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Sensitivity of Consumer Confidence to Stock Markets' Meltdowns

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Sensitivity of consumer confidence to stock markets' meltdowns

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February 2012

Abstract

It is well documented that the financial literacy of ordinary people is low but stock market returns shape consumer confidence indices. This raises an important question with regard to the relationship between stock markets and consumer confidence. Given that consumers do not understand even basic financial concepts, is the impact of changes in stock market returns on consumer confidence equally simplistic or do they display a degree of sophistication when interpreting changes in stock market returns despite their broader 'financial illiteracy'? 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 financial crisis of 2007-2009) to address this question. We find that consumers appear to correctly distinguish between those declines in stock markets which led to changes in economic conditions from those which did not. Moreover, in contrast to earlier research we also find strong evidence that stock markets impact on expectations about future household finances. Consumer confidence with regard to personal finances is driven by the indirect effect (consumers think they will be personally worse off because of the impact of poor future economic conditions on their finances) whilst the direct wealth effect (personal finances are worse because of the effect of stock market decline on wealth) is comparatively weak.

Key words: consumer confidence, dotcom bubble, financial crisis, stock market reaction, financial literacy

JEL Classification: G00, G15

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1. Introduction

It is well documented that the financial literacy of ordinary people is low. Indeed, it has recently been shown that people do not even understand the difference between bonds and stocks (van Rooij et al., 2011). However, despite this 'financial illiteracy', the finance literature shows that consumers pay attention to stock markets. In particular, stock market returns play an important role in shaping consumer confidence (Fisher and Statman, 2003; Jansen and Nahuis, 2003; Otoo, 1999). Furthermore, the impact of stock markets in shaping consumers' confidence is higher now than it was a couple of decades ago (Lopez and Durré, 2003). This raises an important question with regard to the relationship between stock markets and consumer confidence. Given that consumers do not understand even basic financial concepts, is the impact of changes in stock market returns on consumer confidence equally simplistic or do consumers display a degree of sophistication when interpreting changes in stock market returns despite their broader 'financial illiteracy'? The answer has broad relevance since the moods and opinions of consumers are very important and are closely monitored in developed countries. Governments, the business community and politicians are extremely sensitive to changes in consumer confidence indices. Furthermore, if consumers are sophisticated in their interpretation of changes in stock market returns, then this highlights another channel affecting the 'reach' of financial markets into the community. Using European and US data, this paper provides a case study of the two recent stock market meltdowns (the post-dotcom bubble correction of 2000-2002 and the collapse of stock markets during the financial crisis of 2007-2009) to address this question.

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 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. Research shows that, although changes in stock market prices and changes in consumer confidence are contemporaneously correlated, typically changes in stock markets Granger cause changes in consumer confidence, and not vice versa (Fisher and Statman, 2003; Jansen and Nahuis, 2003; Otoo, 1999). Indeed, there is very little evidence that consumer confidence impacts on the formation of stock market returns in the short-term (Barsky and Sims, 2009; Hsu et al., 2011). In addition, Jansen and Nahuis (2003) and Otoo (1999) suggest that the stock market–consumer confidence (SM-

CC) relationship is driven by consumers' expectations about economy-wide conditions rather than their expectations of changes in their personal finances.

Some movements of stock markets may carry implications for the whole economy whilst other changes may have implications only for sections of the economy. Therefore, some movements of stock markets are more informative about future economic conditions than others. In the light of the low level of financial literacy amongst the general public it is not obvious whether consumers display a degree of sophistication in their interpretation of stock market movements or not; but if they do then one should expect that there are periods when the SM-CC relationship is stronger than others (to reflect when market changes are more informative about changes in general economic conditions than others).[1]

This paper tests whether this is the case using data for 12 developed EU countries and the US over the period 1990-2010. In essence we have two distinct tests although the relevance of the 'test' on 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 for the EU sample during 2000-2002 but no such effect (i.e., weakening of the SM-CC relationship) should be observed during the financial crisis which was followed by the economic downturn. Second, since in the US both the post-dotcom and the financial crisis periods were followed by economic slowdown, we should not expect the US data to reflect the differences we observed in the EU data, i.e., in particular we should not expect to observe a difference in the US SM-CC relationship between the two stock market crashes.

There are several reasons why the dotcom crash and the current financial crisis are particularly apt for to test for changes in the SM-CC relationship. First, in many countries the two crashes resulted in similar declines in stock markets but had different consequences for economy-wide conditions, as emphasized above. Therefore, they provide a rich natural experiment base to study not only consumer reactions but the differences between them. Second, the crashes were short in duration (less than two years each) and relatively close in time, which reduces the exposure to long-term changes in stock market characteristics and/or macroeconomic policies. Third, the stock market crashes occurred in many countries,

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[1] In this paper we focus on the SM-CC relationship because the movement of stock markets can be considered as exogenous. Other commonly considered variables such as, for example, interest rates can be subject to policymaking decisions (e.g., are kept artificially low to stimulate economic conditions) and as such do not fully reflect market conditions.

allowing us to address the issue as an international phenomenon, not as an individual country effect. Moreover, taking a portfolio of countries helps further distance ourselves from individual country effects.

The EU countries and the US provide different consumer survey data, hence require different methodological approaches. From the perspective of this research the sample of 12 EU countries is potentially more informative than the US data for several reasons. First, having 12 comparable country indices provides the opportunity of calculating an average which will, at least to some extent, dilute individual country effects and enables us to focus on fundamental properties of the sample. We refer to this average as EU12. Second, these EU countries have similar patterns of stock market growth and economic growth over our sample period (1990-2010). In particular, the end of the dotcom did not affect their economic growth, while the financial crisis did, which is crucial for testing our hypothesis that consumers distinguish between stock market crashes with economic consequences from those without. Third, the fact that the European Commission's national Consumer Confidence Indices (CCIs) are based purely on forward-looking questions allows us to directly link stock market returns with the CCIs' changes. In contrast, two out of the five questions of the US Consumer Sentiment Index (CSI) collected by the University of Michigan's Institute for Social Research ask about the past and current situation which may reduce the informative power of the index about the future expectations of surveyed subjects. Although we step aside from this problem by focusing on the individual forward-looking questions only, the issue remains that in the US both stock market meltdowns were followed by an economic recession, suggesting that in contrast with EU12 the SM-CC relationship should not decline after the dotcom bubble ended. Although a lack of statistical significance of the dotcom bubble burst on the US market, as a stand-alone result, may not seem very informative, it is an interesting finding in the light of the SM-CC relationship observed for EU12.

To give a pre-taste of our results, we find strong support for our hypotheses. European consumers utilising the informational content of stock market returns appear to correctly distinguish between those changes in stock markets which lead to changes in economic conditions from those which do not. Also, consistent with our expectations, we do not find any (statistically significant) impact of the stock market crashes on the SM-CC relationship in the US. This is consistent with the fact that both the post-dotcom bubble decline and the

financial crisis were followed by economic slowdown. Moreover, in contrast to earlier research (e.g., Jansen and Nahuis, 2003) we also find strong evidence that stock markets shape consumer confidence at various levels. That is, using individual survey questions, we show that stock markets impact both on expectations about future economic conditions and on expectations about future household finances. Furthermore, we show that during the post-dotcom correction the impact of stock market changes on consumers' perceptions of their personal financial situation declined. This allows us to conclude (see Section 6) that consumer confidence with regard to personal finances is driven by the indirect effect (consumers think they will be personally worse off because of the impact of poor future economic conditions on their finances) whilst the direct wealth effect (personal finances are worse because of the effect of stock market decline on wealth) is comparatively weak.

Therefore, this research contributes to the literature on consumer sentiment in two ways. First, it shows that consumers' understanding of stock markets is far more sophisticated than might be expected. Consumers not only observe stock markets, but correctly interpret their information. This finding contrasts with the traditional literature on financial literacy of consumers which finds that consumers lack even basic understanding of financial concepts (e.g., Bernheim, 1995, 1998; Lusardi and Mitchell, 2006, 2007; Mandell, 2004; Moore, 2003; van Rooij et al., 2011). Second, in contrast with Jansen and Nahuis (2003) and Otoo (1999) we find that the information drawn from stock market movements helps consumers not only to infer future economy-wide conditions, but also to form their expectations about future personal finances.

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 consumer confidence and stock market data for both the EU and the US. Section 5 presents the methodology and empirical results, and Section 6 closes with conclusions.

2. Literature review

Stock markets as predictors of economic conditions

Numerous papers show that stock market fluctuations contribute to changes in economic conditions. It is well documented that changes in stock prices can affect the real

economy through the consumption channel, i.e. the traditional wealth effect (Poterba, 2000), the investment channel (Tobin, 1969) and the balance sheet channel (Bernanke et al., 1999). Boone and Girouard (2002) show significant wealth effects across OECD countries, i.e., they find that share price movements have contributed to a cumulated decline in consumption after 2000.

