18] The dynamic nature of the panel specification as well as the fact that we have only 12 cross-sections for 252 time observations, i.e., we have a small N and large T panel, cause some issues. The sample's heterogeneity (different levels of stock market development, different levels of shareholder ownership, etc.) also needs to be addressed. To utilise the panel structure of the data the mean group (MG) estimation technique for heterogeneous dynamic panels developed by Pesaran and Smith (1995) is adopted. More precisely, the panel regressions are obtained for the following specifications:

$$\Delta CC_{it} = \alpha_i + \alpha_{DCi} DC_i + \gamma_i R_{it} + \gamma_{DCi} DC_i \times R_{it} + \Delta Macro_{i,t} \delta_i' + \theta_i (CC_{i,t-1} - \phi_i p_{it} - Macro_{i,t} \varphi_i') + \varepsilon_{it}, \quad (2)$$

and

$$\Delta CC_{it} = \alpha_i + \alpha_{DCi} DC_i + \alpha_{FCi} FC_i + \gamma_i R_{it} + \gamma_{DCi} DC_i \times R_{it} + \gamma_{FCi} FC_i \times R_{it} + \Delta Macro_{it} \delta_i' + \theta_i (CC_{i,t-1} - \phi_i p_{it} - Macro_{it} \varphi_i') + \varepsilon_{it}, \quad (3)$$

where *CC* refers to the CCI or its four individual questions, *p* refers to the logarithm of the mid-month share price indices, *Macro* refers to a vector of macroeconomic variables as defined in Section 4.3, and *DC* and *FC* are the time dummies as defined above. The specification of the error correction vector follows Pesaran et al. (1999). The foregoing error correction is employed to accommodate the fact that consumer confidence measured at each point in time reflects consumers' expectations about the future state of the world. It is reasonable to assume that these expectations are shaped by forecasts. Given that these forecasts are not available, we use next month values in the foregoing error correction specification.[19]

Specification (2) introduces only the *DC* dummy and its interaction with *R* as we are interested in observing whether the impact of stock market returns declined during the post-dotcom correction, i.e., whether γ_{DC} is statistically significantly negative. Specification (3) adds the *FC* dummy and its interactive term with stock market returns. We do not have any particular expectations about the significance of this dummy, but we expect that the γ_{DC} and the γ_{FC} coefficients are statistically significantly different from each other.[20]

Table 4 shows the MG estimates of the coefficient of adjustment θ and of the short-run coefficients. When only *DC* is included in the equation specification (Panel A), the estimates of the γ coefficient are all positive and all, except for one, statistically significant at 1%. All the estimates of the γ_{DC} coefficient are negative and statistically significant at 1% or 5%. That is, the decline of stock markets during the post-dotcom bubble correction reduced the SM-CC relationship both for the economic and household finance questions. As the trend coefficients are not of direct interest, to save space, we do not report them (they can be obtained from the authors on request). However, we would like to mention that across all the specifications presented in Table 4 the coefficients estimated for *p* are statistically significant at 1%. The coefficients estimated for the *Macro* variables vary in their level of statistical significance with those estimated for the unemployment remaining consistently statistically insignificant.[21]

Our results are robust to the alternative specification in which we control for the 2007-2009 stock market crash (Panel B). Here, all the γ coefficients, except for one, are statistically significant and all the γ_{DC} coefficients but one are negative and significant, although their significance is slightly weaker than when only the post-dotcom stock market collapse was controlled for. In contrast, only two coefficients estimated for γ_{FC} are significant. This result seems to be driven by the unemployment question, i.e., the decline in stock markets covaries with consumers' expectations about the future increase in unemployment. The results also show that given that γ_{DC} and γ_{FC} are statistically significantly different from each other (Panel B, the last column with Wald-tests), the sensitivity of ΔCCI to stock market returns was statistically lower during the post-dotcom bubble burst than it was during the 2007-2009 stock market collapse. Moreover, because the absolute size of the γ_{DC} coefficient is always larger than the absolute size of the γ coefficient, we can conclude that during the post-dotcom bubble period the SM-CC relationship was not positive. This is consistent with Figure 2.

********** insert Table 4 here **********

Finally, we find that, where significant, the sign of the estimated *Macro* coefficients is consistent across specifications. Consistent with our expectations, an increase in unemployment covaries negatively with changes in the CCI, and among its individual questions it has the greatest coefficient (in absolute terms) for the question about the future unemployment. Similarly, increasing inflation is perceived as a bad sign. However, it is a bit puzzling that an increase in interest rates impacts positively on the CCI, and, in particular, on the predictions of the future economic situation and decline in unemployment. The positive and significant coefficients estimated for the change in the interest rates may indicate that consumers may not see that high interest rates increase the cost of borrowing and slow down business activities.

5.2. US sample

The decline in both US stock market indices occurred at the same time, therefore, the definition of the *DC* and *FC* dummies is straightforward: the *DC* dummy is equal to one between September 2000 and September 2002 (zero otherwise) and the *FC* dummy is equal to one between November 2007 and February 2009 (zero otherwise). Using these dummy specifications we run error correction model (ECM) regressions as specified by Equations (2) and (3) for the returns of the NYSE Composite Index, and of the NASDAQ 100 index. We use ΔCSI, ΔQ_{ii} (personal finances) and ΔQ_{iii} (economic conditions) as dependent variables.

Table 5 shows the regression results, and in particular, shows that stock market returns are statistically and economically important in explaining ΔCSI. Also, consistently across specifications, the γ coefficients estimated for the NYSE Composite Index (Panel A) are about twice as large as those for the NASDAQ 100 Index (Panel B). However, as the average monthly returns of NASDAQ 100 are higher than the average monthly returns of NYSE Composite (1.2% and 0.64% respectively), the marginal impact of the two index returns on ΔCSI is comparable. None of the γ_{DC} coefficients is significant, and all are statistically insignificantly different from the corresponding γ_{FC}s, which is consistent with our hypothesis. The γ_{FC} coefficient estimated for the personal finances question, Q_{ii}, in the regression for the NASDAQ 100 stock market index is the only statistically significant coefficient. The negative sign of the coefficient indicates that the informative power of the NASDAQ in shaping expectations about future financial situation of households declined in the 2007-2009 period. This might mean that it was hard to read from the decline of share prices of companies traded on NASDAQ whether the decline was permanent, or only temporary. The collapse of the market did not seem to be driven by an 'internal' overpricing. The high-tech sector was not the cause of the financial crisis, and might not be affected by it over the next five years. Indeed, the NASDAQ 100 index returned to its pre-financial crisis level by the end of the sample period.

********** insert Table 5 here **********

5.3. Robustness tests

We performed a series of robustness tests to confirm the stability of our findings. We used several potential definitions of the post-dotcom and of the financial crisis periods, alternative definitions of variables, alternative estimation techniques, as well as looked in more detail at the individual country responses given that Granger causality tests are quite different for individual EU countries. Below we discuss these robustness tests in detail.

