

Sensitivity of consumer confidence to stock markets' meltdowns

Elena Ferrer^a, Julie Salaber^b and Anna Zalewska^{b,*}

^aDepartment of Business Management, Public University of Navarra, Spain

^bSchool of Management, University of Bath, UK

January 2012

Abstract

Using European and US data over the period 1990-2010 we study the stock market – consumer confidence relationship (SM-CC). We argue that if consumers use stock markets to predict future economic conditions the SM-CC relationship should be weaker during stock market declines which are not followed by economic turbulences. We use the post Dot-Com stock market crash and the stock market crash of the Financial Crisis to test our hypothesis. In contrast with the literature on financial illiteracy of consumers we find that consumers correctly interpret stock market meltdowns. We also find a strong information effect, i.e., stock markets indirectly impact on consumers' expectations of household finances. This contrasts with previous studies which find that the information effect is weak or non-existent.

Key words: consumer confidence, Dot-Com bubble, Financial Crisis, stock market reaction, financial literacy

JEL Classification: G00, G15

* Corresponding author: School of Management, University of Bath, Bath BA2 7AY, UK; phone: +44 (0)1225 384354, fax: +44 (0)1225 386473; email address: a.zalewska@bath.ac.uk

1. Introduction

Numerous papers show that the financial literacy of ordinary people is low. It is documented that people do not even understand differences between bonds and stocks (van Rooij, Lusardi and Alessie, 2011), have problems with the calculation of interest rates (Lusardi and Mitchell, 2007) and do not know that mutual funds do not pay a guaranteed rate of interest (Hilgert and Hogarth, 2002). Yet, businessmen and politicians are focused on consumers' moods and opinions. Consumer confidence indices, and in particular, consumers' perceptions of a country's forthcoming economic conditions are closely watched and there is real concern if these are low. Several papers show that stock market returns play an important role in shaping consumer confidence, and that the impact of stock markets in shaping consumers' confidence is higher now than it was a couple of decades ago (Lopez and Durré, 2003). However, even if consumers do not understand basic financial concepts it is interesting to consider whether they at least interpret stock market fluctuations correctly. This paper addresses this question by looking at the impact on consumer confidence of the two recent stock market meltdowns, the post Dot-Com bubble correction of 2000-2002, and the collapse of stock markets during the Financial Crisis of 2007-2009 using European and US data.

Numerous papers show that changes in stock markets lead changes in economic conditions.¹ 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.² Indeed, there is very little evidence that consumer confidence impacts on the formation of stock market returns.³ 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 personal finances.

If consumers use stock markets to forecast future economic conditions, it is important to understand whether stock market movements are interpreted correctly. Some movements

¹ See, e.g., Bernanke, Gertler, and Gilchrist (1999), Poterba (2000) and Tobin (1969).

² See, e.g., Fisher and Statman (2003), Jansen and Nahuis (2003), Otoo (1999).

³ See, e.g., Barsky and Sims (2009), Hsu, Lin and Wu (2011),.

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. Consequently, one may expect that there are periods when the SM-CC relationship is stronger than others. This paper tests whether this is the case using data for 12 developed EU countries and the US. More precisely, it tests whether the collapse of stock markets during the Dot-Com Bubble burst and the current Financial Crisis had different or similar (in statistical sense) impact on the SM-CC relationship, and whether this impact manifested itself via expectations of changes in the future economic conditions or of changes in the future household financial situation.

Studying the impacts of Dot-Com crash and the current Financial Crisis on consumer confidence has several advantages. First, in many countries the two crashes resulted in similar declines in stock markets but had different consequences for economy-wide conditions. Therefore, they provide a rich natural experiment base to study not only consumer reactions but differences between them. Second, the crashes were relatively short in duration (less than year and half each) and close in time, relaxing an immediate need to control for long term changes in stock market characteristics and/or macroeconomic policies. Third, the stock market crashes occurred in many countries, allowing to look at the issue as a global phenomenon, not an individual country effect. Moreover, taking a portfolio of countries helps further distance ourselves from individual country effects.

The EU countries and the US used in this study offer very different research material. First, although their declines in stock markets have been similar in timing and magnitude, the two regions had quite different patterns of economic growth after the end of the Dot-Com Bubble. This allows us both to look at changes in the SM-CC relationship in each region, and also to contrast the regions against each other. Second, they provide different 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, because 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, the EU countries have similar patterns of stock market growth and of economic growth over the period 1990-2010. In particular, the end of Dot-Com 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 only forward looking questions allows us to directly link the stock market returns with the CCI's 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 focussing on the individual forward looking questions only, it still leaves an issue that in the US both stock market meltdowns were followed by an economic slowdown, i.e., this suggests that each of the stock market crashes would affect the SM-CC relationship in a different way.

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 changes in economic conditions from those which do not. Moreover, in contrast to earlier research (e.g., Jansen and Nahuis, 2003) we find strong evidence that stock markets shape consumer confidence at various levels. Stock markets impact both on perceptions about expectations of future economic conditions and expectations of future household finances. We show that during the post Dot-Com correction the impact of stock market changes on consumers' perceptions of their financial situation declined. If only the so called "wealth effect" (i.e., the decline in share prices itself reduces households' wealth) mattered, then the SM-CC relationship should not decline during the post Dot-Com correction. The fact that it declines (statistically significantly at the 1% level) shows that more fundamental (economy related) factors mattered.

Also consistently 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 Dot-Com Bubble decline and the Financial Crisis were followed by economic slowdown. This also indirectly supports our findings for the European market. Their reaction is not universal for the time but market specific.

Therefore, this research contributes to the literature on consumer sentiment and animal spirit 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; Hilgert and Hogarth, 2002; Lusardi and Mitchell, 2006, 2007; Mandell, 2004; Moore, 2003; and van Rooij, Lusardi and Alessie, 2011).

Second, in contrast with Jansen and Nahuis (2003) and Otoo (1999) we find that the information drawn from stock market movements helps consumers to infer future economy-wide conditions, as well as to form their expectations about future personal finances.

The rest of the paper is organised as follows. Section 2 provides a brief literature review and outline of our hypotheses. Section 3 presents the data. Section 4 shows the results, and Section 5 closes with conclusions.

2. Literature review and our hypotheses

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, 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 show that share price movements have contributed to a cumulated decline in consumption after 2000.

Because stock markets fluctuations impact on future economic conditions, they are often used as a forecasting tool. However, Stock and Watson (2003) find that asset prices are useful in forecasting future economic output for some periods. In particular, using a sample of seven developed countries (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) they show that the forecasting power of stock markets was higher in the period 1971-1984 than in 1985-1999. Henry, Olekalns and Thong (2004) go one step further in explaining the stock market potential in predicting economic conditions. Using data for 27 countries world-wide 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 expansion periods.