Because stock market fluctuations impact on future economic conditions, they are often used as a forecasting tool. However, the forecasting power of markets is not time-invariant. Stock and Watson (2003) find that asset prices are useful in forecasting future economic output for some periods more than others. In particular, using a sample of seven developed countries (Canada, France, Germany, Italy, Japan, the UK and the US) they show that the forecasting power of stock markets was higher in the period 1971-1984 than in 1985-1999. Henry et al. (2004) go one step further in explaining the stock market potential in predicting economic conditions. Using data for 27 countries worldwide over the period 1982-2001 they show that stock returns contain information that is useful for predicting economic conditions when the economy is contracting, but exhibit rather poor forecasting properties during periods of expansion.

Consumer confidence as a predictor of 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.[2] 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".[3] 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

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[2] Similarly to stock markets, consumer confidence is not just an indicator of economic conditions, but also a factor which 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.

[3] Source: Conference Board Consumer Confidence Survey Technical Note (February 2011), available at http://www.conference-board.org/pdf_free/press/TechnicalPDF_4134_1298367128.pdf

Financial Affairs) considers the survey as "an essential tool to monitor the economic situation in the Member States, the euro area and the EU".[4]

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) perform a similar analysis using UK quarterly data over 1975-1990 and show that consumption growth is predictable from consumer confidence. Moreover this result cannot be explained by the existence of imperfect capital markets. It is shown that the predictive ability of confidence indicators is consistent with forward-looking behaviour. Bram and Ludvigson (1998) also confirm the predictive power of consumer confidence indices for total personal consumption growth using two major US consumer confidence indicators, the Conference Board and the University of Michigan indices. Finally, Throop (1992) finds that movements in consumer sentiment significantly influenced expenditures on consumer durables over the period 1963-1989, 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.

Stock market–consumer confidence (SM-CC) relationship

Since both stock prices and confidence indicators lead future economic conditions, the causal relationship between both 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 (e.g., Fisher and Statman, 2003; Jansen and Nahuis, 2003; Kim and Oh, 2009; Otoo, 1999).[5] 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 (people use movements in stock prices as a leading indicator, i.e., higher stock prices may be interpreted by economic agents as a sign of favourable economic conditions in the future). Kim and Oh (2009) find that both the wealth (direct) effect and the information (indirect) effect are accountable for the SM-CC

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

[5] 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; 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).

relationship in Korea. Otoo (1999) using US data, Kremer and Westermann (2004) using European data and Hsu, Lin and Wu (2011) using a sample of 21 countries worldwide show that the relationship is more consistent with the information effect (without ruling out the direct wealth effect). Finally, Jansen and Nahuis (2003) find a significant information effect on consumer confidence but no wealth effect in a sample of 11 EU countries.

As the power of stock markets to predict future economic conditions changes over time, there is also some evidence that the contribution of the stock market to consumers' expectations about future economic conditions 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. Fisher and Statman (2003) show for instance that the sensitivity of the University of Michigan Consumer Sentiment Index to S&P500 returns decreased from 0.40 in 1978-1994 to 0.28 in 1995-2002 and decreased from 0.33 to 0.14 for NASDAQ returns.

Milani (2008) reports that the effect of stock market fluctuations on economic agents' expectations of future real activity has considerably varied over the period 1960-2007. Using US data he shows that in the 1960s-1970s, economic agents believed changes in the stock market to have a stronger effect on output than in the 1990s-2000s. According to Milani (2008), this decline in the stock market effects on the real economy may be related to the "Great Moderation". The improved monetary policy, which is one of the major drivers of the Great Moderation, may have induced agents to expect small deviations of actual output from potential output and, therefore, it may have reduced the usefulness of asset prices in forecasting the output gap.

Lopez and Durré (2003) come to a quite opposite conclusion. They show that US consumers use increasingly more information about stock market returns to form their expectations about future economic conditions. They suggest that during the 1980s economic variables such as GDP growth seemed to have been the main forces that have driven the confidence index, whereas the stock market index did not have any significant impact. However, stock market growth significantly influenced consumer confidence during the 1990s (along with expected inflation, short-term interest rates and the business cycle indicator). While their results support the idea that stock price fluctuations influence consumer confidence, these are driven by the wealth effect rather than the information effect.

3. Hypotheses statement

The existing research documents that the SM-CC relationship displays long-run trends. The long-run evolution of the relationship reflects long-term changes in macroeconomic policies and conditions (e.g., improved monetary policies), as well as long-term changes in stock market properties (e.g., a long-term increase in volatility). Jansen and Nahuis (2003) show that although stock market returns Granger cause changes in consumer confidence in a sample of 11 EU countries, this causation declines with the length of the period stock market returns are calculated over (monthly returns give weaker results than fortnightly returns). This suggests that consumers' opinions about changes in the forthcoming conditions are more likely to be affected by recent stock market events than those remote in time.

The SM-CC relationship and the informative power of stock markets

In this paper we link the changes in the strength of the SM-CC relationship to particular stock market events, and more precisely to whether stock market crashes were followed by economic slowdown or not. If consumers use stock market information correctly to forecast future economic conditions, then we would expect a positive relationship between stock market returns and changes in consumer confidence. However, this relationship should be weaker when stock market declines are not followed by economy-wide repercussions. We formally test whether this is the case using the last two big stock market crashes, the post-dotcom bubble burst and the 2007 financial crisis.

To illustrate the similarities and dissimilarities of the post-dotcom crash and the financial crisis crash, Figure 1 shows stock market indices for six European stock markets (Panel A), GDP figures for these countries (Panel B), two US stock market indices, NASDAQ100 and NYSE Composite, as well as the equally-weighted average for the 6 EU market indices (Panel C), and the US GDP and equally-weighted GDP for the 6 EU countries (Panel D) over the period January 1990–December 2010.[6] All the stock market indices are monthly and normalised to 100 in January 1990, All the GDP statistics are quarterly, seasonally adjusted and normalised to 100 in 1990 Q1 for ease of comparison.

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[6] These six countries (out of 12 EU countries studied in the paper) were selected for Figure 1 because their GDP statistics shown in Panel B were available from January 1990 (Source: OECD Statistics). The equally-weighted average stock market index of the 6 EU countries is correlated at 97% with the EU12 equally-weighted average index used in the regression analysis.

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

The European stock market indices display similar patterns, they experienced a sharp decline after the dotcom bubble ended and when the credit crunch hit the markets (Panel A). Even though the declines of the stock markets after the dotcom bubble and during the financial crisis were similar, 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 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 B). Turning to the US, its stock markets show a similar pattern to the one observed for EU countries (Panel C), however, in contrast to the EU sample, the US economy experienced downturns following both stock market meltdowns, i.e., it contracted in 2001 and 2007 (Panel D).[8]

In the light of this, if consumers do not discriminate in terms of the implications of stock market changes for future economic conditions, then both stock market meltdowns should be expected to have a similar impact on consumer confidence. However, if consumers discriminate in terms of the implications that stock market changes have for future economic conditions, then we would expect to observe changes in the SM-CC relationship for EU12 but not for the US. More precisely, we would expect that for EU12 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).

In the US, on the other hand, an economic recession occurred in 2001 and in 2007. Although the magnitude of the economic slowdown was much higher during the financial crisis than during the post-dotcom crash, the outlooks for the US economy in 2000 were pretty bleak. Federal Reserve Chairman Alan Greenspan has said repeatedly in 2000 that the

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[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] Following NBER business cycle dates, the contraction of the US economy started in 2001Q1 and ended in 2002Q1.

last firewall between the US economy and a recession was consumer confidence.[9] In January 2001, US confidence dropped. The CSI 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. Therefore, although the magnitude of the economic turbulences was different, it may be expected that the SM-CC relationship would be similar during these events. That is, in the US there may not be any significant difference in the SM-CC relationship between the post-dotcom correction and the financial crisis.

Household financial situation: direct or indirect effect?

So far we have used the term 'consumer confidence' as a generic term. In practice, the consumer confidence index is a mix of confidence about economic conditions and confidence about household finances. Naturally, 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. This is because a decline in stock markets may have a direct and indirect impact on the perceptions of household financial position. The decline in share prices has a direct negative effect on household finances to the extent households hold shares. However, there will also be 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, etc. However, if the decline in stock markets is not perceived to be informative about a 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.

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

Therefore, we can expect that the direct wealth effect of stock markets may be relatively small. If for EU12 we observe that during the post-dotcom stock market correction the informative power of stock markets on the perceptions of household finances was lower, then we can conclude that the indirect effect exists. Using the US data, we cannot separate the direct effect from the indirect effect because the two crashes were followed by economic turbulences, i.e., the direct and the indirect effects can be expected to work in the same direction during both stock market declines.

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 give confidence that their movement is 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.[10] For each country we collected monthly consumer confidence data and daily stock market indices over the period January 1990–December 2010.[11] The characteristics of consumer confidence and stock market data are described below.