5.3.1. Using different specifications of the period dummies and returns

To test robustness of the results we repeated the analysis for various alternative definitions of stock market returns, of the *DC* and the *FC* dummies, for both the EU sample and the US. In more detail, we repeated the analysis using previous month stock market returns to account for the fact that consumer responses collected at the beginning of each calendar month could not possibly incorporate mid-month stock markets' positions. We also used several definitions of the periods of stock market declines. We determined the period of *DC* being equal to one by *(i)* the month of the peak and the month of the lowest EU12

average stock market index, *(ii)* the first peak month and the latest lowest month observed for the individual country indices, and *(iii)* the average of individual countries' periods of the highest and of the lowest individual country indices. We also used the *FC* dummy lasting till the end of the sample, i.e., December 2010 given that stock markets were still under turmoil through the late 2009 and 2010. We did that because the standard deviation of monthly returns for the EU12 stock market index in the period April 2009 till December 2010 was 5.6%, which although lower than the one observed between September 2007-March 2009 (6.6%), was still higher than the standard deviation of the post-dotcom correction (5.4%), and higher than the standard deviations of the pre-dotcom crash period (4.8%) and of the period between the two crashes (3.6%). We have also repeated the US regressions using the EU12 stock market declines' dummies, and vice versa. All these modifications had practically no impact on the results.

5.3.2. Cross-sectional dependence

Potentially, there may be an issue with the MG estimator of Pesaran and Smith (1995) used to estimate the EU panel. The MG estimator does not take into account that certain parameters may be the same across countries. This is a potential limitation because it can be expected that the variables in the EU sample display some cross-sectional dependence. Pesaran et al. (1999) developed the pooled mean group (PMG) estimation technique for heterogeneous dynamic panels which addresses this issue by assuming that long-run coefficients are the same across the group. Although this assumption seems also unrealistic given our data, we repeated the EU regressions using the PMG estimator to test the robustness of our findings. In general, the error correction coefficients estimated with PMG were smaller and more significant than those estimated with MG, however, there was no visible impact on the coefficients of interest (i.e., γ, γ_{DC} and γ_{FC}).[22]

We also tackled the issue of cross-sectional dependence by repeating the analysis using the time series of EU12 averages. Using averages has the advantage that country specific effects are diluted, and therefore, only common trends are likely to get picked up. Table 6 presents estimates of the error correction model (ECM) of specifications (2) and (3) using the EU12 average. The *DC* and *FC* dummies are defined by the timing of the peak and the bottom of the EU12 average stock market index, i.e., *DC* is equal to one between March 2000 and September 2002 (zero otherwise), and *FC* equal to one between November 2007 and February 2009 (zero otherwise).

********** insert Table 6 here **********

Our earlier findings are fully confirmed. In Panel A all the estimates of γ are positive and statistically significant at 1% with the exception of the coefficient estimated for Q_i (ability to save) for which 5% significance is obtained. All the γ_{DC}s are negative and statistically significant. When the *FC* dummy is added to the regression (Panel B) the results hold although the γ_{DC} coefficient estimated for Q_{iv} (unemployment) becomes 10% significant only. In contrast, the γ_{FC} coefficient estimated for this question is statistically significant at 1% and positive. All F-tests but one show that γ_{DC}s are statistically significantly lower than

γ_{FC}s. Also, as expected, the significance of macroeconomic variables is much lower than as presented in Table 4.

5.3.3. Individual countries

Finally, given the diversity of individual EU countries economic and stock market development, differences in attitudes to equity investments, and a different degree of causality documented in Table 2 it is important to look at individual countries. We discuss the results for the three leading EU economies: France, Germany and the UK as they provide a very interesting sub-sample. They are the leading and biggest economies of the EU. Furthermore, they are characterised by very different systems of social security and stock market penetration into economy and individual investors' involvement with the UK being most and Germany being least open.

Tables 7 and 8 present estimates of the error correction model (ECM) of specification (2) and (3), respectively, for France (Panel A), Germany (Panel B) and the UK (Panel C). For the sake of space for each country the estimates for the corresponding CCI indices and for questions about personal finances (Q_{ii}) and economic situation (Q_{iii}) are presented. We focus on these two questions as they are most informative in our discussion of the SM-CC relationship and the existence of the indirect effect of stock markets on predicting financial situation of households.

********** insert Table 7 here **********

********** insert Table 8 here **********

The results presented at the EU level are fully confirmed by the individual country regressions. First, there is a statistically significant co-movement between the stock market returns and changes in CC, i.e., all γ coefficients but one are statistically significantly positive in the CCI and the individual questions regressions. However, the magnitude of the SM-CC relationship varies from country to country with the UK being strongest and Germany being weakest (the UK's γ coefficients are 2.5-4 times bigger than those estimated for Germany). Second, the negative impact of the post-dotcom crash on the SM-CC relationship is also clearly visible. As expected, the effect is most pronounced in the UK. It is somewhat interesting that the weakest effect (in the sense of statistical significance) is depicted for France. However, the difference between the coefficients estimated for the two time dummies is statistically significant only for the UK and France. This, once more confirms that the SM-CC relationship is strongest in the UK.

Finally, the above results show that the weak Granger causality documented in Table 2 is not driven by the breakdown in the SM-CC relationship. For instance, the UK has one of the most significant Ganger causality results. It also has a highly statistically significant decline in the SM-CC relationship during the post-dotcom bubble burst. In contrast, the Granger causality tests are highly statistically insignificant for Germany, and the change in the SM-CC relationship after the post-dotcom stock market decline is rather weak (only 10%

significant decline of the γ_{DC} coefficient). These results indicate that the observed significant differences in penetration of stock markets into society and economic life of individual countries are likely to be behind the results. Yet, even if the awareness of the equity markets may be relatively low in Germany, and therefore, the German results are weaker, the direction of inference is as expected.

6. Conclusions

In this paper, we investigate the time-variation in the stock market–consumer confidence (SM-CC) relationship for 12 EU countries and the US over the period 1990-2010. We find that, consistent with our hypotheses, the SM-CC relationship decreased in Europe when the dotcom bubble ended. This is observed for the aggregate CCIs and the individual questions used to construct these indices. In contrast, in the US, the SM-CC relationship remained unaffected during the post-dotcom crash. However, we find some evidence that the informative power of the NASDAQ 100 index for shaping future personal finances declined significantly during the financial crisis crash.

DeLong et al. (1990) postulate that investor sentiment and stock market movements have a positive relationship. Therefore, the observed lack of the positive SM-CC relationship leads us to the conclusion that neither CCIs nor their individual questions are suitable proxies for investor sentiment and more research is needed to find reliable proxies for it.

Our results also show that the indirect impact of stock markets on the perceptions about future personal finances was strong in the EU countries. During the post-dotcom stock market correction the sensitivity of changes in expectations about future household finances to stock market returns declined. This means that the interpretation of the distinction between household-finance and economy-wide survey questions made in previous literature in order to gauge the relative importance between the wealth effect and the information effect in consumer confidence may be spurious.