Consumer confidence as a predictor of economic conditions

Obviously, the stock markets are not the only source of information that is relevant when predicting future economic conditions. Consumer confidence is typically perceived as an important and informative predictor of forthcoming economic conditions, alongside typical macroeconomic variables like interest rate spreads and money supply.⁴ 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”.⁵ 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) uses consumer survey data as input to a dynamic factor model to project quarterly GDP growth in the euro area. Survey data are also used to understand consumers’ perceptions and analyse the impact of exceptional events (such as the cash changeover to euro) on economic developments (the following decoupling between actual and perceived inflation).⁶

This perception that consumer confidence conveys relevant information for predicting future economic conditions is confirmed by academic research. Carroll, Fuhrer and Wilcox (1994) find that consumer confidence forecasts future changes in household spending in the US, i.e. lagged values of the consumer sentiment index explain about 14% of the variation in the growth of total real personal consumption expenditures over 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. This result cannot be explained by the existence of imperfect capital markets. Allowing for time aggregation and using a model in which the conditional variances of consumption growth and interest rates depend upon consumer confidence, the authors show 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

⁴ 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.

⁵ Source: Conference Board Consumer Confidence Survey Technical Note (February 2011), available at http://www.conference-board.org/pdf_free/press/TechnicalPDF_4134_1298367128.pdf

⁶ Source: http://ec.europa.eu/economy_finance/publications/publication7568_en.pdf

personal consumption growth using two major US consumer confidence indicators, the Conference Board and the University of Michigan indices; although they argue that the indices due to differences in their construction have different incremental predictive properties. Finally, Throop (1992) finds that movements in consumer sentiment significantly influence 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 (see Fisher and Statman, 2003; Kim and Oh, 2009; Jansen and Nahuis, 2003; Otoo, 1999).⁷ 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 effect and the information effect are accountable for the SM-CC 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 around the world 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 stock market contribution to create consumer's expectations about the 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

⁷ 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 (Solt and Statman 1988; Neal and Wheatley 1998; Fisher and Statman 2000; Brown and Cliff 2005; Lemmon and Portniaguina 2006; Baker and Wurgler 2006; Baker and Wurgler 2007; Schmeling 2009; Chen 2011)

(2003) show for instance that the sensitivity of the University of Michigan Consumer Confidence Index to S&P500 returns decreased from 0.40 in 1978-1994 to 0.28 in 1995-2002 and the NASDAQ returns from 0.33 to 0.14 over the same periods of time. The authors argue that the difference between the sensitivity of consumer sentiment to stock returns during 1995-2002 and the earlier period is likely to be due to the extraordinary gains in stock prices from 1995 to early 2000 and the extraordinary losses from early 2000 to the end of 2002. Changes in consumer confidence are small relative to such large gains and losses.

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 standard deviation of the output gap measure has fallen after 1985, while the standard deviation of the stock price gap did not experience a similar decline. The stock market has remained volatile, but the volatility of asset price fluctuations has not translated into macroeconomic volatility. The improved monetary policy, which is one of the major drivers of the Great Moderation, may have induced agents to expect small deviations of output from potential 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 investigate several variables that potentially drive consumer confidence over two different sub-periods: 1983-1990 and 1992-2001. During the eighties, economic variables of business cycle (such as growth indicator) seem to be the main forces that have driven the confidence index, whereas the stock market index does 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 prices fluctuations influence consumer confidence, these are driven by the wealth effect rather than the information effect.

In summary, the existing research documents that the SM-CC relationship appears to display long-run trends. The time 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). However since the surveyed subjects are representative of their country populations, it can be expected that only a small fraction of them has any financial education and/or interest in finance large enough to be able to compare the fundamentals of stock markets when they are surveyed with those a few decades ago, especially that the significant proportion of the surveyed subjects is relatively young. Therefore, it is likely that people's opinions are more affected by recent stock market events than those remote in time. The Jansen and Nahuis (2003) results to some extent confirm this reasoning. Although they find strong evidence that 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 for (monthly returns give weaker results than fortnightly).

Hypotheses statement

The previous research links time-varying properties of the SM-CC relationship with long term changes in stock market conditions and the effectiveness of macroeconomic policies. In contrast with the previous research (e.g. Fisher and Statman, 2003, Milani, 2008) we link the changes in the strength of the SM-CC relationship to particular stock market events, or more precisely, to whether stock market crashes, the post Dot-Com crash and the Financial Crisis were followed by economic slowdown or not.

To illustrate the similarities and dissimilarities of the post Dot-Com crash and the Financial Crisis crash Figure 1 shows stock market indices for six European stock markets⁸ (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 EU12 stock market index (Panel C), and the US GDP and the equally weighted GDP for 11 EU countries (Panel D) over the period January 1990 – December 2010.⁹ All the stock market indices are normalised to 100 in January 1990, and all the GDP statistics are seasonally adjusted and also normalised to 100 in January 1990 for ease of comparison.

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

⁸ The six out of 12 countries studied in the paper were selected for Figure 1 because their GDP statistics shown in Figure 2 were available from January 1990 (we use OECD statistics).

⁹ Sweden is excluded due to the lack of OECD statistics.

The European stock market indices display similar patterns, they experienced a sharp decline after the Dot-Com Bubble ended and when the Credit Crunch hit the markets. However, there is a substantial difference in the nature of these two stock market meltdowns even though the decline of stock markets after the Dot-Com Bubble ended and during the Financial Crisis were similar. Whilst the collapse of the share prices of high-tech companies caused severe disturbances on the European stock markets, these effects were somewhat concentrated on specific sectors and did not cause strong economy-wide repercussions.¹⁰ However, although the Financial Crisis started in the banking sector it quickly spread across other sectors and developed into a broad economic downturn. Turning to the US, its stock markets show a similar pattern to the one observed for the EU countries, however, in contrast to the EU sample, the US economy was negatively affected by both stock market meltdowns, i.e., the US economy contracted in 2001 and 2007.¹¹

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 Dot-Com correction (the decline in share prices was not to be followed by the economic slowdown).

In the US, on the other hand, the economic slowdown occurred in 2000 and in 2007. Although the magnitude of the economic slowdown was much higher during the Financial Crisis than during the post Dot-Com crash, 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.¹² In January 2001, US confidence dropped. The CCI 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

¹⁰ Hon, Strauss and Yong (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.

¹¹ Following NBER the contraction of the US economy started in 2001Q1 and ended in 2002Q1.

¹² Source: <http://www.usatoday.com/money/economy/2001-01-30-confidence-pre.htm>

significant difference in the SM-CC relationship between the post-Dot-Com correction and the Financial Crisis.