4.1. EU12 sample

For all EU countries we use Consumer Confidence Indices (CCIs) of the European Commission. National CCIs are calculated using information collected from surveys that ask the same questions across all EU countries. That is, the surveys ask how respondents foresee

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[10] We initially considered the US, Canada, Japan, developed countries of the EU and Australia. Unfortunately, Canadian consumer confidence data are available on a monthly basis only from 2002; the methodology of Japanese data changed in April 2004 and the Japanese consumer confidence index does not contain any questions about general economic conditions. Moreover the dotcom crash affected neither the Australian economy nor its stock market leaving no data for comparison with the financial crisis period. Finally, from the group of developed EU countries only 12 satisfied our data requirements. The rejected EU countries either had too short sample periods (e.g., Luxemburg joined the survey in 2002), or changed significantly the methodology during the period of interest (e.g., Portugal changed the methodology of data collection in September 1997), or stopped collecting data all together (e.g., Irish data are available till April 2008 only).

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

general economy-wide conditions and their household financial situation over the next 12 months. Responses are collected during the first 10 working days of each month. In some countries participation in the survey is compulsory while in others is optional.[12] In Germany, Italy and Sweden consumer surveys are carried out by so-called quota sampling, i.e., respondents (consumers) are searched until a certain, predetermined, quota of respondents is reached. However, as there is no reason to believe that these differences in the data collection procedures result in systematically shorter collection periods in some countries, the 10 working days (i.e., first 2 weeks of a month) are taken as the period of consumer survey data collection for all months and all countries.

All national surveys ask the same following questions: *(Q_i)* over the next 12 months, how likely is it that you save any money? *(Q_{ii})* how do you expect the financial position of your household to change over the next 12 months? *(Q_{iii})* how do you expect the general economic situation in this country to develop over the next 12 months? And *(Q_{iv})* how do you expect the number of people unemployed in this country to change over the next 12 months? Each question can be answered in six ways: get a lot better (PP), get a little better (P), stay the same (S), get a little worse (M), get a lot worse (MM), and finally "I don't know" (N). For each of the four questions, a balance $B = (PP + \frac{1}{2}P) - (\frac{1}{2}M + MM)$ is calculated, where PP, P, M and MM represent the percentage proportion of answers in each category. These balances are averaged to calculate the country composite CCI:

$$CCI = (B_i + B_{ii} + B_{iii} - B_{iv}) / 4.$$

Figure 2 shows the EU12 average CCI mean-adjusted balance. Although it can be misleading to directly interpret the magnitude of the index, it is clear that the post-dotcom bubble period was perceived differently than the financial crisis period. The decline of the EU12 CCI from 2000 onwards was gradual and clearly distinguished in magnitude from the decline of the CCI during the period 2007-2009.[13]

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

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[12] Participation is compulsory in France, Italy, Luxembourg, the Netherlands and Spain.
[13] From this graph, the period 1990-1994 appears as a period of general pessimism among consumers. We control for this period of over-pessimism by replicating our analysis with *(i)* a shorter sample period (starting in January 1995) and *(ii)* a dummy variable for the period Jan-90 to Dec-94. Findings are virtually identical to the ones presented in the paper.

For each EU12 country, along with the CCI data, we collected daily observations of one of its main stock market indices.[14] The choice of the stock market indices was somewhat arbitrary, but since the correlation of indices within a country was always very high (e.g., the correlation of returns of FTSE 100 and FTSE All Share Index was about 0.98), the particular choice does not impact on our results. The average return for EU12 stock markets is calculated as an equally-weighted average of monthly percentage returns of the 12 stock indices.

The first difference of the average CCIs (ΔCCI) and the percentage change of the average stock market index are used in our analysis.[15] Augmented Dickey-Fuller and Phillips-Perron tests show that the (monthly) average stock market index and the average CCI are I(1) processes.[16]

4.2. US sample

The US Consumer Sentiment Index (CSI) is published by the University of Michigan's Institute for Social Research[17] 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, or 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

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[14] Austria (ATX), Belgium (BEL20), Denmark (OMX Copenhagen 20), Finland (OMX Helsinki 25), France (CAC40), Germany (DAX30), Greece (ATHEX Composite), Italy (FTSE MIB), the Netherlands (AEX), Spain (IBEX35), Sweden (OMX Stockholm 30) and the UK (FTSE 100).

[15] The consumer confidence indices are expressed in percentages, so a simple difference of them is taken. To be consistent percentage returns of stock markets are used in the rest of the paper. The results for log returns are virtually identical to the percentage ones, so for the sake of space they are not reported, however they can be obtained from the authors on request.

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

[17] We use the Michigan's CSI not the Consumer Climate Survey published by the Conference Board because in spite of the former's differences with the European CCI, the Michigan's CSI contains individual questions which have greater similarity to the European CCI's questions than the Conference Board index's questions. The Conference Board index is based on five questions which ask the respondents to assess current and future conditions, however 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, i.e., there is no possibility to answer 'I do not know'.

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? And *(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 is not the only difference with the EU CCIs. The CSI monthly surveys are collected over the entire month (not 10 working days as the EU counterpart) and aggregated in a different way. First, there are only four possible answers to each of the five questions: get better (P), stay the same (S), get worse (M), and "I don't know" (N). Second, for each individual question *i* a relative score (X_i) is calculated as the percentage of favourable responses minus the percentage of unfavourable responses, plus 100, i.e., for each of the five questions $X_i = P-M+100$ where P and M refer to the percentage of respondents choosing 'get better' and 'get worse' respectively. In this way the index for each question is always positive because in any state of the world there cannot be more than 100% people responding negatively to each question. The scores are rounded to the nearest whole number. The CSI is calculated as a linear transformation of the sum of the individual question relative scores:

$$CSI = 2 + \frac{1}{6.7558} \sum_{i=1}^{5} X_i \ ,$$

where 6.7558 is the 1966 base period total, and the constant, 2, is added to correct for the sample design changes from the 1950s. Although the CSI and the EU12 CCI are not directly comparable, they are not miles apart as the first impression might suggest. Indeed, the CSI can be seen as a linear transformation of the EU12 CCI.[18] As such first differences of the CSI (ΔCSI) will be equivalent to first differences of the CCI (times 5/6.7558) subject to differences in the nature of questions and possible answers.

Figure 3 shows the CSI mean-adjusted balance (recalculated from the index formula). There is some similarity between the CSI and the CCI shown in Figure 2, i.e., the periods of optimism and pessimism are similar, although not identical. The biggest difference is in the

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[18] Note that $CSI = 2 + 500/6.7558 + 5/6.7558 \left(\sum_{i=1}^{5} (P_i - M_i)/5 \right)$ and therefore can be seen as a linear transformation of the equivalent CCI.

period between both stock market crashes (over 2003-2007). While the EU12 consumer confidence was quite high, the US consumer sentiment was relatively low and quite volatile.

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

The choice of the US stock market indices was less straightforward than for the EU countries. The US is not the only country with several stock markets, but it 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 an index from NASDAQ; we thus use the NASDAQ100 Index. In addition, to balance the analysis we use the NYSE Composite Index which covers stocks listed on the New York Stock Exchange.[19]

As with the EU sample, the Augmented Dickey-Fuller and Phillips-Perron tests show that the monthly average stock market indices and the CSI are I(1) processes.

5. Empirical results

5.1. EU12 sample

Stock market–consumer confidence (SM-CC) relationship

Although it is already well documented that stock returns Granger cause consumer confidence (and not the other way round) we start the analysis by formally testing for Granger causality between stock market returns and ΔCCI by using the following equation specification:[20]

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

$$(1)$$

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[19] Alternatively, we could use just one index based on the two stock markets. We replicated the whole analysis on S&P500 returns, as well as using the equally-weighted average of NYSE Composite and NASDAQ100 returns. All the results remained unchanged and are not presented in the paper; they can be obtained from the authors on request.
[20] Schwarz criterion identifies that one-month lag is optimal.

where ΔCCI_t is the EU12 change in consumer confidence (first difference) between month t and month t-1. The calculation of R_t requires a word of explanation. Although the EU12 CCI is based on responses collected over the first 10 working days of a corresponding month, it summarises consumers' expectations of the next 12 months using the information (current and past) available at the time of filling in the survey. Therefore, if we wish to test whether stock markets impact on the creation of consumers' perceptions of the next 12 months, recent prior information on how stock markets have performed in addition to information about returns earned on the day one fills in the survey is likely to be relevant. There is no theory or prior evidence specifying how far back the memory of consumers goes when it comes to shaping their expectations about the next 12 months; however it is common in the literature to restrict the period of stock market returns to a month. This also seems justified because consumer surveys are collected on a monthly basis and taking into account stock market returns for periods longer than a month could potentially create overlaps with past survey collections and cause identification problems. For the Granger-causality test, we use mid-month returns, R_t, calculated over the two weeks of the CCI_t collection period plus the preceding two weeks, i.e., the two weeks of month t-1 after the collection of the CCI_{t-1} ended (see Figure 4).