The results also indicate that consumers' understanding of basic market processes may be more sophisticated than some earlier research might indicate, and their forecasting abilities should not be viewed as simply the result of self-fulfilling prophecy.

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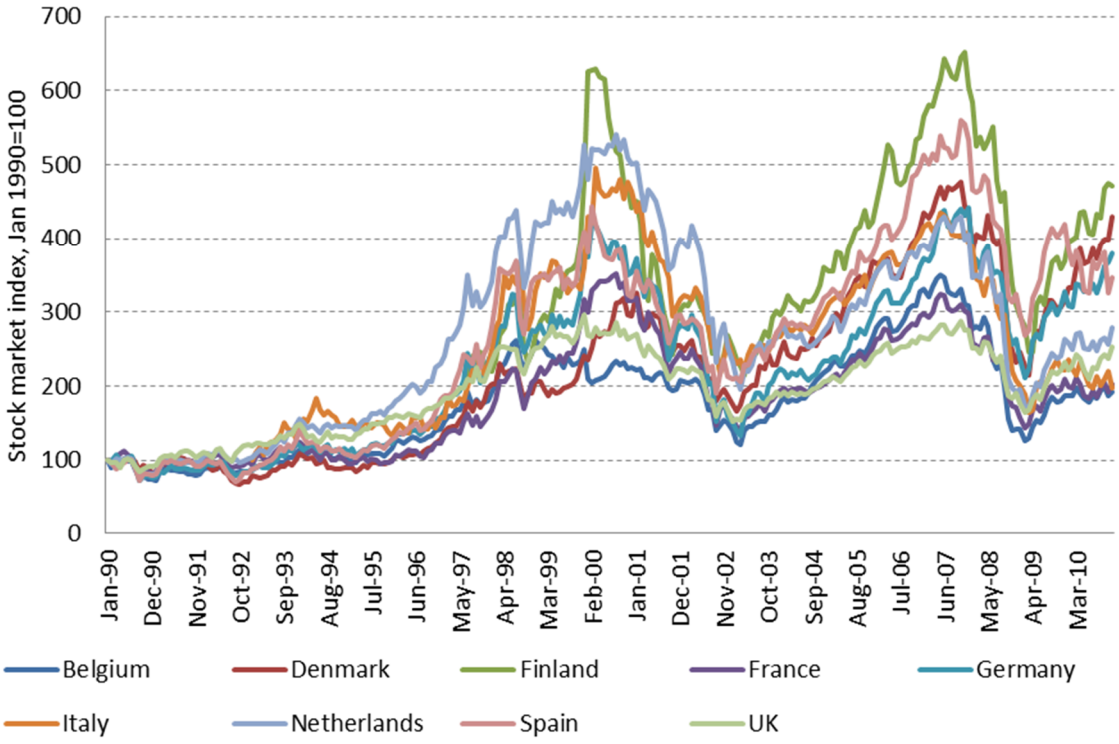
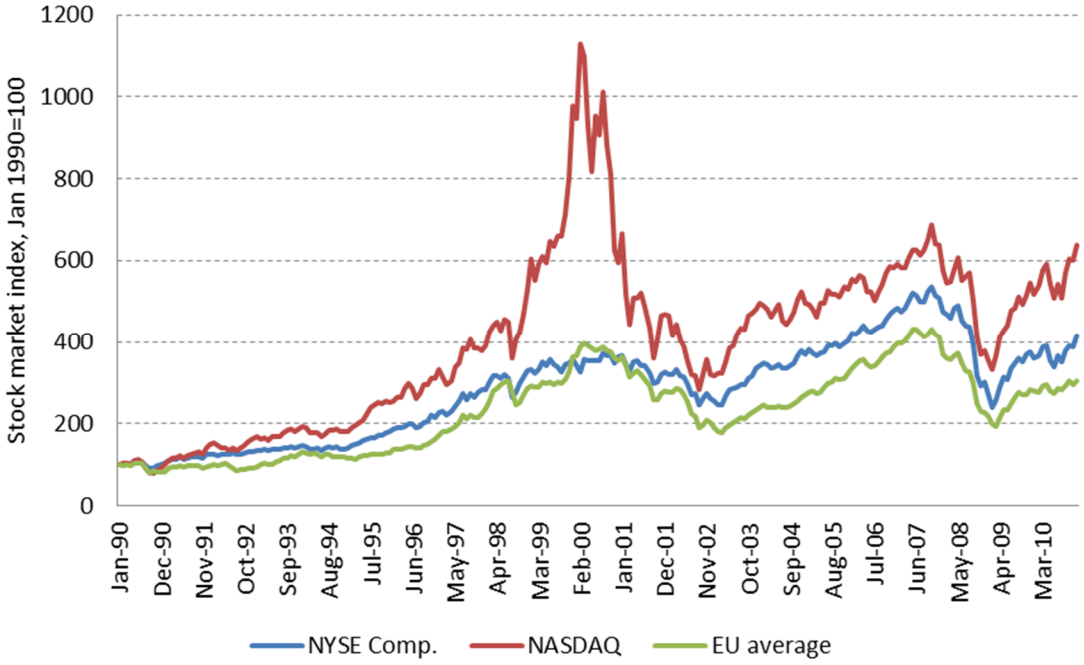
Figure 1. Stock market indices and GDP, 1990-2010. Source: DataStream, OECD.

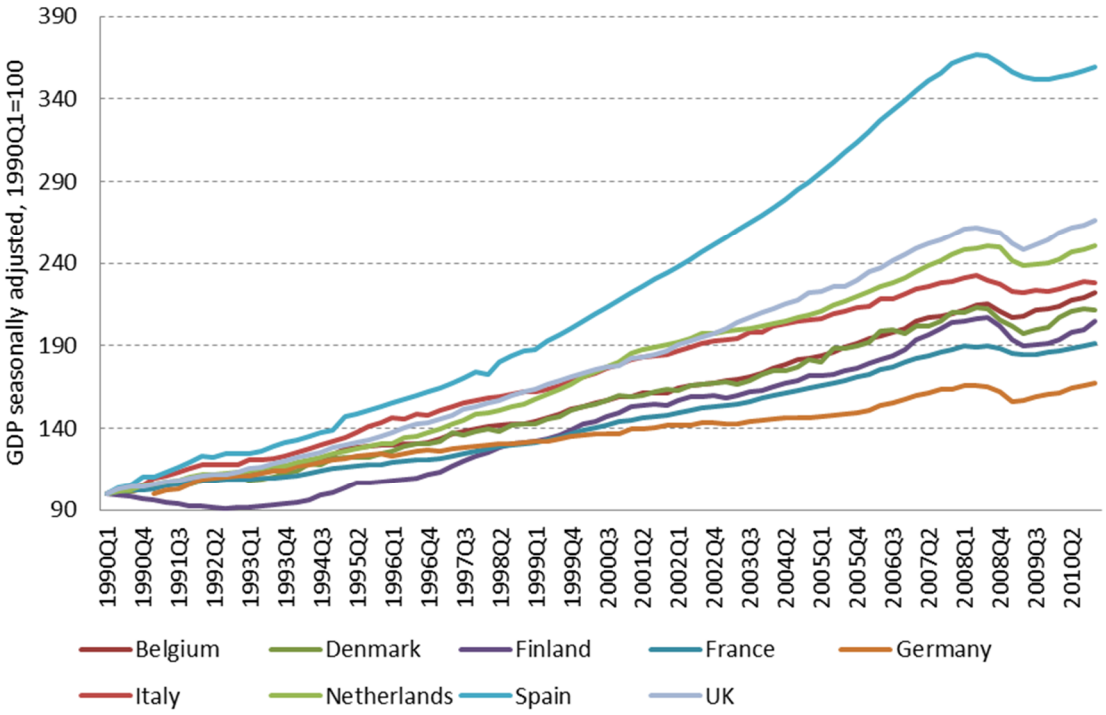
Panel A. Stock market indices (Jan1990=100) for nine EU countries, monthly