So far we used the term ‘consumer confidence’ as a generic term. In practice, consumer confidence 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. It is not however clear that 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 household 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. If the decline in stock markets is informative about the future adverse economic conditions, then this decline may in turn affect what household believe their employment prospects are, 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 depend on stock markets.

Grout, Megginson and Zalewska (2009) report that the share-ownership of individuals in the majority of countries is low. Moreover, on average those who hold shares have only a small fraction of their wealth invested on stock markets, and, on average, rarely modify their portfolios. Therefore, we can expect that the direct wealth effect of stock markets may be small. If using the EU12 data we observe that during the post-Dot-Com stock market correction the informative power of stock markets was lower, then we can conclude that the indirect effect exists and that the direct effect was relatively small. However, if we do not observe any differences in the relationship between the stock market returns and changes in CCI, then we cannot conclude whether the indirect effect exists or not.

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 the stock market crashes.

3. Data

To test the SM-CC relationship we need a sample of countries which have consumer confidence data collected well before the Dot-Com Bubble burst, and have well established and sizable stock markets to give confidence that their movement is indicative about economic conditions. Naturally, our attention was directed to the US, Canada, Japan, developed countries of the EU and Australia. Unfortunately, the Canadian consumer confidence data are available on a monthly basis only from 2002 (quarterly before 2002); the methodology of Japanese data changed in April 2004 (and the consumer confidence index does not contain any questions about general economic conditions); the Dot-Com crash affected neither the Australian economy nor its stock market leaving no data for comparison with the Financial Crisis period,¹³ and finally, from the group of the developed EU countries only 12 satisfied the data requirements. The rejected EU countries had the data too short (e.g., Luxemburg joined the survey in 2002), changed 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). Therefore, we are left with the sample of 12 EU countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Spain, Sweden and the UK)¹⁴ and the US. For each country we collected monthly consumer confidence data and daily stock market indices. The characteristics of the consumer confidence and stock market data are described below.

3. 1. EU12 sample

For all the EU countries we use consumer confidence indices, CCIs, of the European Commission. The CCIs are calculated using information collected from surveys that ask the same questions across all countries. That is, the surveys ask how respondents foresee general economy-wide conditions and their household/individual financial situation over the next 12 months. Responses are collected during the first 10 working days of each month. In some

¹³ When the EU markets lost on average 50% of their value, and NASDAQ nearly 80% of its value, the Australian exchange shrunk by less than 3%. Since in the last 20 years there was no other stock market crash which would be comparable in magnitude with the decline during the Financial Crisis, the Australian data are not suitable for this study.

¹⁴ Three countries have shorter CCIs. These are Austria (October 1995), Sweden (October 1995) and Finland (November 1995).

countries participation in the survey is compulsory while in others is optional.¹⁵ In Germany, Italy and Sweden consumer surveys are carried out by so-called quota sampling, i.e., respondents (consumers) are searched for till 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 than 10 days periods of collection in some countries, we assume that the 10 working days (i.e., first 2 weeks of a month) are the period of consumer survey data collection for all months and all countries.

All the country surveys ask the same 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 five 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, and these balances are used to find the country average:

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

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-Dot-Com 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 2007-2010.

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

For each EU12 country, along with the CCI data, we collected daily stock market indices from one of its main stock market indices.¹⁶ The choice of the stock market index was somewhat arbitrary, but since the correlation of indices within a country was always

¹⁵ Participation is compulsory in Spain, France, Italy, Luxembourg and the Netherlands.

¹⁶ Austria (ATX), Belgium (BEL20), Denmark (OMX Copenhagen 20), Finland (OMX Helsinki 25), France (CAC40), Germany (DAX30), Greece (ATHEX Composite), Italy (FTSE MIB), Netherlands (AEX), Spain (IBEX35), Sweden (OMX Stockholm 30) and the UK (FTSE 100).

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 for the 12 stock indices.

The first difference of the average CCIs (ΔCCI) and the percentage change of the stock market indices are used in our analysis.¹⁷ Augmented Dickey-Fuller and Phillips-Perron tests show that the (monthly) average stock market index and the average CCI are I(1) processes for each country in our sample.¹⁸

3.2. US sample

The US CSI 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 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, a refrigerator, stove, television, and things like that)? The retrospective element of the CSIs is not the only difference with the EU CCIs. The CSI surveys are collected over a 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 of the five questions the relative score, X, 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

¹⁷ 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.

¹⁸ For the sake of space we do not present the results of individual test, but they can be obtained from the authors on request.

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 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.¹⁹ As such first differences of the CSI indices will be equivalent to first differences of the CCI (times 5/6.7558).

Figure 3 shows CSI mean adjusted balances. There is some similarity between the CSI and the CCI shown in Figure 2. The periods of optimism and pessimism are similar, although not identical. The biggest difference is in between stock market crashes period of 2003-2007. While the EU12 consumer confidence was quite high, the US consumers were relatively low and quite volatile.

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

The choice of the US stock market indices was less straightforward than the choice of the stock market indices for the EU countries. The US is not the only country in the world 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 Dot-Com 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.²⁰

¹⁹ Note that the $MSCI = 2 + \frac{500}{6.7558} + \frac{5}{6.7558} \left(\sum_{i=1}^5 \frac{P_i - M_i}{5} \right)$ and therefore can be seen as a linear

transformation of the CCI equivalent index.

²⁰ Alternatively, we could use one of the S&P indices to have just one index based on the two stock markets. Indeed, we replicated the whole analysis on S&P500. All the results remained unchanged, are not presented in the paper, but can be obtained from the authors on request.

4. Empirical results

4.1. EU12 sample

Consumer confidence–stock market 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:²¹

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

where ΔCCI_t is the EU12 change in consumer confidence between month t and $t-1$. 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 when individuals fill 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 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 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). The correlation of ΔCCI_t and R_t is 0.445 and is statistically significant at the 1% level and the Granger causality test shows that the changes in the consumer confidence are caused by the 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%).

²¹ Schwarz criterion identifies that one-month lag is optimal.

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

Having established that causality runs from stock market returns to ΔCCI , we test whether stock markets impact on changes in consumer confidence during the Dot-Com Bubble burst. However, the stock market returns used in the regressions of Granger causality tests are quite distant from the period of survey collection. To allow for more recent stock market information to be incorporated in consumers' perceptions we employ returns calculated for periods closer to the survey collection period. First we shift returns used for the Granger causality tests by two weeks forward, 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 the survey collection.²² 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 the previous month (Panel A) or mid-month returns (Panel B). It is clear that the impact of the 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 and returns to its original level in October 2008.