*********************** insert Figure 4 here ***********************

Results are presented in Table 1 Panel A. The correlation between ΔCCI_t and R_t is 0.261 and is statistically significant at the 1% level. The Granger-causality test shows that changes in consumer confidence are caused by stock market returns (1% statistical significance). There is also some evidence that the causality goes in the opposite direction, but the significance of this relationship is weak (10% level).

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

Having established that causality runs from market returns to ΔCCI, we test whether stock markets impact on ΔCCI during the dotcom bubble burst. However, the stock market returns used in the regressions of Granger-causality tests (mid-month R_{t-1}) are quite distant

from the period of survey collection t. To allow for more recent stock market information to be incorporated in consumers' perceptions we calculate returns for periods closer to the survey collection period. First we shift returns used for the Granger-causality tests forward by two weeks, i.e., we use month t-1 returns (we refer to these returns as 'previous month returns'), and then we shift them by two more weeks forward, i.e., we use mid-month returns. Figure 5 illustrates how the previous month returns and mid-month returns are calculated relative to the periods of survey collection.[21] We can expect that the more recent stock market returns are used, the higher sensitivity of the ΔCCI will be obtained. This is exactly the case.

*********************** insert Figure 5 here ***********************

Figure 6 shows the smoothed Kalman Filter estimates of the γ coefficient for the regression:

$$\Delta CCI_t = \alpha_t + \beta_t \Delta CCI_{t-1} + \gamma_t R_t + \varepsilon_t$$

where R_t refers to previous month (Panel A) or mid-month returns (Panel B). It is clear that the impact of stock market returns on the changes in consumer confidence varies over time and that in the period mid 2000–beginning of 2002 it was lowest. In Panel B, the γ coefficient decreased from 0.17 in 1990 (significantly positive) to about 0.05 in the second half of 2000 (and becomes statistically insignificantly different from zero). It increases again from 2003 onwards.

*********************** insert Figure 6 here ***********************

To formally test whether stock markets impact on consumer confidence differently during the stock market correction which ended the dotcom bubble we use two VAR regression specifications:

$$\Delta CCI_t = \alpha + \alpha_{DC} DC + \beta \Delta CCI_{t-1} + \gamma R_t + \gamma_{DC} DC \times R_t + \varepsilon_t, \tag{2}$$

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[21] Note that previous month returns are formally not suitable for testing Granger causality.

and

$$\Delta CCI_t = \alpha + \alpha_{DC}DC + \alpha_{FC}FC + \beta\Delta CCI_{t-1} + \gamma R_t + \gamma_{DC}DC \times R_t + \gamma_{FC}FC \times R_t + \varepsilon_t, \qquad (3)$$

where *DC* and *FC* refer to the post-dotcom bubble crash dummy and the financial crisis dummy respectively, and *R* denotes either previous month or mid-month returns.[22] Because there are no universal and strictly defined periods for when the post-dotcom crash and the financial crisis occurred, we use a range of specifications for the dummy variables. We use the following combinations of the definitions of the *DC* and *FC* dummies: (i) *DC* is equal to one between March 2000 and September 2002 (zero otherwise), and *FC* is equal to one between November 2007 and February 2009 (zero otherwise); (ii) *DC* is equal to one between July 2000 and September 2002 (zero otherwise), and *FC* as equal to one between September 2007 and March 2010 (zero otherwise); and finally (iii) *DC* is equal to one between April 2000 and October 2002 (zero otherwise), and *FC* as equal to one between July 2007 and December 2010 (zero otherwise). The first set of periods is defined by the timing of the peak and the bottom of the EU12 average stock market index. The second set is defined as the average timing of each EU12 stock market decline, i.e., we look at the earliest and the latest month of the start/finish and take the middle month. The third set is determined by the official, international, dates of the beginning of the dotcom crash and the beginning of the credit crunch which evolved into the financial crisis. October 2002 is chosen as the end of the dotcom bubble burst because it was the lowest month of NASDAQ[23], and the financial crisis ends with the end of the sample as stock markets were still under turmoil through the late 2009 and all 2010. For instance, 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%).

Specification (2) uses only the *DC* dummy. If our hypothesis is true, then estimates of the γ coefficient should be positive and the estimates of the γ_{DC} coefficient should be negative. Both should be statistically significantly different from zero. Table 2 shows that

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[22] Because both periods of interest are too short for meaningful testing of Granger causality on sub-periods we use a regression specification with dummies.

[23] October 2002 is also used in other research papers, e.g., Aharon et al. (2010)

this is the case indeed. All γs are positive and statistically different from zero. Moreover, all γ_{DC} are negative and statistically significantly different from zero at the 1% level when mid-month returns are used. Mid-month return specifications also have higher R^2 suggesting that taking into account stock market returns over the period of the survey collection is important. This result is fully consistent with our expectations and the Kalman Filter regression estimates presented in Figure 6.

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

Specification (3) has dummies for both stock market meltdowns. It tests whether the SM-CC relationship changed during the post-dotcom crash (via γ_{DC}) and whether there was a statistically significant change in the relationship during the two crashes (γ_{DC} is statistically significantly lower than γ_{FC}). Table 3 shows the results and confirms the findings of the Kalman Filter regressions (Figure 6) and of Table 2. As previously all the estimates of the γ coefficient are positive and statistically different from zero at the 1% level. Again, the results obtained for the mid-month returns are stronger. They show not only that γ, γ_{DC} and γ_{FC} are statistically different from zero, but that γ_{DC} and γ_{FC} are statistically significantly different from each other (see the last column with Z-tests). This means that the sensitivity of ΔCCI to stock market returns was statistically lower during the post-dotcom bubble burst than it was during the financial crisis. Moreover, because the γ_{DC} coefficient offsets the γ coefficient for each dummy specification, we can conclude that during the post-dotcom bubble period the impact of stock market returns on consumer confidence was statistically indifferent from zero. This confirms the earlier effect observed for the Kalman Filter regressions. The positive sign of the γ_{FC} coefficients suggests that the SM-CC relationship increased during the financial crisis, i.e., people paid more attention to stock market fluctuations during the financial crisis than before.

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

Following from the fact that the specifications using mid-month returns provide the best fit in both the significance of the coefficients and the magnitude of R^2, in the remaining

analysis of the EU sample only the results for the mid-month returns will be used. Moreover, since our results are robust to the different specifications of *DC* and *FC* dummy variables, only the results for the first specification will be presented in order to focus our attention and save space, i.e., *DC* equal to one between March 2000 and September 2002 and *FC* equal to one between November 2007 and February 2009.[24]

Household finances and economic conditions

The above results show that European consumers do not appear to react blindly to stock market fluctuations, but seem to be selective by taking into account the potential significance of stock markets' movements for future economy-wide conditions. As described earlier the CCI is based on four questions of which two are concerned with the future personal situation of respondents, and two refer to their perception of future economic conditions. Jansen and Nahuis (2003), using a similar sample to ours, show that the SM-CC relationship is driven by the information effect (i.e., stock market movements as a leading indicator of future economic conditions) rather than by, what they call, the wealth effect (i.e., stock market movements as a direct measure of the household financial situation). Indeed they find on average (across their sample of 11 EU countries) a stronger Granger-causality link (more statistically significant) from stock markets to expectations about the general outlook or employment conditions than expectations about the household itself. In particular, they show that the perceived ability to save (Q_i) is not significantly affected by stock market developments (the only exception being Spain at the 10% statistical significance level).

So which part of the confidence index drives our results? Obviously, we should expect that the results presented so far hold for the individual questions which directly ask about the future economic conditions (i.e., questions Q_{iii} and Q_{iv}). However, are the predictions of the household financial situation responding in the same way or not? As described in Section 3, there are two possibilities, direct or indirect effects. The direct effect implies that consumers respond to stock market declines/increases in the same way regardless whether these changes are likely or not to result in economic contraction/expansion. The indirect effect is more subtle; as economies contract/expand they offer worse/better earning opportunities to consumers, hence only these stock market declines/increases which lead changes in

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[24] The other specifications give virtually identical results. They can be obtained from the authors on request.

economic conditions will impact on changes in consumers' expectations about future household finances. Which effect, direct or indirect, is stronger will depend on the proportion of household finances that directly and indirectly depends on stock markets. If for Q_i and Q_{ii} we observe that during the post-dotcom stock market correction the informative power of stock markets was lower than during the financial crisis, then we would be able to conclude that the indirect effect exists and that the direct effect was relatively small in comparison with the indirect effect. However, if we do not observe any differences in the relationship between stock market returns and ΔCCI, then we cannot conclude whether the indirect effect exists or not.

Table 1 Panel B decomposes the contemporaneous correlations between stock market returns and ΔCCI into those of the household financial situation questions and of the economic situation questions. Although the correlation coefficients are statistically significant at every level of disaggregation, the causality is not. The Granger-causality tests show that there is a stronger causality between stock markets and the economic conditions questions than with the household finances questions. Indeed, the hypothesis of causality is rejected for Q_i, consistently with Jansen and Nahuis (2003).