Panel B. Stock market indices (Jan1990=100) for the US and the average of nine EU countries, monthly



Panel C. Seasonally adjusted GDP (1990Q1=100) for nine EU countries, quarterly



Panel D. Seasonally adjusted GDP (1990Q1=100) for the US and the average of nine EU countries, quarterly.

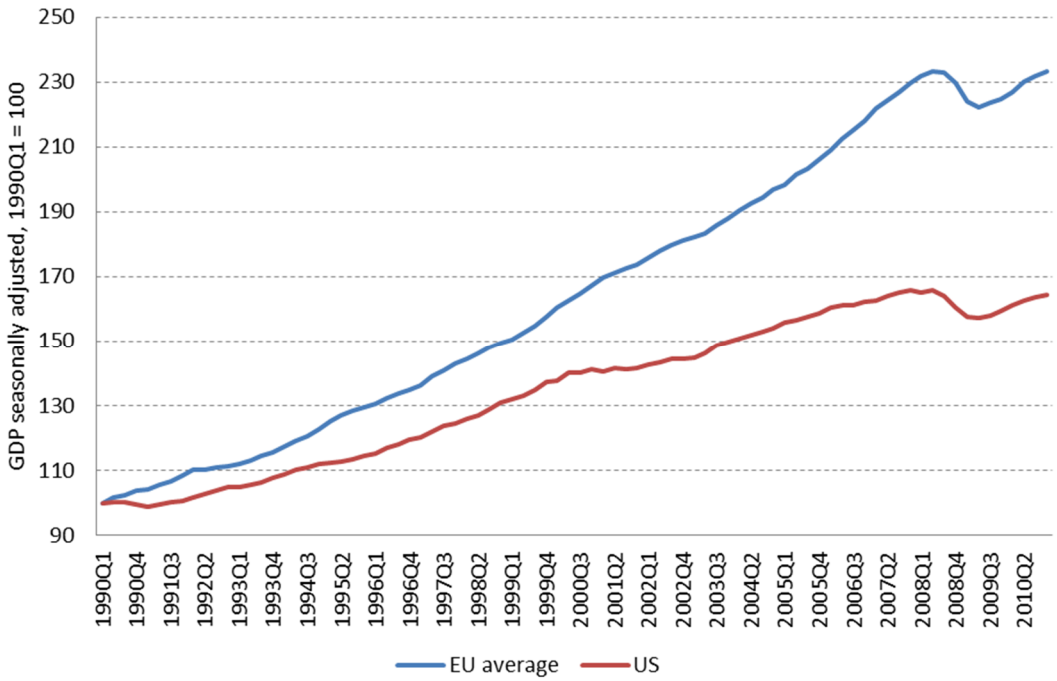


Figure 2. Kalman Filter estimate of the γ coefficient (and 95% confidence intervals, dotted lines) from Eq. 1

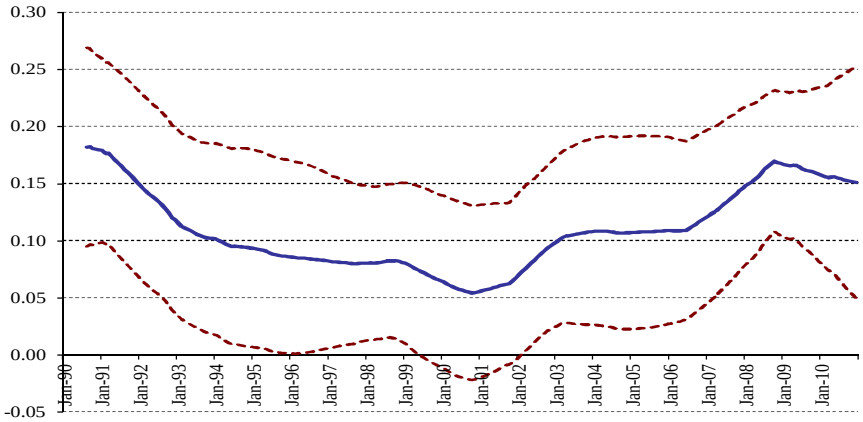


Figure 3. Kalman Filter estimate of the γ coefficient (and 95% confidence intervals, dotted lines) from Eq. 1 with R_{EU12} being replaced by *Δind-prod*.

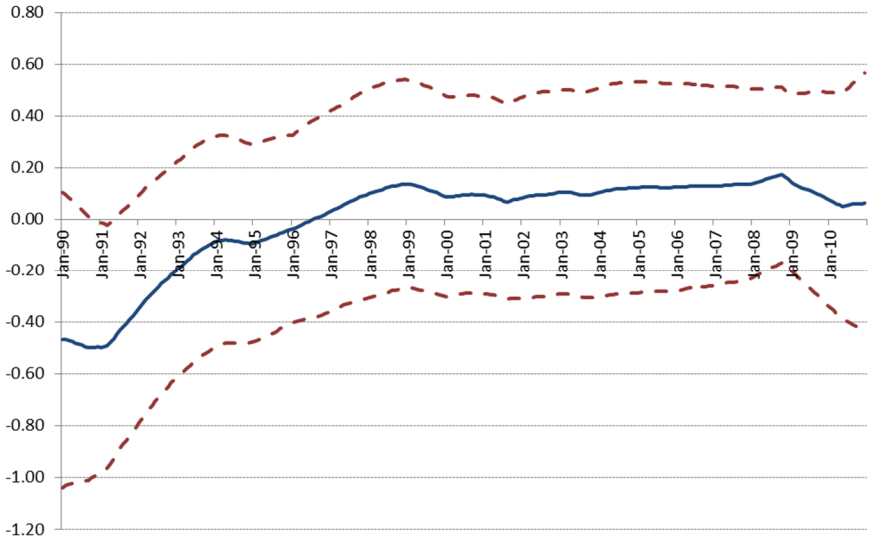


Table 1. Summary statistics

Means and standard deviations of the changes in the CCIs, in the macroeconomic variables and in the stock market indices for the EU12 and the US; monthly, %.