²² Note, that previous month returns and mid-month returns are formally not suitable for testing Granger causality.

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

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

$$\Delta CCI_t = \alpha + \alpha_{DC} DC + \beta \Delta CCI_{t-1} + \gamma R_t + \gamma_{DC} DC \times R_t + \varepsilon_t. \quad (2)$$

and

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

where *DC* and *FC* refer to the post-Dot-Com Bubble crash dummy and the Financial Crisis dummy respectively, and *R* denotes the previous month or mid-month returns.²³ Because there are no official, universal and strictly defined periods for when the post Dot-Com 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 the *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 pick and 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 dates of the beginning of the Dot-Com crash and the date of the beginning of Credit Crunch which evolved into the Financial Crisis. October 2002 is chosen as the end of the Dot-Com Bubble burst because it was the lowest month of NASDAQ²⁴, 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

²³ Because both periods of interest are too short for meaningful testing of Granger causality on sub-periods we use a regression specification with dummies.

²⁴ October 2002 is also used in other research papers, e.g., Aharon, Gavious, Yosef (2010)

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-Dot-Com correction (which was 5.4%), and much higher than the standard deviations of the pre-post Dot-Com crash period and of the period between the two crashes (which were 4.8% and 3.6% respectively).

Specification (2) uses only the DC dummy. If our hypothesis is true then estimate of the γ_{DC} coefficient should be negative and statistically significantly different from zero. Table 1 shows that all γ_{DC} are negative and statistically significantly different from zero at the 1% level when mid-month returns are used. Mid-month returns also have higher R^2 suggesting that taking into account stock market returns from the period of the survey collection is important. This is fully consistent with our expectations and the Kalman Filter regression presented in Figure 6.

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

Specification (3) has dummies for both stock market meltdowns. It tests whether the SM-CC relationship changed during the post Dot-Com crash (via γ_{DC}) and whether there was a statistically significant change in the relationship during the two crashes (γ_{DC} is statistically significantly different from γ_{FC}). Table 2 shows the results and confirms the findings of the Kalman Filter regressions (Figure 6) and the regression results of Table 1. Again, the closer the period of returns is to the period of the survey collection, the stronger the results are. The results obtained for the mid-month returns (i.e., when the stock market returns are calculated for the period of the survey collection and the two weeks before the survey collection) show not only that γ , γ_{DC} and γ_{FC} are statistically different from zero, and that γ_{DC} and γ_{FC} are statistically significantly different from each other (the last column with Z-tests). This means that the sensitivity of ΔCCI to stock market returns was statistically different during the post-Dot-Com Bubble than it was during the Financial Crisis. Moreover, because the γ_{DC} coefficient offsets the γ coefficient for each dummy specification when the mid-month returns are used, we can conclude that during the post-Dot-Com 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 2 here *****

Following from the fact that the results are robust to the different specifications of the *DC* and *FC* dummy variables, and that the specifications using the mid-month returns provides the best fit in the sense of the significance of the coefficients and the magnitude of R^2 , in the remaining part of the paper only the results for the mid-month returns will be used. To focus our attention and save space only the results for *DC* equal to one between March 2000 and September 2002 and *FC* equal to one between November 2007 and February 2009 will be presented.²⁵

Household finances and economic conditions

The above results show that the EU12 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 the 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 the 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 changes forecast future economic conditions) rather than by, what they call, the wealth effect (i.e., stock market changes forecast future financial position of households).

So which part of the confidence index drives our results? Obviously, we should expect that the results presented so far hold for the questions which directly ask about the future economic conditions (i.e., questions Q_{iii} and Q_{iv}). However, are the predictions of the future financial situation responding in the same way or not? As described in Section 3, there are two possibilities, direct and indirect effects. The direct effect implies that consumers respond to stock market declines/increases in the same way regardless whether these changes are

²⁵ The other specifications give virtually identical results. They can be obtained from the authors on request.

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 economic conditions will impact consumers' expectations about future household finances. Which effect, direct or indirect is stronger will depend on what proportion of household finances directly and indirectly depend on stock markets. If we observe that during the post Dot-Com stock market correction the informative power of stock markets was lower than during the Financial Crisis, then we can conclude that the indirect effect exists and that the direct effects was relatively small in comparison with the indirect effect during our sample period. However, if we do not observe any differences in the relationship between the stock market returns and ΔCCI , then we cannot conclude whether the indirect effect exists or not.

Table 3 decomposes the contemporaneous correlations between stock market returns and ΔCCI into those of the personal/household financial situation questions and of economic situation questions. Although the correlation coefficients are statistically significant at every level of disaggregation, the causality is not. The Granger-causality tests for changes in responses to individual questions and stock market returns show that there is a stronger causality between the economic conditions questions and stock markets than with the responses to questions about personal/household finances. Indeed, the hypothesis of causality is rejected for Q_i .

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

Tables 4 and 5 show the results of the regression specifications (2) and (3) for the averages of the questions about household finances, of the questions about economic conditions, and for each individual question. It is clear that stock market returns contribute to the change in expectations both at the household and the global economy level (γ is statistically different from zero 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-Dot-Com Bubble period and of the Financial Crisis.

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

The perception of the economic situation, i.e., the average of Q_{iii} and $-Q_{iv}$, and of household finances, i.e., the average of Q_i and Q_{ii} , are consistent with the hypothesis that the decline of the stock markets during the post Dot-Com Bubble burst reduced the SM-CC relationship. Whether we use DC dummy only (Table 4) or both dummies, DC and FC, (Table 5) all the γ_{DC} coefficients are negative and statistically significantly different from zero at the 1% and 5% level. Moreover, 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 averages 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 Dot-Com crash, but has also strengthened during the Financial Crisis. This stronger relationship is driven by expectations of increase of unemployment (Q_{iv}) than the question about the general country economic conditions (Q_{iii}).

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

The results obtained for the questions about perceptions of personal finances are particularly interesting. Although for the question about ability to save (Q_i) no Granger causality was detected, for completeness of the analysis we estimate its sensitivity the two stock market crashes. Although for this questions the regression results are weakest they still show that the γ_{DC} coefficient is negative and significantly different from zero at the 10% level for the two regression specifications. Moreover, γ_{DC} is statistically different from zero from γ_{FC} at the 10% level.

A much stronger results is obtained for the questions about household financial situation (Q_{ii}). Here, the 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 clearly document that not only the post Dot-Com crash reduced the SM-CC relationship but that the impact of stock market returns on consumers' perceptions of their household financial situation declined. This means that we observe a statistically significant informational effect of stock markets.