Tables 4 and 5 show the results of the regression specifications (2) and (3) for each individual question, as well as for the average of the two household finances questions and the average of the two economic conditions questions. It is clear that stock market returns contribute to the change in expectations both at the household and at the global economy level (γ is statistically different from zero at the 1% level and positive for every regression specification). However, there are some differences at the individual question level when it comes to the impact of the post-dotcom bubble period and of the financial crisis.

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

The perception of the economic situation (average of Q_{iii} and $-Q_{iv}$) and of the household finances (average of Q_i and Q_{ii}) are consistent with our hypothesis that the decline of stock markets during the post-dotcom bubble reduced the SM-CC relationship. Whether we use the DC dummy only (Table 4) or both the DC and FC dummies (Table 5) all the γ_{DC} coefficients are negative and all but one are statistically significantly different from zero at

the 1% and 5% levels. Moreover, in Table 5 the *DC* and *FC* dummies are statistically significantly different from each other at the 1% level (Z-tests are 2.19 and 2.88 for the household finances average and the economic situation average respectively). It is interesting that the *FC* dummy is also statistically significantly different from zero at the 1% level for the average of the economic conditions questions. This indicates that the SM-CC relationship has not only declined during the post-dotcom crash, but has also strengthened during the financial crisis. This stronger relationship is driven by expectations of increase in unemployment (Q_{iv}) rather than expectations about the general country economic conditions (Q_{iii}).

<p align="center">*************************** insert Table 5 here ***************************</p>

The results obtained for the questions about perceptions of personal finances are particularly interesting. Although for the question about the ability to save (Q_i) no Granger causality was detected, for completeness of the analysis we still estimated its sensitivity to the two stock market crashes. Even though the regression results are weakest for this individual question, they still show that the γ_{DC} coefficient is negative and significantly different from zero at the 10% level (for both regression specifications). Moreover, γ_{DC} is statistically lower than γ_{FC} at the 10% level. A much stronger result is obtained for the question about household financial situation (Q_{ii}). Here, γ_{DC} coefficients are always negative and statistically significant at the 1% level, and γ_{DC} is statistically different from γ_{FC} at the 1% level. These results support the indirect effect of stock markets and contradict Jansen and Nahuis' (2003) conclusion that stock markets do not shape consumers' expectations about their household finances.

Overall, the results for our EU12 sample clearly document that not only the post-dotcom crash reduced the SM-CC relationship but that the impact of stock market returns on consumers' perceptions of their household financial situation declined.

5.2. US sample

As previously we start the analysis from testing for Granger causality. Because the CSI is collected over a month, stock market returns used here are calculated over a corresponding calendar month. The results of the Granger-causality test for the CSI, the household finance question (Q_{ii}) and the economic conditions question (Q_{iii}) are shown in Table 6. Similarly to the EU12 results, contemporaneous correlations are positive and significant, and Granger causality runs from stock markets to consumer confidence.

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

In the case of EU12 we used several specifications of time dummies to control for the post-dotcom correction and the financial crisis to deal with the fact that individual countries' stock market decline periods differed. In the case of the US we do not have this problem. The declines in the US stock markets occurred at the same time, therefore we define the post-dotcom dummy, *DC*, as being equal to one between September 2000 and September 2002 (zero otherwise) and the financial crisis dummy, *FC*, as being equal to one between November 2007 and February 2009 (and zero otherwise).[25]

To stay consistent with the definitions of returns used in the EU12 regressions, we also calculated previous calendar month returns and mid-month returns. However, since the surveys are collected over an entire month, the mid-month returns do not cover the whole period of the survey collection. Using same month returns deals with this issue, however such returns do not take into account stock market fluctuations before the surveys open on the first day of each calendar month (i.e., those subjects who are surveyed in the first days of each month do not have any stock market information to base their judgment on). In contrast, the EU12 mid-month returns are based on the returns over the period of the survey collection plus the two preceding weeks. Consistently, we defined six-week returns, i.e., returns for the month of the survey collection plus the two weeks before the survey collection for a given month. The rest of the analysis is based on previous month, mid-month and six-week returns.

Table 7 shows that American consumers take into account stock market returns while forming their opinions. Every γ coefficient is statistically significant at the 1% or 5% level.

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[25] We have also used the EU12 dummies, but because the results were virtually unaffected, we present the results for the US own dummies only.

However, the explanatory power of the CSI regressions and of the economic expectations regressions is at most half of that obtained for EU12. Indeed, only the regressions for the household finances question have an explanatory power similar to, or even higher than, the EU12 regressions for the same question.

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

Consistently across all the specifications of returns and dependent variables, the coefficients estimated for the NYSE Composite Index are about twice as large as those for the NASDAQ 100 Index. However, as the average monthly return of NASDAQ 100 is higher than the average monthly return of NYSE Composite (0.99% and 0.66% respectively), the marginal impact of the two indices returns on the changes in consumer confidence are comparable.

The results obtained for the CSI show no time pattern, no γ_{DC} and no γ_{FC} are statistically significantly different from zero and, more importantly, they are not different from each other (the Z-tests are insignificant). This is consistent with the notion that both stock market declines were associated with economic turbulences.[26]

Also consistently with our expectations the γ coefficients estimated for the economic situation question are much higher than those for the CSI. This is because the CSI is a mix of expectations about the future and the assessment of past and current situations, which dilutes the stock market forecasting ability. The higher coefficients obtained for the economic situation question show that the contribution of the stock markets to the creation of perceptions of future economic conditions is stronger than the CSI would suggest.

The household finances regressions are the only ones with statistically significant coefficients. The estimates of γ_{FC} for NASDAQ100 using mid-month returns and six-week returns are statistically significantly different from zero at the 10% and 5% significance levels respectively. The coefficients have a negative sign which means that consumers paid less attention to the performance of NASDAQ during the financial crisis than otherwise. However, the Z-test shows no statistically significant difference between γ_{DC} and γ_{FC}.

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[26] We also run a Kalman Filter regression (allowing for time-varying coefficients) for the US sample. The smoothed estimate for γ coefficient does not show any time pattern.

Because these are the only two out of 18 specifications which show some weak statistical significance, we cannot draw any conclusion from them.[27]

6. Conclusions

In this paper, we investigate the time-variation in the stock market-consumer confidence (SM-CC) relationship for Europe and the US. Recent literature argues that changes in stock prices Granger cause changes in confidence (Fisher and Statman, 2003; Jansen and Nahuis, 2003; Kim and Oh, 2009; Otoo, 1999) and that this relationship is due to the fact that consumers use stock market movements as a leading indicator of future economic conditions (Hsu et al., 2011; Jansen and Nahuis, 2003; Kremer and Westermann, 2004; Otoo, 1999). However there is no evidence on how consumers take into account the informative power of stock returns for future economic conditions. If consumers use stock market information correctly to forecast future economic conditions, we should observe changes in the SM-CC relationship depending on whether stock market returns carry implications for the whole economy or not. We formally test this hypothesis in the context of the last two big stock market declines: the post-dotcom bubble burst and the 2007 financial crisis. Both events had a similar impact on international stock markets but different economy-wide consequences. In Europe, stock market indices experienced a sharp decline after both the dotcom bubble and the credit crunch, but only the 2007 market crash was followed by a broad economic downturn. In the US, the stock markets dropped on both occasions and the American economy turned into recession after both stock market meltdowns.

We find that consumers discriminate in terms of the implications that stock market changes have for future economic conditions. Our results show that consumers correctly take into account the informational content of stock market returns, distinguishing between those changes in stock markets which may lead changes in broad economic conditions and those

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[27] As explained in footnote 17, the Conference Board index is not used in the paper. However, we have repeated the analysis on it and on its sub-index which is based on three questions asking about expectations about job availability, business conditions in the area and personal financial conditions in the next six months. The results were virtually identical to those obtained for the CSI, i.e., (i) strong Granger causality was detected from the stock markets to the confidence indices, but not the other way round, (ii) all γ coefficients were statistically significant at the 1% level, (iii) neither γ_{DC} nor γ_{FC} were statistically significant and (iv) the γ_{DC} and γ_{FC} were statistically significantly indifferent from each other. These results can be obtained from the authors on request.

which do not. Consistent with our hypothesis, we find that in Europe the SM-CC relationship decreased when the dotcom bubble ended. In contrast, in the US, the SM-CC relationship remained unaffected as consumers correctly forecast economic downturns in both cases.

Using individual questions of the European and American surveys we tested whether the results hold both for consumers' expectations about their household financial situation and expectations about general economic conditions. Studying individual questions allows us to test whether a decline in stock markets had an indirect impact on the perceptions of household financial position. The direct effect, i.e., when the decline in share prices has a direct negative impact on household finances to the extent they hold shares, implies that consumers respond to stock market movements in the same way regardless of their informational content. The indirect effect arises when the decline in stock prices is informative about future adverse economic conditions which in turn affect households' expectations about, for instance, their employment prospects. Our results show that the indirect impact of stock markets on the perceptions about future personal finances was strong in European countries. During the post-dotcom stock market correction the sensitivity of changes in expectations about future household finances to stock market returns declined.