	EU12		USA	
	Mean	St. dev.	Mean	St dev.
Changes in the consumer confidence indices and the scores of the individual questions				
ΔCCI	-0.014	1.478		
ΔCSI			-0.063	4.141
ΔQ_i (Ability to save)	0.012	1.158		
ΔQ_{ii} (Personal finances)	-0.017	0.894	-0.067	5.384
ΔQ_{iii} (Economic situation)	-0.013	0.037	-0.143	11.327
$-\Delta Q_{iv}$ (Unemployment)	-2.531	3.075		
Macroeconomic variables				
infl	0.179	0.394	0.216	0.334
Δind-prod	0.061	1.011	0.162	0.685
Δunempl	0.001	0.103	0.016	0.158
Δint-rate	-0.040	0.450	-0.032	0.328
Stock market returns				
EU12	0.668	5.270		
NYSE Comp.			0.637	4.473
NASDAQ 100			1.200	7.400

Table 2. Contemporaneous correlations (Panel A) and p-values for the Granger causality test (Panel B) for the 12 individual EU countries and the EU12 average, 1990-2010.

	ΔCCI		ΔQ_i Ability to save		ΔQ_{ii} Personal finances		ΔQ_{iii} Economic situation		ΔQ_{iv} Unemployment	
Panel A	Coeff	P-value	Coeff	P-value	Coeff	P-value	Coeff	P-value	Coeff	P-value
EU12	0.436	0.000	0.198	0.002	0.240	0.000	0.386	0.000	0.376	0.000
Austria	0.239	0.001	-0.011	0.882	0.008	0.910	0.281	0.000	0.291	0.000
Belgium	0.285	0.000	0.124	0.050	0.216	0.001	0.241	0.000	0.235	0.000
Denmark	0.111	0.078	0.106	0.094	0.043	0.501	0.006	0.924	0.113	0.073
Finland	0.229	0.003	0.031	0.675	0.166	0.026	0.243	0.002	0.171	0.021
France	0.313	0.000	0.157	0.012	0.142	0.024	0.274	0.000	0.265	0.000
Germany	0.201	0.001	0.127	0.044	0.106	0.093	0.181	0.004	0.164	0.009
Greece	0.208	0.001	0.089	0.159	0.148	0.019	0.235	0.000	0.158	0.012
Italy	0.229	0.001	0.109	0.111	0.052	0.452	0.169	0.013	0.255	0.000
Netherlands	0.207	0.001	-0.130	0.039	0.073	0.250	0.276	0.000	0.191	0.002
Spain	0.263	0.000	0.120	0.057	0.150	0.017	0.284	0.000	0.201	0.001
Sweden	0.271	0.000	0.075	0.316	0.102	0.170	0.231	0.002	0.230	0.002
UK	0.248	0.000	0.101	0.110	0.187	0.003	0.212	0.001	0.214	0.001
Panel B										
	R→ΔCC	ΔCC→ R	R→ΔCC	ΔCC→ R	R→ΔCC	ΔCC→ R	R→ΔCC	ΔCC→ R	R→ΔCC	ΔCC→ R
EU12	0.001	0.070	0.430	0.784	0.016	0.104	0.015	0.141	0.001	0.087
Austria	0.163	0.099	0.928	0.441	0.282	0.140	0.442	0.250	0.155	0.277
Belgium	0.090	0.257	0.181	0.105	0.205	0.667	0.588	0.123	0.059	0.094
Denmark	0.048	0.230	0.976	0.139	0.539	0.893	0.181	0.160	0.003	0.075
Finland	0.003	0.015	0.705	0.169	0.020	0.121	0.076	0.040	0.000	0.131
France	0.003	0.516	0.855	0.434	0.048	0.576	0.015	0.732	0.001	0.310
Germany	0.840	0.746	0.294	0.933	0.717	0.847	0.296	0.888	0.557	0.656
Greece	0.407	0.834	0.941	0.869	0.688	0.904	0.188	0.706	0.325	0.639
Italy	0.589	0.490	0.014	0.572	0.702	0.276	0.253	0.506	0.103	0.938
Netherlands	0.000	0.062	0.500	0.055	0.012	0.912	0.008	0.391	0.000	0.075
Spain	0.029	0.090	0.668	0.767	0.186	0.011	0.019	0.208	0.015	0.087
Sweden	0.007	0.859	0.222	0.537	0.419	0.549	0.070	0.695	0.046	0.522
UK	0.016	0.257	0.032	0.138	0.088	0.858	0.068	0.430	0.062	0.390

Table 3. Contemporaneous correlations and results of the Granger causality test for the US, 1990-2010.

	Correlations		Granger causality test (P-values)	
	Coeff.	P-value	$R \rightarrow \Delta CC$	$\Delta CC \rightarrow R$
NYSE Composite				
ΔCSI	0.164	0.009	0.000	0.939
ΔQ_{ii} (Personal finances)	0.039	0.539	0.003	0.687
ΔQ_{iii} (Economic situation)	0.152	0.016	0.000	0.853
NASDAQ100				
ΔCSI	0.132	0.036	0.000	0.692
ΔQ_{ii} (Personal finances)	0.003	0.963	0.003	0.954
ΔQ_{iii} (Economic situation)	0.143	0.023	0.000	0.676

Table 4. MG estimates of Eq. 2 (Panel A) and of Eq. 3 (Panel B) for the panel of the 12 EU countries, 1990-2010, and the Wald test of equality between γ_{DC} and γ_{FC}. Only short-run coefficients are presented. The four *Macro* variables are: inflation (*infl*), industrial production (*ind-prod*), unemployment (*unempl*) and monthly interest rate (*int-rate*). Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