4.2. US sample

As previously we start the analysis from testing 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_{iv}) 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 Dot-Com 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 that problem. The US stock markets' declines occurred at the same time, therefore we define the post Dot-Com 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).²⁶

To stay consistent with the definitions of returns used in the EU12 regressions we also calculate previous calendar month returns and mid-month returns. However, since the surveys are collected over a month, the mid-month returns do not cover the whole period of the survey collection. Using the same month returns deals with this issue, however such returns do not take into account stock market fluctuations of the period 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 two preceding weeks. Therefore, we define 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.

²⁶ We have also used the EU12 dummies, but because the results were virtually unaffected, we present the results for the US own dummy only.

Table 7 shows that American consumers pay attention to stock market returns in forming their opinions. Every γ coefficient is statistically significant at the 1% level, although the explanatory power of the CSI regressions and of the economic expectations question is at most half of that obtained for EU12. Only the regressions for the household finances question have a similar to, or even higher than, the explanatory power of the regressions for the same question for EU12.

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

Consistently across all specifications of returns and dependent variables the coefficients estimated for the NYSE Composite Index are about twice as large as those estimated for the NASDAQ100 Index. This is consistent with our expectations that NYSE as the exchange which lists and trades companies across all economic sectors is more informative than NASDAQ in predicting future economic conditions. 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 the economic turbulences.

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 the past and current situations, which dilutes the stock market forecasting ability. The higher coefficient obtained for the economic situation question shows that the contribution of the stock markets to the creation of perceptions of the future economic conditions is stronger than the CSI would suggest.

The household finances regressions are the only one with statistically significant coefficients. The estimates of γ_{FC} for NASDAQ100 using six-week returns and mid-month returns are statistically significantly different from zero at the 5% and the 10% significance level 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} . Because these are the only two out of 18 specifications which show some weak statistical significance, we cannot draw any conclusion from them.

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

5. Conclusions

In this paper, we investigate the time variation in the 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; Kim and Oh, 2009; Jansen and Nahuis, 2003; 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, Lin and Wu, 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 (e.g., a stock market crash predicting an economic recession) or not (e.g., a stock market crash is an individual sector driven without economic implications). We formally test this issue in the context of the last two big stock market declines: the post Dot-Com bubble and the 2007 Financial Crisis. Both events had a different impact on international stock markets and economies. In Europe, stock market indices experienced a sharp decline after both the Dot-Com 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 which don't. Consistently with our hypothesis, we find that in Europe the SM-CC relationship decreased when the Dot-Com 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 for consumer's expectations about their household financial situation and about general economic conditions. Studying individual questions allowed testing whether a

decline in stock markets has a direct or 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.

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 for future economic conditions. Moreover, we argue that 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 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.

References

- Acemoglu, D., Scott, A., 1994. Consumer Confidence and Rational Expectations: Are Agents' Beliefs Consistent with the Theory? *The Economic Journal* 104, 1-19.
- Aharon D. Y., Gavious Ilanit & Y. Rami, 2010, Stock Market Bubble Effects on Mergers and Acquisitions, *The Quarterly Review of Economics and Finance* 50, 456–470.
- Baker, M., and J. Wurgler, 2006. Investor sentiment and the cross section of stock returns. *The Journal of Finance* 61(4), 1645-1680.
- Baker, M., and J. Wurgler, 2007. Investor sentiment in the stock market, *Journal of Economic Perspectives* 21(2), 129-152.
- Barsky R.B., and E.R. Sims, 2009, Information, animal spirits, and the meaning of innovations in consumer confidence, NBER WP 15049.
- Bernanke, B., Gertler, M., Gilchrist, S., 1999. The financial accelerator in a quantitative business cycle framework, in: Taylor, J.B., Woodford, M. (Eds.), *Handbook of Macroeconomics*. Elsevier Science.

Bernheim, D., 1995, Do households appreciate their financial vulnerabilities? An analysis of actions, perceptions, and public policy, in: *Tax Policy and Economic Growth*, American Council for Capital Formation, Washington, DC, 1-30.

Bernheim, D., 1998, Financial illiteracy, education and retirement saving, in: O. Mitchell and S. Schieber (eds), *Living with Defined Contribution Pensions*, University of Pennsylvania Press, Philadelphia, 38-68.

Boone, L., Girouard, N., 2002. The stock market, the housing market and consumer behavior. *OECD Economic Studies* 35, 175–200.

Bram, J., Ludvigson, S., 1998. Does Consumer Confidence Forecast Household Expenditure? A Sentiment Index Horse Race. *Economic Policy Review*, Federal Reserve Bank of New York, 59-78.

Brown, G.W., Cliff, M.T., 2004. Investor sentiment and the near-term stock market. *Journal of Empirical Finance* 11, 1-27.

Brown, G. W., Cliff, M. T., 2005. Investor sentiment and asset valuation. *Journal of Business* 78(2), 405-440.

Carroll, C., Fuhrer, F., Wilcox, D., 1994. Does Consumer Sentiment Forecast Household Spending? If So, Why? *American Economic Review* 84(5), 1397-1408.

Chen, S.-S., 2011. Lack of consumer confidence and stock returns. *Journal of Empirical Finance* 18, 225–236.

Clarke, R. G., Statman, M., 1998. Bullish or bearish? *Financial Analysts Journal* 63-72.

DG ECFIN, 2006. European Economy Special Report No 5: The Joint Harmonised EU Programme of Business and Consumer Surveys (December).

Fisher, K.L., Statman, M., 2000. Investor sentiment and stock returns. *Financial Analysts Journal*, March/April, 16–23.

Fisher, K.L., Statman, M., 2003. Consumer confidence and stock returns. *Journal of Portfolio Management* 30, 115–127.

Grout, P.A., W.L. Megginson and A. Zalewska, 2009, One half-billion shareholders and counting-determinants of individual share ownership around the world, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1364765

Henry, Ó.T., N. Olekalns & J. Thong, 2004. Do stock market returns predict changes to output? Evidence from a nonlinear panel data model. *Empirical Economics* 29, 527–540.

Hilgert, M., and J. Hogarth, 2002, Financial knowledge, experience and learning preferences: Preliminary results from a new survey on financial literacy, *Consumer Interest Annual*, 48.

Hon, M., Strauss, J., Yong, Soo-Keong. 2007. Deconstructing the Nasdaq bubble: A look at contagion across international stock markets. *Journal of International Financial*

Markets, Institutions and Money 17: 213-230.

Hsu Chih-Chiang, Lin, Hung-Yu, Wu, Jyun-Yi. 2011. Consumer Confidence and Stock Markets: The Panel Causality Evidence. *International Journal of Economics and Finance* 3(6): 91-98.

Jansen, W.J., Nahuis, N.J., 2003. The stock market and consumer confidence: European evidence. *Economics Letters* 79, 89–98.