To summarize, our paper suggests that consumers not only react to stock market movements, but they also react to the change in stock market informativeness about future economic conditions. That is, consumers display a degree of sophistication when interpreting changes in stock market returns despite their documented 'financial illiteracy'. Moreover, we argue that the interpretation of the distinction between household-finance and economy-wide survey questions made in the previous literature in order to gauge the relative importance between the wealth effect and the information effect in consumer confidence is spurious, as we show that consumers also exhibit a strong information effect in their expectations about their household's finances, i.e. they take into account the informative power of stock prices for future economic conditions that will potentially impact their personal financial situation.

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Figure 1. Monthly stock market indices and quarterly GDP over the period 1990-2010. Panel A shows the stock market indices (Jan1990=100) for six EU countries. Panel B shows quarterly, seasonally adjusted GDP (1990Q1=100) for the same six EU countries. Panel C shows the NYSE Composite and NASDAQ100 indices for the US and the equally-weighted average of the stock market index for the six EU countries (Jan1990=100). Panel D shows quarterly, seasonally adjusted GDP (1990Q1=100) for the US and equally-weighted average GDP for the six EU countries. Source: DataStream, OECD.

Panel A.
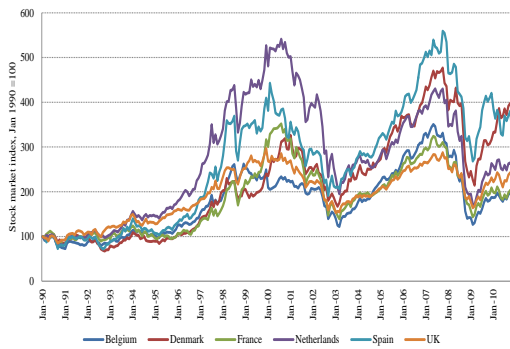
Panel B.
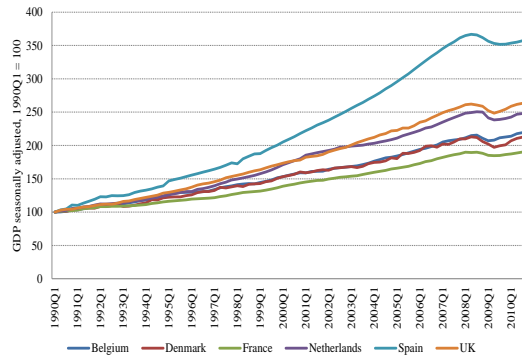
Panel C.
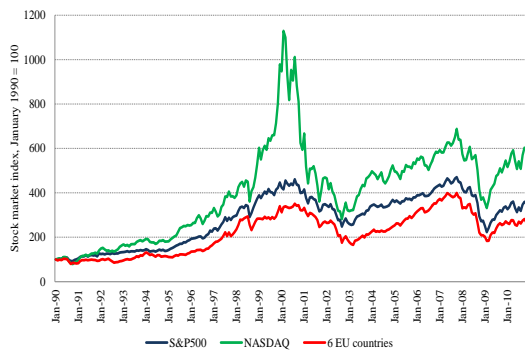
Panel D.
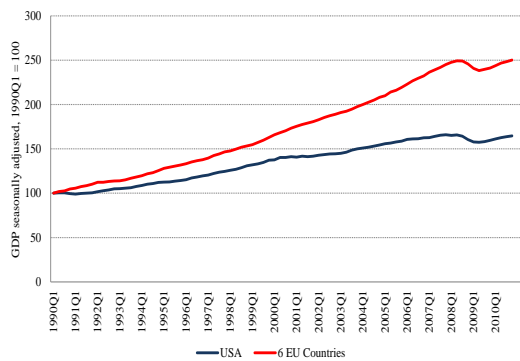
Figure 2. Average CCI mean-adjusted balance for the EU12 sample for the period 1990-2010.
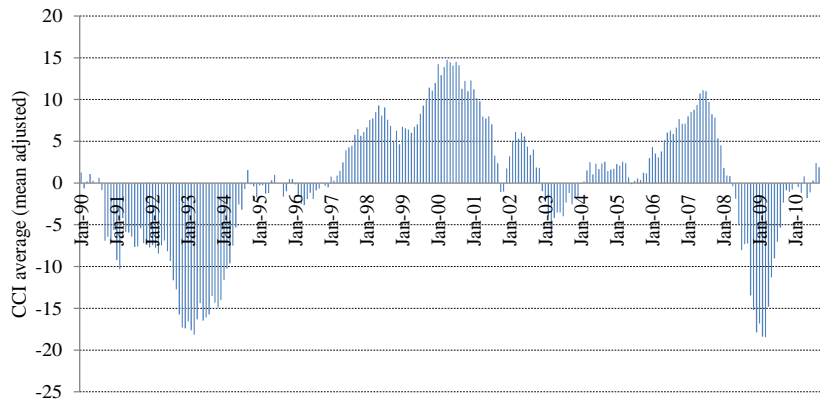
Figure 3. US CSI mean-adjusted balance for the period 1990-2010.
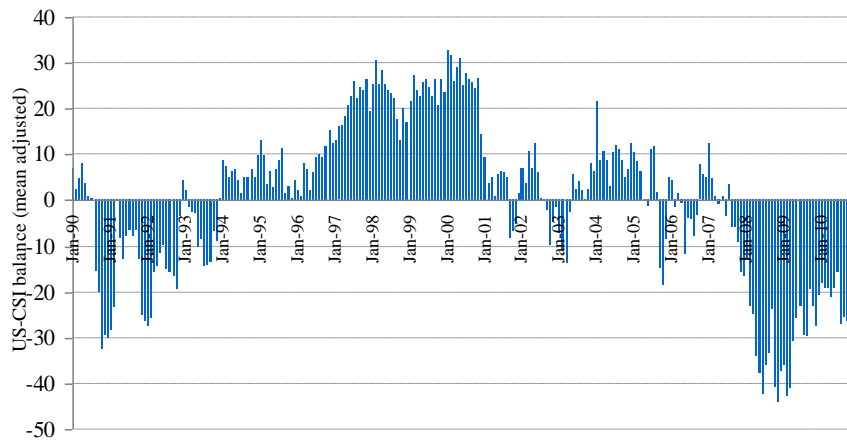
Figure 4. Definition of the returns used for Granger-causality tests for the EU12 sample.
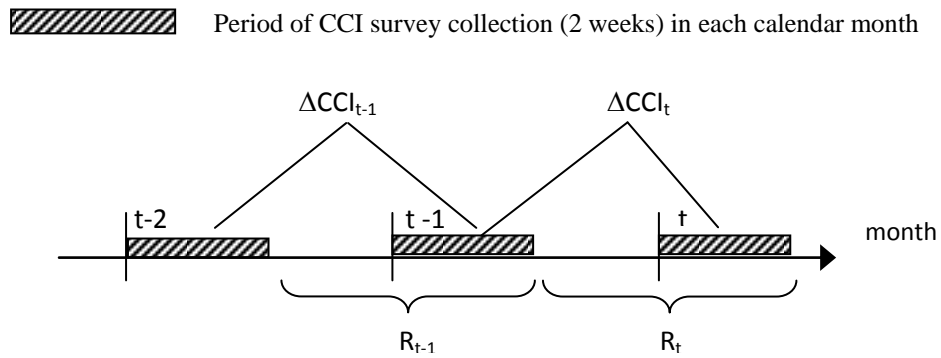
Figure 5. Definition of regression returns for the EU12 sample.
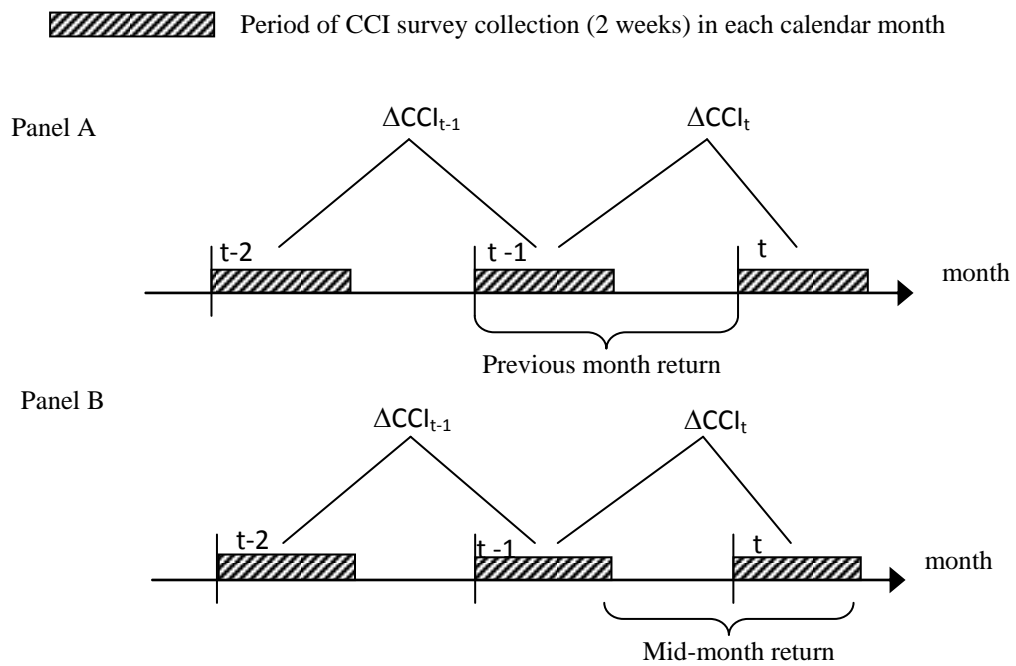
Figure 6. Kalman Filter estimate of γ coefficient (and 95% confidence intervals) with EU12 CCI as dependent variable