	θ	α	α_{DC}	α_{FC}	γ	γ_{DC}	γ_{FC}	δ_{infl}	$\delta_{\Delta ind\text{-}prod}$	$\delta_{\Delta unempl}$	$\delta_{\Delta int\text{-}rate}$	χ^2
Panel A												
ΔCCI	-0.203***	0.332**	0.004		0.090***	-0.127***		-0.275	0.009	-2.268**	1.459***	
	(0.019)	(0.149)	(0.003)		(0.016)	(0.037)		(0.172)	(0.035)	(0.978)	(0.446)	
ΔQ_i (Ability to save)	-0.311***	0.411**	0.002		0.045***	-0.064**		-0.190*	-0.018	-0.717	0.055	
	(0.062)	(0.159)	(0.002)		(0.014)	(0.031)		(0.108)	(0.027)	(0.564)	(0.459)	
ΔQ_{ii} (Personal finances)	-0.443***	0.251	0.010**		0.024	-0.075**		-0.226	-0.016	-1.704**	0.105	
	(0.042)	(0.384)	(0.004)		(0.017)	(0.030)		(0.157)	(0.074)	(0.667)	(0.327)	
ΔQ_{iii} (Economic situation)	-0.218***	0.654**	0.006		0.145***	-0.156**		-0.467*	0.074	-1.586	1.869***	
	(0.032)	(0.267)	(0.004)		(0.028)	(0.070)		(0.242)	(0.060)	(1.090)	(0.666)	
$-\Delta Q_{iv}$ (Unemployment)	0.204***	0.200	0.005		0.129***	-0.171***		-0.152	-0.017	-5.502**	3.584***	
	(0.023)	(0.367)	(0.006)		(0.026)	(0.060)		(0.256)	(0.058)	(2.632)	(0.686)	
Panel B												
ΔCCI	-0.235***	-0.002	0.001	-0.021***	0.067***	-0.101***	0.064***	-0.305*	-0.023	-2.163**	1.200***	15.52***
	(0.026)	(0.126)	(0.003)	(0.005)	(0.017)	(0.038)	(0.023)	(0.175)	(0.034)	(0.956)	(0.423)	
ΔQ_i (Ability to save)	-0.350***	0.118	0.000	-0.020***	0.032**	-0.046	0.019	-0.205*	-0.050*	-0.488	-0.175	3.34*
	(0.060)	(0.168)	(0.002)	(0.004)	(0.013)	(0.031)	(0.019)	(0.114)	(0.026)	(0.591)	(0.463)	
ΔQ_{ii} (Personal finances)	-0.465***	0.022	0.009**	-0.011**	0.011	-0.058**	0.040	-0.254	-0.047	-1.458**	0.015	4.26**
	(0.039)	(0.414)	(0.004)	(0.006)	(0.015)	(0.026)	(0.033)	(0.164)	(0.071)	(0.698)	(0.331)	
ΔQ_{iii} (Economic situation)	-0.246***	0.220	0.003	-0.034***	0.134***	-0.139*	-0.030	-0.423*	0.039	-1.432	1.481**	2.73*
	(0.038)	(0.169)	(0.004)	(0.008)	(0.031)	(0.075)	(0.047)	(0.256)	(0.064)	(1.021)	(0.657)	
$-\Delta Q_{iv}$ (Unemployment)	0.219***	-0.291	-0.001	-0.024***	0.073**	-0.112*	0.252***	-0.296	-0.054	-5.250**	3.094***	19.53***
	(0.024)	(0.335)	(0.006)	(0.007)	(0.032)	(0.061)	(0.057)	(0.259)	(0.059)	(2.568)	(0.646)	

Table 5. ECM estimates of Eq. 3 and the F-test of equality between γ_{DC} and γ_{FC} for NYSE Comp. and NASDAQ100 indices, 1990-2010. *DC* is equal to one for months between September 2000 and September 2002 (zero otherwise) and *FC* is equal to one for months between November 2007 and February 2009 (zero otherwise). The four *Macro* variables are: inflation (*infl*), industrial production (*ind-prod*), unemployment (*unempl*) and 1-month interest rate (*int-rate*). Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

	θ	α	α_{DC}	α_{FC}	γ	γ_{DC}	γ_{FC}	δ_{infl}	$\delta_{\Delta ind\text{-}prod}$	$\delta_{\Delta unempl}$	$\delta_{\Delta int\text{-}rate}$	R^2	F-Test
Panel A. NYSE Composite													
ΔCSI	-0.002***	0.760***	-0.013	-0.029*	0.215***	0.186	0.148	-3.469***	0.007	1.052	0.830	0.235	0.02
	(0.000)	(0.226)	(0.009)	(0.015)	(0.066)	(0.211)	(0.170)	(0.746)	(0.428)	(1.751)	(0.783)		
ΔQ_{ii} (Personal finances)	-0.006***	1.473***	-0.001	-0.069***	0.151*	-0.122	-0.265	-2.233**	-0.686	1.390	-0.009	0.291	0.21
	(0.001)	(0.288)	(0.011)	(0.018)	(0.082)	(0.263)	(0.214)	(0.931)	(0.535)	(2.170)	(0.968)		
ΔQ_{iii} (Economic situation)	-0.002***	2.016***	-0.028	-0.054	0.672***	0.532	-0.009	-10.205***	1.293	4.721	4.546**	0.247	0.63
	(0.000)	(0.594)	(0.025)	(0.040)	(0.178)	(0.573)	(0.461)	(2.018)	(1.161)	(4.750)	(2.114)		
Panel B. NASDAQ 100													
ΔCSI	-0.002***	1.074***	-0.014	-0.049***	0.111***	0.023	0.033	-2.993***	0.143	0.301	0.614	0.223	0.01
	(0.000)	(0.257)	(0.011)	(0.014)	(0.040)	(0.105)	(0.119)	(0.735)	(0.430)	(1.760)	(0.787)		
ΔQ_{ii} (Personal finances)	-0.006***	1.625***	-0.000	-0.078***	0.084*	-0.046	-0.319**	-1.956**	-0.497	1.645	-0.108	0.301	2.23
	(0.001)	(0.308)	(0.013)	(0.017)	(0.050)	(0.129)	(0.147)	(0.904)	(0.525)	(2.156)	(0.962)		
ΔQ_{iii} (Economic situation)	-0.002***	3.034***	-0.038	-0.104***	0.318***	0.036	-0.065	-9.308***	1.937*	2.930	3.858*	0.239	0.06
	(0.000)	(0.676)	(0.029)	(0.038)	(0.110)	(0.285)	(0.321)	(1.985)	(1.165)	(4.763)	(2.118)		

Table 6. ECM estimates of Eq. 2 (Panel A), and of Eq. 3 (Panel B) for the EU12 average, 1990-2010, and the F-tests of equality between γ_{DC} and γ_{FC}. *DC* is equal to one for months between March 2000 and September 2002 (zero otherwise) and *FC* is equal to one for months between November 2007 and February 2009 (zero otherwise). The four *Macro* variables are: inflation (*infl*), industrial production (*ind-prod*), unemployment (*unempl*) and 1-month interest rate (*int-rate*). Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