Kim, S. N. and W. K. Oh, “Relationship between Consumer Sentiment and Stock Price in Korea” *The Journal of the Korean Economy*, 10(3), 2009, pp.421-442

Kremer, M. and Westerman, T. 2004. Consumer Confidence and Stock Prices in the Euro Area: Is There a Relationship – and Does it Matter? Paper presented at the 27thCIRET conference.

Lemmon, M., Portniaguina, E., 2006. Consumer confidence and asset prices: Some empirical evidence. *Review of Financial Studies* 19(4): 1499.

Lopez, B.H. and A. Durre. 2003. The Determinants of Consumer Confidence: The Case of United States and Belgium. <http://www.core.ucl.ac.be/services/psfiles/dp03/dp2003-53.pdf>.

Lusardi, A., and O. Mitchell, 2006, Financial literacy and planning: Implications for retirement wellbeing, *Pension Research Council Working Paper 1*, The Wharton School.

Lusardi, A., and O. Mitchell, 2007, Financial literacy and retirement preparedness: Evidence and implications for financial education, *Business Economics*, 35-44.

Mandell, L, 2004, Financial literacy: Are we improving? Washington, D.C.: Jump\$tart Coalition for Personal Financial Literacy.

Milani, F. 2008. Learning about the interdependence between the macroeconomy and the stock market. University of California at Irvine, mimeo

Moore, D., 2003, Survey of financial literacy in Washington State: Knowledge, behavior, attitudes and experiences, Technical report 03-39, Social and Economic Sciences Research Center, Washington State University.

Neal, R., Wheatley, S. M., 1998. Do measures of investor sentiment predict returns? *Journal of Financial and Quantitative Analysis* 33(4).

Otoo, M.W., 1999. Consumer sentiment and the stock market. Finance and Economics Discussion Paper 1999-60, Federal Reserve Board, Washington, D.C.

Poterba, J.M., 2000. Stock market wealth and consumption. *Journal of Economic Perspectives* 14, 99–118.

Schmeling, M., 2009. Investor sentiment and stock returns: Some international evidence. *Journal of Empirical Finance* 16(3): 394-408.

Solt, M.E., Statman, M., 1988. How useful is the sentiment index. *Financial Analysts Journal*, September/October, 45– 55.

Stock, J.H, and M.W. Watson. 2003. Forecasting Output and Inflation: The Role of Asset Prices. *Journal of Economic Literature* 41(3), 788-829.

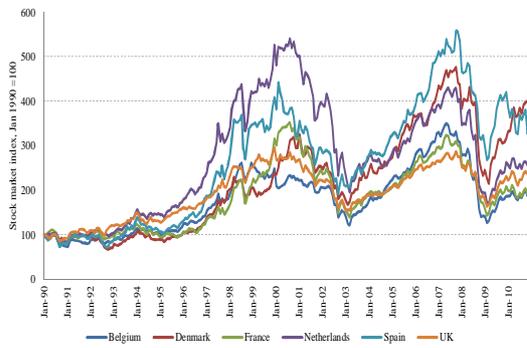
Throop, A. W., 1992. Consumer Sentiment: Its Causes and Effects. *Federal Reserve Bank of San Francisco Economic Review* 1, 35-60.

Tobin, J., 1969. A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking* 1, 15–29.

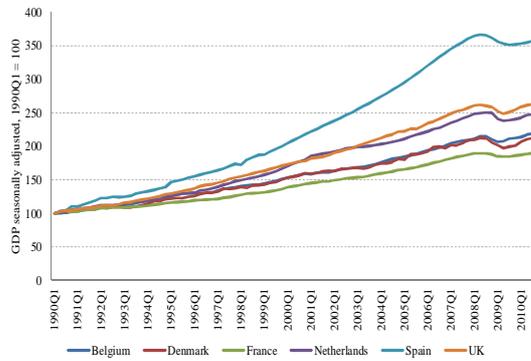
Van Rooij, M., R. Alessie, and A. Lusardi, 2011, Financial Literacy and Stock Market Participation, *Journal of Financial Economics*, 101(2), 449-472.

Figure 1. Monthly stock market indices and GDP over the period 1990-2010. Panel A shows the stock market indices (Jan-1990=100) for six EU countries. Panel B shows quarterly, seasonally adjusted GDP (Jan-1990 = 100) for the same six EU countries. Panel C shows the NYSE Composite and NASDAQ indices for the US and the equally weighted average of the stock market index for EU12 (Jan-1990=100). Panel D shows quarterly, seasonally adjusted GDP (Jan-1990=100) for the US and equally weighted average GDP for EU12. Source: DataStream, OECD.

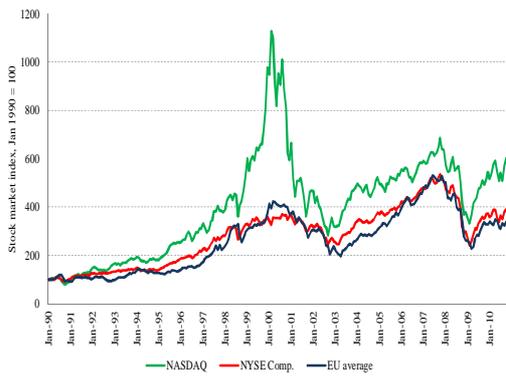
Panel A.



Panel B.



Panel C.



Panel D.

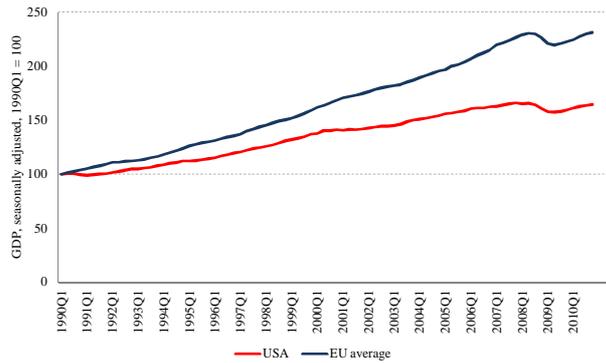


Figure 2. Average CCI mean adjusted balance for the EU12 sample for the 1990-2010 period.