Panel A: Previous month return
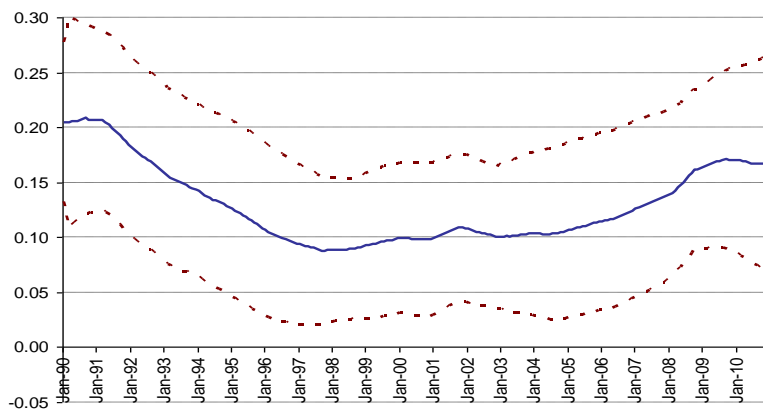
Panel B: Mid-month return
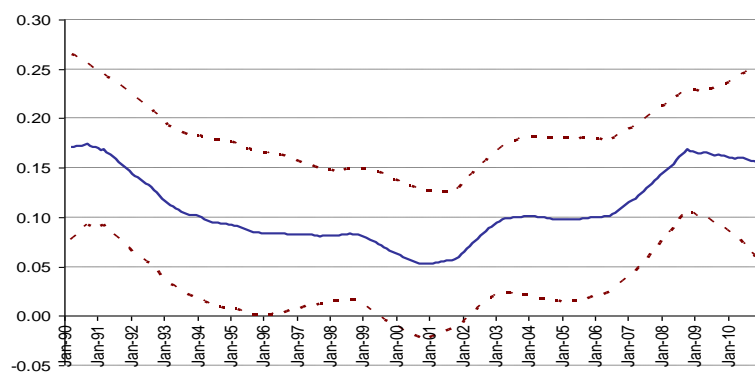
Table 1. Contemporaneous correlations and results of the Granger-causality test for the EU12 CCI (Panel A) and individual component questions (Panel B) over the period 1990-2010.

|	Correlations		Granger-causality test (P-values)	
	Coeff	P-value	$R \rightarrow \Delta CCI$	$\Delta CCI \rightarrow R$
Panel A				
CCI: $0.25(Q_i+Q_{ii}+Q_{iii}-Q_{iv})$	0.261	0.000	0.001	0.070
Panel B				
Household finances average: $0.5(Q_i+Q_{ii})$	0.237	0.000	0.058	0.535
of which:				
Q_i: Over the next 12 months, how likely is it that you save any money?	0.198	0.002	0.430	0.784
Q_{ii}: How do you expect the financial position of your household to change over the next 12 months?	0.240	0.000	0.016	0.104
Economic situation average: $0.5(Q_{iii}-Q_{iv})$	0.443	0.000	0.000	0.033
of which:				
Q_{iii}: How do you expect the general economic situation in this country to develop over the next 12 months?	0.388	0.000	0.015	0.141
Q_{iv}: How do you expect the number of people unemployed in this country to change over the next 12 months?	-0.376	0.000	0.001	0.087

Table 2. Results of the regression $\Delta CCI_t = \alpha + \alpha_{DC} DC + \beta \Delta CCI_{t-1} + \gamma R_t + \gamma_{DC} DC \times R_t + \varepsilon_t$ for EU12 for the period 1990-2010. Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

Returns	α	α_{DC}	β	γ	γ_{DC}	R^2
				Regression estimates		
			DC = March 2000 to September 2002			
Previous month	-0.001	0.000	0.044	0.129***	-0.021	0.207
	(0.001)	(0.003)	(0.060)	(0.019)	(0.055)	
Mid-month	-0.001	-0.002	0.124**	0.137***	-0.159 ***	0.242
	(0.001)	(0.003)	(0.056)	(0.017)	(0.050)	
			DC = July 2000 to September 2002			
Previous month	-0.001	-0.001	0.044	0.129***	-0.025	0.208
	(0.001)	(0.003)	(0.059)	(0.018)	(0.059)	
Mid-month	-0.001	-0.003	0.125**	0.135***	-0.163***	0.241
	(0.001)	(0.003)	(0.057)	(0.017)	(0.052)	
			DC = April 2000 to October 2002			
Previous month	-0.001	-0.001	0.044	0.129***	-0.012	0.207
	(0.001)	(0.003)	(0.060)	(0.019)	(0.052)	
Mid-month	-0.001	-0.003	0.119**	0.135***	-0.141***	0.237
	(0.001)	(0.003)	(0.056)	(0.017)	(0.049)	

Table 3. Results of the regression $\Delta CCI_t = \alpha + \alpha_{DC} DC + \alpha_{FC} FC + \beta \Delta CCI_{t-1} + \gamma R_t + \gamma_{DC} DC \times R_t + \gamma_{FC} FC \times R_t + \varepsilon_t$ for EU12 for the period 1990-2010, and Z tests of equality between γ_{DC} and γ_{FC}. Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

Returns	Regression estimates								Z test (t-values)
	α	α_{DC}	α_{FC}	β	γ	γ_{DC}	γ_{FC}	R^2	
DC = March 2000 to September 2002 and *FC* = November 2007 to February 2009									
Previous month	-0.001	-0.001	0.000	0.015	0.114***	-0.004	0.073*	0.217	1.06
	(0.001)	(0.003)	(0.003)	(0.062)	(0.021)	(0.056)	(0.043)		
Mid-month	-0.001	-0.002	0.001	0.093	0.114***	-0.135***	0.092**	0.259	2.99
	(0.001)	(0.003)	(0.003)	(0.058)	(0.020)	(0.051)	(0.039)		
DC = July 2000 to September 2002 and *FC* = September 2007 to March 2009									
Previous month	0.000	-0.002	-0.011***	0.007	0.123***	-0.017	-0.045	0.236	-0.39
	(0.001)	(0.003)	(0.004)	(0.061)	(0.020)	(0.059)	(0.052)		
Mid-month	0.000	-0.004	-0.008**	0.082	0.122***	-0.146***	0.020	0.259	2.50
	(0.001)	(0.003)	(0.004)	(0.059)	(0.019)	(0.053)	(0.048)		
DC = April 2000 to October 2002 and *FC* = July 2007 to December 2010									
Previous month	-0.001	-0.001	-0.001	0.016	0.105***	0.012	0.078*	0.220	1.11
	(0.001)	(0.003)	(0.002)	(0.061)	(0.022)	(0.053)	(0.040)		
Mid-month	-0.001	-0.003	-0.001	0.099*	0.109***	-0.113**	0.075**	0.250	3.47
	(0.001)	(0.003)	(0.002)	(0.057)	(0.021)	(0.051)	(0.036)		

Table 4. Results of the regression $\Delta CCI_t = \alpha + \alpha_{DC}DC + \beta\Delta CCI_{t-1} + \gamma R_t + \gamma_{DC}DC \times R_t + \varepsilon_t$ for EU12 for the period 1990-2010 where ΔCCI is calculated for individual questions (as stated in column 1), and *R* are mid-month returns. *DC* is equal to one for months between March 2000 and September 2002, zero otherwise. Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

	Regression estimates	
	α	α_{DC}	β	γ	γ_{DC}	R^2
Household finances
$0.5(Q_i+Q_{ii})$	0.000	-0.002	-0.201***	0.049***	-0.089***	0.131
	(0.001)	(0.002)	(0.060)	(0.010)	(0.031)	
Q_i	0.000	-0.003	-0.272***	0.046***	-0.078*	0.120
	(0.001)	(0.002)	(0.061)	(0.014)	(0.043)	
Q_{ii}	-0.001	-0.001	-0.058	0.050***	-0.102***	0.099
	(0.001)	(0.002)	(0.061)	(0.010)	(0.031)	
Economic Situation
$0.5(Q_{iii}-Q_{iv})$	-0.002	-0.002	0.216***	0.201***	-0.225***	0.264
	(0.001)	(0.004)	(0.056)	(0.026)	(0.077)	
Q_{iii}	-0.002	-0.002	0.122**	0.183***	-0.213**	0.179
	(0.001)	(0.004)	(0.059)	(0.027)	(0.083)	
$-Q_{iv}$	-0.002	-0.002	-0.287***	0.219***	-0.229**	0.249
	(0.002)	(0.005)	(0.056)	(0.033)	(0.099)	