	θ	α	α_{DC}	α_{FC}	γ	γ_{DC}	γ_{FC}	δ_{infl}	$\delta_{\Delta ind\text{-}prod}$	$\delta_{\Delta unempl}$	$\delta_{\Delta int\text{-}rate}$	R^2	F-Test
Panel A													
ΔCCI	-0.113***	0.240**	0.001		0.101***	-0.167***		-0.182	0.023	-0.817	0.374**	0.302	
	(0.023)	(0.116)	(0.003)		(0.018)	(0.049)		(0.203)	(0.084)	(1.001)	(0.187)		
ΔQ_i (Ability to save)	-0.133***	0.294**	0.001		0.039**	-0.091**		-0.097	-0.086	-0.088	0.187	0.097	
	(0.030)	(0.115)	(0.003)		(0.016)	(0.044)		(0.179)	(0.074)	(0.851)	(0.165)		
ΔQ_{ii} (Personal finances)	-0.141***	0.346***	0.001		0.040***	-0.104***		-0.133	-0.062	0.125	0.172	0.170	
	(0.032)	(0.091)	(0.002)		(0.011)	(0.032)		(0.134)	(0.055)	(0.646)	(0.125)		
ΔQ_{iii} (Economic situation)	-0.104***	0.391*	0.001		0.172***	-0.220**		-0.484	-0.027	-0.040	0.277	0.218	
	(0.026)	(0.210)	(0.005)		(0.031)	(0.089)		(0.367)	(0.152)	(1.791)	(0.338)		
$-\Delta Q_{iv}$ (Unemployment)	-0.111***	0.007	-0.000		0.152***	-0.251**		-0.026	0.267	-3.196	0.897**	0.268	
	(0.023)	(0.248)	(0.006)		(0.037)	(0.105)		(0.432)	(0.179)	(2.140)	(0.393)		
Panel B													
ΔCCI	-0.135***	0.086	-0.000	-0.012**	0.073***	-0.138***	0.099*	-0.227	-0.052	-0.681	0.282	0.340	13.05***
	(0.023)	(0.121)	(0.003)	(0.005)	(0.019)	(0.049)	(0.051)	(0.199)	(0.083)	(0.975)	(0.183)		
ΔQ_i (Ability to save)	-0.135***	0.271**	0.001	-0.003	0.037**	-0.089**	-0.007	-0.095	-0.096	-0.020	0.173	0.091	1.86
	(0.030)	(0.121)	(0.003)	(0.004)	(0.017)	(0.044)	(0.047)	(0.181)	(0.076)	(0.860)	(0.168)		
ΔQ_{ii} (Personal finances)	-0.217***	0.313***	0.002	-0.013***	0.022*	-0.085***	0.038	-0.142	-0.113**	0.213	0.138	0.235	8.28***
	(0.035)	(0.088)	(0.002)	(0.003)	(0.012)	(0.032)	(0.034)	(0.129)	(0.054)	(0.621)	(0.120)		
ΔQ_{iii} (Economic situation)	-0.139***	0.157	-0.000	-0.025***	0.148***	-0.197**	-0.001	-0.462	-0.107	0.059	0.189	0.239	2.66*
	(0.028)	(0.222)	(0.005)	(0.009)	(0.034)	(0.089)	(0.095)	(0.365)	(0.153)	(1.769)	(0.336)		
$-\Delta Q_{iv}$ (Unemployment)	-0.112***	-0.269	-0.003	-0.011	0.088**	-0.176*	0.370***	-0.225	0.127	-2.646	0.673*	0.315	15.44***
	(0.022)	(0.258)	(0.006)	(0.010)	(0.039)	(0.103)	(0.109)	(0.422)	(0.178)	(2.083)	(0.386)		

Table 7. ECM estimates of Eq. 2 for France, Germany and the UK, 1990-2010. *DC* is equal to one for months between March 2000 and September 2002 (zero otherwise). The four *Macro* variables are: inflation (*infl*), industrial production (*ind-prod*), unemployment (*unempl*) and 1-month interest rate (*int-rate*). The German and French data are winsorized at 99%. Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

	θ	α	α_{DC}	γ	γ_{DC}	δ_{infl}	$\delta_{\Delta ind\text{-}prod}$	$\delta_{\Delta unempl}$	$\delta_{\Delta int\text{-}rate}$	R^2
Panel A. France										
ΔCCI	-0.185***	-0.034	-0.001	0.142***	-0.243**	-0.697	-0.021	-8.964***	-0.180	0.192
	(0.035)	(0.367)	(0.008)	(0.038)	(0.116)	(0.693)	(0.151)	(2.621)	(0.200)	
ΔQ_{ii} (Personal finances)	-0.192***	0.264	0.001	0.035*	-0.079	-0.614*	-0.047	-1.991	-0.004	0.102
	(0.039)	(0.194)	(0.004)	(0.020)	(0.062)	(0.371)	(0.081)	(1.335)	(0.107)	
ΔQ_{iii} (Economic situation)	-0.211***	0.304	0.005	0.198***	-0.302*	-1.566	-0.046	-6.248	-0.173	0.159
	(0.041)	(0.585)	(0.013)	(0.061)	(0.188)	(1.126)	(0.245)	(4.136)	(0.323)	
Panel B. Germany										
ΔCCI	-0.121***	0.321*	0.005	0.082**	-0.121*	-0.439	0.017	-4.047	1.698*	0.162
	(0.038)	(0.185)	(0.006)	(0.031)	(0.065)	(0.461)	(0.123)	(2.921)	(0.927)	
ΔQ_{ii} (Personal finances)	-0.157***	0.131	-0.001	0.043**	-0.059*	-0.666**	0.040	0.194	0.233	0.124
	(0.042)	(0.110)	(0.004)	(0.018)	(0.037)	(0.261)	(0.068)	(1.679)	(0.507)	
ΔQ_{iii} (Economic situation)	-0.070**	0.417	0.005	0.117**	-0.252***	-0.144	0.062	-5.579	3.125**	0.187
	(0.030)	(0.258)	(0.009)	(0.045)	(0.093)	(0.658)	(0.174)	(4.264)	(1.325)	
Panel C. The UK										
ΔCCI	-0.150***	0.566	-0.008	0.212***	-0.425***	0.130	-0.012	1.380	1.045	0.156
	(0.035)	(0.554)	(0.007)	(0.046)	(0.114)	(0.413)	(0.213)	(1.966)	(0.662)	
ΔQ_{ii} (Personal finances)	-0.120***	0.245	0.001	0.169***	-0.351***	0.062	-0.018	2.688	-0.239	0.109
	(0.030)	(0.524)	(0.006)	(0.043)	(0.107)	(0.388)	(0.201)	(1.796)	(0.606)	
ΔQ_{iii} (Economic situation)	-0.175***	2.001*	-0.007	0.339***	-0.714***	0.397	-0.174	2.624	1.462	0.157
	(0.036)	(1.021)	(0.012)	(0.081)	(0.202)	(0.733)	(0.381)	(3.488)	(1.168)	

Table 8. ECM estimates of Eq. 3 for France, Germany and the UK, 1990-2010, and the F-tests of equality between γ_{DC} and γ_{FC}. *DC* is equal to one for months between March 2000 and September 2002 (zero otherwise) and *FC* is equal to one for months between November 2007 and February 2009 (zero otherwise). The four *Macro* variables are: inflation (*infl*), industrial production (*ind-prod*), unemployment (*unempl*) and 1-month interest rate (*int-rate*). The German and French data are winsorized at 99%. Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