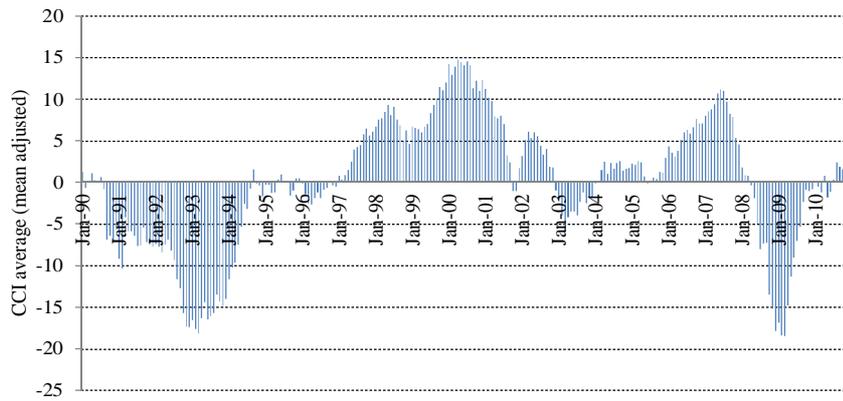


Figure 3. The US CSI mean adjusted balance for the 1990-2010 period.

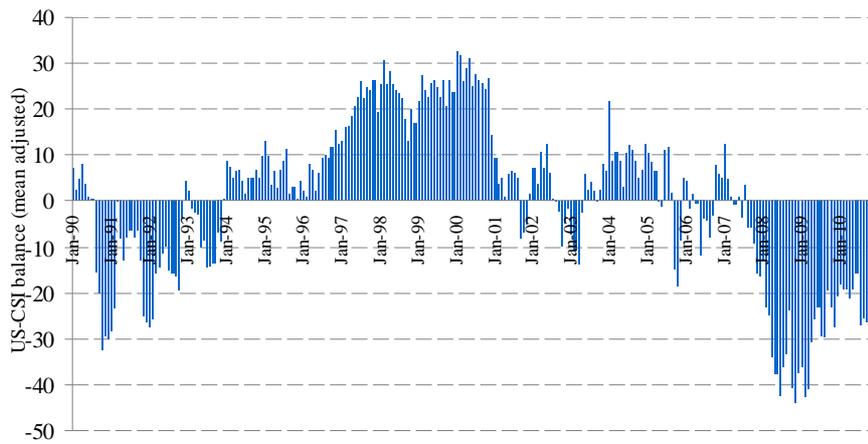


Figure 4. Definition of the returns used for Granger causality tests for the EU12 sample.

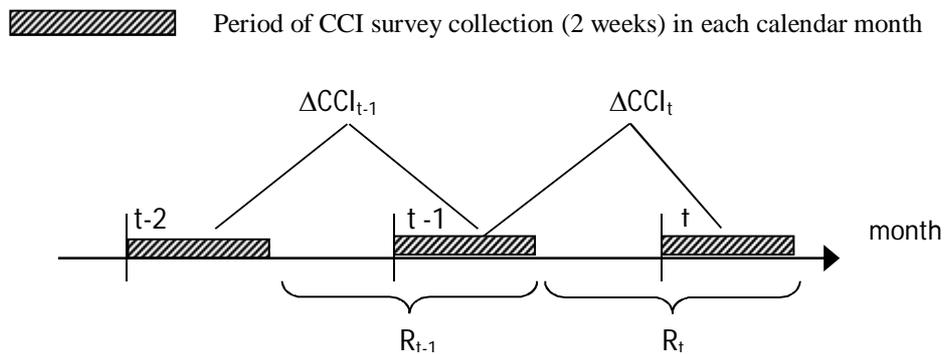


Figure 5. Definition of regression returns for the EU12 sample

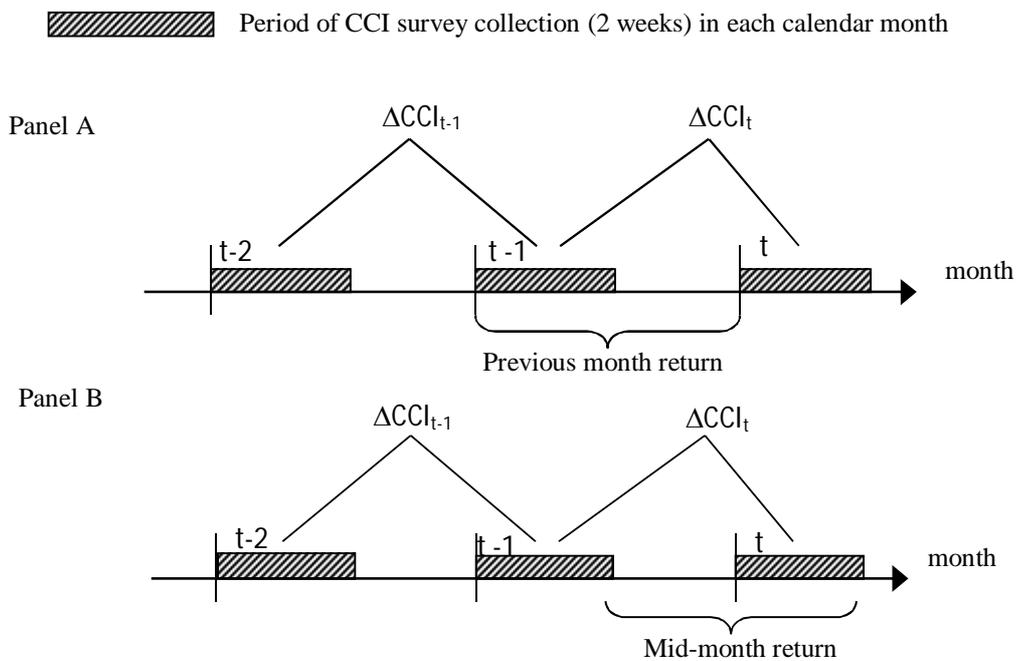
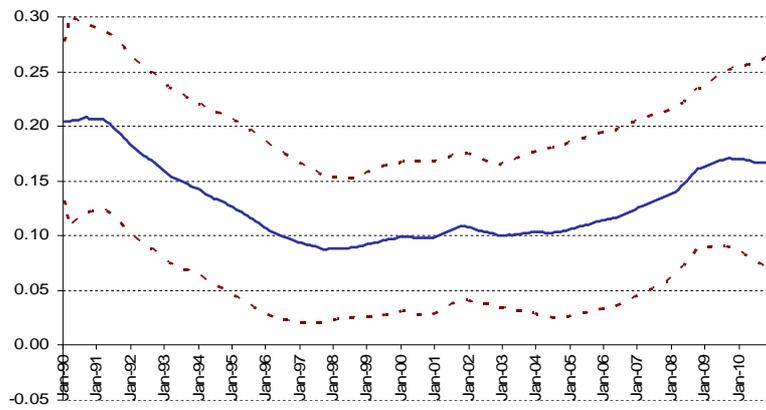


Figure 6. Kalman Filter estimate of γ coefficient (and 95% confidence intervals) with EU12 CCI as dependent variable