Table 5. Results of the regression $\Delta CCI_t = \alpha + \alpha_{DC}DC + \alpha_{FC}FC + \beta\Delta CCI_{t-1} + \gamma R_t + \gamma_{DC}DC \times R_t + \gamma_{FC}FC \times R_t + \varepsilon_t$ for EU12 for the period 1990-2010, and Z tests of equality between γ_{DC} and γ_{FC}. ΔCCI is calculated for individual questions (as stated in column 1), and R are mid-month returns. DC is equal to one for months between March 2000 and September 2002 (otherwise zero) and FC is equal to one for months between November 2007 and February 2009 (otherwise zero). Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

	Regression estimates								Z test (t-values)
	α	α_{DC}	α_{FC}	β	γ	γ_{DC}	γ_{FC}	R^2	
	Household finances								
$0.5(Q_i+Q_{ii})$	0.000	-0.002	-0.001	-0.227***	0.038***	-0.078**	0.039	0.141	2.19
	(0.001)	(0.002)	(0.002)	(0.062)	(0.012)	(0.032)	(0.024)		
Q_i	0.000	-0.003	-0.003	-0.370***	0.041***	-0.069*	0.034	0.188	1.81
	(0.001)	(0.002)	(0.003)	(0.060)	(0.015)	(0.042)	(0.045)		
Q_{ii}	0.000	-0.002	-0.005**	-0.102*	0.046***	-0.095***	0.006	0.121	2.20
	(0.001)	(0.002)	(0.003)	(0.061)	(0.012)	(0.034)	(0.036)		
	Economic situation								
$0.5(Q_{iii}-Q_{iv})$	-0.001	-0.003	0.001	0.180***	0.154***	-0.175**	0.187***	0.293	2.88
	(0.001)	(0.004)	(0.004)	(0.056)	(0.029)	(0.077)	(0.059)		
Q_{iii}	-0.002	-0.002	-0.008	0.081	0.209***	-0.233**	-0.071	0.196	1.29
	(0.002)	(0.005)	(0.007)	(0.060)	(0.033)	(0.092)	(0.098)		
$-Q_{iv}$	-0.000	-0.005	-0.010	-0.199***	0.164***	-0.169	0.323***	0.268	3.38
	(0.002)	(0.006)	(0.009)	(0.058)	(0.038)	(0.106)	(0.113)		

Table 6. Contemporaneous correlations and results of the Granger-causality test for the US stock market indices and the CSI (total and two forward-looking sub-questions) over the period 1990-2010.

	Correlations		Granger-causality test (P-values)	
	Coeff.	P-value	$R \rightarrow \Delta CSI$	$\Delta CSI \rightarrow R$
NYSE Composite				
CSI	0.164	0.009	0.000	0.939
Q_{ii}: Do you think that a year from now you (and your family) will be better off financially, or worse off, or just about the same as now?	0.039	0.539	0.003	0.687
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?	0.152	0.016	0.000	0.853
NASDAQ100				
CSI	0.132	0.036	0.000	0.692
Q_{ii}: Do you think that a year from now you (and your family) will be better off financially, or worse off, or just about the same as now?	0.003	0.963	0.003	0.954
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?	0.143	0.023	0.000	0.676

Table 7. Results of the regression $\Delta CCI_t = \alpha + \alpha_{DC} DC + \alpha_{FC} FC + \beta \Delta CCI_{t-1} + \gamma R_t + \gamma_{DC} DC \times R_t + \gamma_{FC} FC \times R_t + \varepsilon_t$ for the NYSE Composite and NASDAQ100 indices, and Z tests of equality between γ_{DC} and γ_{FC}. ΔCCI is calculated for the CSI and individual forward-looking questions, 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). Standard errors are in parentheses and asterisks refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10.

| Returns | Regression estimates | | | | | | | | Z-test |
	α	α_{DC}	α_{FC}	β	γ	γ_{DC}	γ_{FC}	R^2	(t-values)
				CSI					
NYSEComp									
Previous month	-0.002	-0.004	-0.009	-0.081	0.264***	0.066	-0.123	0.079	-0.74
	(0.003)	(0.009)	(0.012)	(0.062)	(0.072)	(0.207)	(0.181)		
Mid-month	-0.002	-0.001	-0.003	-0.071	0.280***	0.184	0.004	0.109	-0.67
	(0.003)	(0.009)	(0.012)	(0.061)	(0.067)	(0.228)	(0.169)		
Six-week	-0.003	-0.001	-0.004	-0.053	0.226***	0.086	-0.031	0.095	-0.56
	(0.003)	(0.009)	(0.012)	(0.062)	(0.058)	(0.176)	(0.139)		
NASDAQ100									
Previous month	-0.002	-0.003	-0.012	-0.071	0.143***	-0.042	-0.050	0.071	-0.05
	(0.003)	(0.009)	(0.011)	(0.062)	(0.042)	(0.078)	(0.141)		
Mid-month	-0.002	0.007	-0.011	-0.061	0.156***	0.112	-0.038	0.098	-0.96
	(0.003)	(0.010)	(0.011)	(0.061)	(0.041)	(0.112)	(0.123)		
Six-week	-0.003	0.010	-0.011	-0.049	0.127***	0.037	-0.082	0.087	-0.97
	(0.003)	(0.011)	(0.011)	(0.062)	(0.035)	(0.078)	(0.108)		
				Household finances					
NYSE Composite									
Previous month	-0.003	-0.003	-0.001	-0.390***	0.256***	-0.332	-0.071	0.181	0.83
	(0.004)	(0.011)	(0.015)	(0.058)	(0.088)	(0.254)	(0.222)		
Mid-month	-0.003	-0.002	-0.008	-0.405***	0.252***	-0.238	-0.230	0.180	0.02
	(0.004)	(0.011)	(0.015)	(0.059)	(0.083)	(0.284)	(0.212)		
Six-week	-0.003	-0.002	-0.010	-0.392***	0.175**	-0.145	-0.200	0.170	-0.21
	(0.004)	(0.011)	(0.015)	(0.059)	(0.071)	(0.219)	(0.173)		
NASDAQ100									
Previous month	-0.003	0.000	-0.007	-0.385***	0.160***	-0.123	-0.123	0.184	0.00
	(0.004)	(0.011)	(0.014)	(0.058)	(0.051)	(0.095)	(0.171)		
Mid-month	-0.003	0.003	-0.013	-0.400***	0.149***	-0.056	-0.292*	0.184	-1.23
	(0.004)	(0.012)	(0.014)	(0.058)	(0.050)	(0.138)	(0.152)		
Six-week	-0.003	0.000	-0.017	-0.397***	0.098**	-0.080	-0.302**	0.176	-1.45
	(0.004)	(0.013)	(0.014)	(0.058)	(0.043)	(0.096)	(0.133)		

Table 7 continued

Returns	Regression estimates							R^2	Z-test (t-values)
	α	α_{DC}	α_{FC}	β	γ	γ_{DC}	γ_{FC}		
Economic situation									
NYSEComp									
Previous month	-0.007	-0.006	0.001	-0.024	0.887***	-0.041	-0.282	0.099	-0.35
	(0.008)	(0.024)	(0.033)	(0.062)	(0.196)	(0.562)	(0.491)		
Mid-month	-0.007	0.004	-0.006	-0.012	0.817***	0.587	-0.412	0.104	-1.36
	(0.008)	(0.024)	(0.033)	(0.061)	(0.184)	(0.626)	(0.466)		
Six-week	-0.009	0.005	-0.006	0.005	0.689***	0.218	-0.414	0.096	-1.11
	(0.008)	(0.025)	(0.033)	(0.061)	(0.158)	(0.482)	(0.379)		
NASDAQ100									
Previous month	-0.009	-0.002	-0.005	-0.012	0.509***	-0.278	-0.014	0.096	0.65
	(0.008)	(0.025)	(0.031)	(0.062)	(0.113)	(0.211)	(0.380)		
Mid-month	-0.007	0.025	-0.018	-0.013	0.416***	0.348	-0.248	0.086	-1.39
	(0.008)	(0.028)	(0.030)	(0.062)	(0.113)	(0.308)	(0.339)		
Six-week	-0.010	0.040	-0.016	0.001	0.385***	0.147	-0.313	0.098	-1.37
	(0.008)	(0.029)	(0.031)	(0.061)	(0.095)	(0.213)	(0.293)		