	θ	α	α_{DC}	α_{FC}	γ	γ_{DC}	γ_{FC}	δ_{infl}	$\delta_{\Delta ind\text{-}prod}$	$\delta_{\Delta unempl}$	$\delta_{\Delta int\text{-}rate}$	R^2	F-Test
Panel A. France													
ΔCCI	-0.198***	-0.208	-0.003	-0.017*	0.123***	-0.224*	0.029	-0.772	-0.072	-8.884***	-0.225	0.199	2.53*
	(0.036)	(0.376)	(0.008)	(0.010)	(0.041)	(0.117)	(0.123)	(0.696)	(0.153)	(2.615)	(0.201)		
ΔQ_{ii} (Personal finances)	-0.262***	0.112	0.000	-0.023***	0.029	-0.075	-0.095	-0.565	-0.103	-2.354*	-0.047	0.152	0.06
	(0.043)	(0.193)	(0.004)	(0.006)	(0.021)	(0.061)	(0.064)	(0.363)	(0.080)	(1.302)	(0.105)		
ΔQ_{iii} (Economic situation)	-0.238***	-0.038	0.002	-0.039**	0.166**	-0.278	-0.029	-1.598	-0.146	-6.422	-0.267	0.174	0.95
	(0.042)	(0.596)	(0.013)	(0.016)	(0.066)	(0.188)	(0.197)	(1.123)	(0.246)	(4.108)	(0.322)		
Panel B. Germany													
ΔCCI	-0.157***	0.104	-0.002	-0.024**	0.071**	-0.112*	-0.028	-0.416	-0.054	-3.363	1.447	0.180	0.61
	(0.041)	(0.205)	(0.007)	(0.010)	(0.033)	(0.066)	(0.100)	(0.456)	(0.127)	(2.905)	(0.936)		
ΔQ_{ii} (Personal finances)	-0.170***	0.059	-0.003	-0.009	0.046**	-0.064*	-0.068	-0.660**	0.029	0.480	0.162	0.130	0.00
	(0.043)	(0.122)	(0.004)	(0.006)	(0.019)	(0.038)	(0.057)	(0.260)	(0.069)	(1.686)	(0.521)		
ΔQ_{iii} (Economic situation)	-0.101***	0.105	-0.005	-0.032**	0.099**	-0.237**	-0.001	-0.113	-0.027	-4.954	2.808**	0.200	2.30
	(0.034)	(0.294)	(0.010)	(0.015)	(0.048)	(0.094)	(0.143)	(0.653)	(0.178)	(4.240)	(1.337)		
Panel C. The UK													
ΔCCI	-0.188***	-0.297	-0.008	-0.029***	0.199***	-0.414***	-0.041	0.102	-0.091	1.949	0.769	0.177	5.52**
	(0.037)	(0.635)	(0.007)	(0.010)	(0.049)	(0.115)	(0.133)	(0.411)	(0.215)	(1.952)	(0.668)		
ΔQ_{ii} (Personal finances)	-0.164***	-0.794	0.002	-0.036***	0.141***	-0.320***	0.029	-0.020	-0.127	3.922**	-0.777	0.155	5.65**
	(0.031)	(0.579)	(0.006)	(0.010)	(0.046)	(0.106)	(0.123)	(0.381)	(0.199)	(1.777)	(0.609)		
ΔQ_{iii} (Economic situation)	-0.209***	1.128	-0.006	-0.050***	0.366***	-0.744***	-0.409	0.480	-0.202	3.475	1.208	0.182	1.41
	(0.037)	(1.110)	(0.012)	(0.018)	(0.088)	(0.203)	(0.235)	(0.728)	(0.382)	(3.458)	(1.178)		

Notes

[1] Similarly to stock markets, consumer confidence is not just an indicator of economic conditions, but also a factor which potentially influences them. When consumer attitudes are positive (negative), they are more likely to spend more (less) money, contributing to the very economic growth (slowdown) they anticipate.

[2] http://www.conference-board.org/pdf_free/press/TechnicalPDF_4134_1298367128.pdf

[3] http://ec.europa.eu/economy_finance/publications/publication7568_en.pdf

[4] In the long run, there is evidence that the level of sentiment predicts stock returns, i.e., when investors are overoptimistic, future returns over multiyear horizons will be low, and vice versa (Baker and Wurgler, 2006, 2007; Bathia and Bredin, 2012; Brown and Cliff, 2004, 2005; Chen, 2011; Fisher and Statman, 2000; Lemmon and Portniaguina, 2006; Neal and Wheatley, 1998; Schmeling, 2009; Solt and Statman, 1988; Verma and Verma, 2008).

[5] E.g., Lee et al. (1991), Chen et al. (1993), Neal and Wheatley (1998), Brown and Cliff (2004), Doukas and Milonas (2004), Baker and Wurgler (2006, 2007), Kurov (2010), Hwang (2011), the papers in the special issue of the Journal of Financial Economics 2012, 104(2).

[6] The three countries used in the regression analysis were dropped from Figure 1 because of shorter GDP time series. The equally-weighted average stock market index of these nine EU countries is correlated at 98% with the EU12 equally-weighted average stock market index used in the regression analysis.

[7] Hon et al. (2007) show that the collapse of OECD stock markets was tied to close links across sectors (particularly in the technology, media, and telecommunication), and could not be attributed to widespread contagion.

[8] http://www.usatoday.com/money/economy/2001-01-30-confidence-pre.htm

[9] Other developed countries have data with incompatible methodologies (e.g., Japan), too short times series of monthly data (e.g., Canada, Portugal), or stopped collecting data all together (e.g., Ireland).

[10] Three countries have shorter CCIs. These are Austria (October 1995), Sweden (October 1995) and Finland (November 1995).

[11] It does not seem correct to lag stock market returns more, as the period of the calculation of returns would include a period of the previous month survey collection. If consumers take stock markets news into account, it can be expected that they would have already incorporated last month stock market news into their previous month predictions.

[12] We do not use the Consumer Confidence Survey published by the Conference Board because its forecasting questions ask about subjects' expectations over the next six months (not 12 months) and do not refer to 'country wide' conditions but to conditions 'in the area'. Moreover, the questions have only three possible answers: positive, negative and neutral.

[13] It can be shown that the multiplier of the linear transformation is approximately 5/6.7558.

[14] We replicated the analysis on returns of S&P500, and of the equally-weighted average of NYSE Composite and NASDAQ100. The results remained unchanged and can be obtained from the authors on request.

[15] Tetlock (2007) rejects the hypothesis that media content contains new information about fundamental asset values or is a sideshow with no relation to asset markets.

[16] For the sake of space we do not present the results, but they can be obtained from the authors on request.

[17] The Kalman Filter regression was also run including the changes in the four macro variables. The estimate of the time path of the γ coefficient remained practically identical.

[18] To save space we do not present the results of the cointegration tests, but they rejected the null hypothesis of no cointegration for all variables at the individual country level and for EU12.

[19] Using a 'classic' specification with lag values of *p* and *Macros* would be consistent with the assumption that consumers expect that the current situation will not change, i.e., the future is going to be exactly as the current state of the world. However, although this is rather unrealistic, we also tried this specification. The main results, i.e., the statistically significant decline in the SM-CC relationship, remained unchanged.

[20] For Q_{iv} we use $-\Delta CC$ instead of ΔCC so the sign of the α, γ and δ coefficients are consistent with those estimated for questions Q_i-Q_{iii}. This however results in obtaining an opposite sign for θ, i.e., θ becomes positive.

[21] The long-term effects obtained for the regression specifications presented in Tables 5-8 are similar, i.e., the coefficients estimated for *p* are always statistically significant while the coefficients estimated for the Macro variables differ in their significance (including the unemployment variable).

[22] The Hausman test comparing the MG and PMG techniques was inconclusive.