Panel A: Previous month return



Panel B: Mid-month return

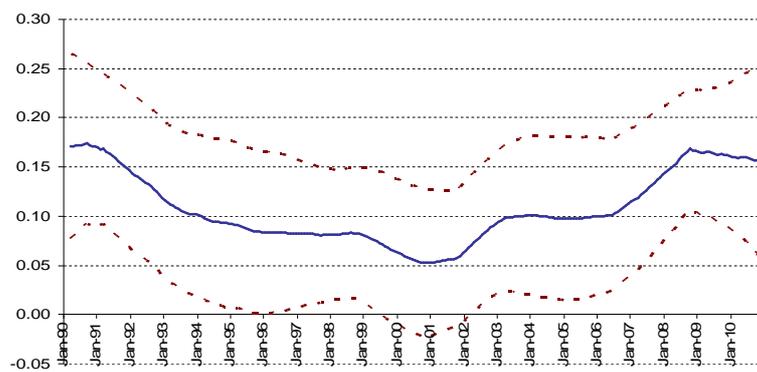


Table 1. Results of the regression $\Delta CCI_t = \alpha + \alpha_{DC}DC + \beta\Delta CCI_{t-1} + \gamma R_t + \gamma_{DC}DC \times R_t + \varepsilon_t$ for EU12 for the period 1990-2010.

Returns	Regression estimates						R ²
	α	α_{DC}	β	γ	γ_{DC}		
		DC=Mar-2000 to Sept-2002 and FC=Nov-2007 to Feb-2009					
Previous month	-0.0011 0.0009	-0.0004 0.0027	0.0435 0.0600	0.1296 0.0185	*** 	-0.0212 0.0550	0.207
Mid-month	-0.0013 0.0009	-0.0019 0.0026	0.1235 0.0564	** 	0.1367 0.0168	*** -0.1593 0.0504	*** 0.242
		DC=Jul-2000 to Sept-2002 and FC=Sept-2007 to Mar-2009					
Previous month	-0.0011 0.0009	-0.0008 0.0029	0.0436 0.0599	0.1294 0.0183	*** 	-0.0248 0.0587	0.208
Mid-month	-0.0012 0.0009	-0.0028 0.0028	0.1245 0.0565	** 	0.1352 0.0167	*** -0.1632 0.0522	*** 0.241
		DC=Apr-2000 to Oct-2002 and FC=Jul-2007 to Dec-2010					
Previous month	-0.0011 0.0009	-0.0005 0.0028	0.0439 0.0600	0.1286 0.0189	*** 	-0.0119 0.0521	0.207
Mid-month	-0.0012 0.0009	-0.0029 0.0027	0.1198 0.0565	** 	0.1350 0.0170	*** -0.1411 0.0493	*** 0.237

Table 2. 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} .

Returns	Regression estimates								Z test (t-values)
	α	α_{DC}	α_{FC}	β	γ	γ_{DC}	γ_{FC}	R^2	
DC = Mar-2000 to Sept-2002 and FC = Nov-2007 to Feb-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 Sept-2002 and FC = Sept-2007 to Mar-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 Oct-2002 and FC = July-2007 to Dec-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 3. Contemporaneous correlations and results of Granger-causality test (1990-2010) for the EU12 CCI and individual component questions

	Correlations		Granger causality test (P-values)	
	Coeff	P-value	$R \rightarrow \Delta CCI$	$\Delta CCI \rightarrow R$
CCI: $0.25(Q_i + Q_{ii} + Q_{iii} - Q_{iv})$	0.261	0.000	0.001	0.070
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	0.43	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 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 denote individual questions (as stated in column 1), and R are mid-month returns. DC is equal to one for months between Mar-2000 and Sept-2002, zero otherwise.

	Regression estimates						R^2		
	α	α_{DC}	β	γ	γ_{DC}				
Household finances									
0.5(Q _i +Q _{ii})	-0.0002 0.0005	-0.0019 0.0016	-0.2014 0.0602	***	0.0493 0.0102	***	-0.0896 0.0311	***	0.1308
Q _i	0.0003 0.0007	-0.0028 0.0022	-0.2720 0.0605	***	0.0455 0.0140	***	-0.0781 0.0426	*	0.1203
Q _{ii}	-0.0007 0.0006	-0.0012 0.0016	-0.0580 0.0611		0.0502 0.0104	***	-0.1015 0.0314	***	0.0989
Economic Situation									
0.5(Q _{iii} -Q _{iv})	-0.0018 0.0013	-0.0020 0.0040	0.2164 0.0557	***	0.2008 0.0256	***	-0.2254 0.0768	***	0.2640
Q _{iii}	-0.0016 0.0014	-0.0016 0.0043	0.1224 0.0587	**	0.1831 0.0274	***	-0.2131 0.0826	**	0.1785
-Q _{iv}	-0.0020 0.0017	-0.0023 0.0052	-0.2872 0.0559	***	0.2185 0.0330	***	-0.2296 0.0991	**	0.2487

Table 5. Regression results (1990-2010) for EU12 and Z tests of equality between γ_{DC} and γ_{FC} , with individual questions as dependent variables. Returns are mid-month returns and the dummy variables are defined as follows: DC is equal to one for the months between Mar-2000 and Sept-2002 (otherwise zero) and FC is equal one for the months between Nov-2007 and Feb-2009 (otherwise zero).

	Regression estimates							R^2	Z test (t-values)
	α	α_{DC}	α_{FC}	β	γ	γ_{DC}	γ_{FC}		
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 its two sub-questions) over the 1990-2010 period.

	Correlations		Granger causality test (P-values)	
	Coeff	P-value	$R \rightarrow \Delta CCI$	$\Delta CCI \rightarrow R$
<i>NYSE Composite</i>				
CSI	0.164	0.009	0.000	0.939
Q _{ii}	0.039	0.539	0.003	0.687
Q _{iii}	0.152	0.016	0.000	0.853
<i>NASDAQ100</i>				
CSI	0.132	0.036	0.000	0.692
Q _{ii}	0.003	0.963	0.003	0.954
Q _{iii}	0.143	0.023	0.000	0.676

Table 7. Regression results for the NYSE Composite and NASDAQ indices and Z tests of equality between γ_{DC} and γ_{FC} .

	α	α_{DC}	α_{FC}	Regression estimates				R^2	Z-test (t-values)	
				β	γ	γ_{DC}	γ_{FC}			
US-CSI										
<i>NYSEComp</i>										
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			
<i>NASDAQ100</i>										
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										
<i>NYSEComp</i>										
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			
<i>NASDAQ100</i>										
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			
Economic situation										
<i>NYSEComp</i>										
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			
<i>NASDAQ100</i>										
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			