I. Assessing the impact of uncertainty on consumption and investment [1]

Economic theory suggests that uncertainty has a detrimental effect on economic activity by giving agents the incentive to postpone investment, consumption and employment decisions until uncertainty is resolved, and by pushing up the cost of capital through increased risk premia.

To test the impact of uncertainty on activity in the euro area, indicators of uncertainty for industry and consumers are derived from business and consumer surveys (BCS). The indicators measure the divergence of business and consumer expectations about the economy and their finances. The underlying assumption is that the more economic agents disagree in their expectations, the higher the uncertainty in the economy. The impact of uncertainty is then estimated using fully specified investment and consumption models. To benchmark the results of the estimation against alternative measures of uncertainty, the BCS indicators are compared with a widely used indicator of Policy Uncertainty. A key finding of the analysis is that uncertainty has a significant negative impact on both investment and consumption. The effect of uncertainty on economic activity also appears to have increased since the crisis.

The econometric analysis indicates that uncertainty is currently hindering economic activity in the euro area. Although uncertainty in financial markets has abated significantly in recent months on the back of decisive policy interventions, other sources of macroeconomic uncertainty remain high. The policy uncertainty and BCS indicators are still unusually high and have so far shown only limited signs of improvement.

I.1. Introduction

Arguably, a defining feature of the macroeconomic and financial market situation since the start of the crisis in 2008 has been an unprecedented level of uncertainty. In particular, many commentators have argued that the weakness of the recovery after the financial crisis has been partly due to this exceptionally high level of uncertainty. Uncertainty in financial markets has abated in recent months on the back of decisive policy measures, but available indicators suggest that uncertainty remains unusually high in other sectors of the economy.

According to economic theory, a high level of uncertainty can depress economic activity through a number of channels: investment, consumption, employment or risk premia. When investment, consumption or employment decisions are costly to revert (e.g. due to fixed and adjustment costs), high uncertainty gives agents an incentive to postpone or cancel their decisions until uncertainty is resolved and more information is available, thus depressing economic activity. [2] Other channels through which uncertainty can dampen economic activity include a higher cost of finance and lower asset prices due to increased risk premia, [3] as well as increasing managerial risk aversion. [4]

The purpose of this focus section is to examine the evolution of macroeconomic uncertainty in recent years, and to estimate its impact on economic activity. To do so, it reviews developments in a range of uncertainty indicators, including two new indicators derived from business and consumer survey data. The impact of uncertainty is then estimated using fully specified investment and consumption equations.

I.2. Measuring uncertainty

In a broad sense, uncertainty can be illustrated as a mean preserving increase in the 'tails' of the probability distribution of an event. An increase in uncertainty makes future outcomes more uncertain in the sense that 'tail events', or realisations at the

[1] Section prepared by Narcissa Balta, Ismael Valdés Fernández and Eric Ruscher.

[2] Bernanke, B. (1983), 'Irreversibility, uncertainty, and cyclical investment', *The Quarterly Journal of Economics*, MIT Press, Vol. 98(1), pp. 85-106, February; Dixit, A.K. and R.S. Pindyck (1994), 'Investment under uncertainty', *Princeton University Press*, Princeton, N.J.

[3] Gilchrist, S., J. Sim and E. Zakrajsek (2010), 'Uncertainty, financial friction and investment dynamics', 2010 Meeting Papers 1285, Society for Economic Dynamics.

[4] Panousi, V. and D. Papanikolaou (2009), 'Investment, idiosyncratic risk, and ownership', *MPRA Paper* 24239, University Library of Munich, Germany.

extreme of the distribution, have a higher probability of occurring. [5]

Uncertainty is difficult to quantify but economic research has come up with several ways of constructing uncertainty measures based on stock market volatility, [6] dispersion in forecasts by professional forecasters, [7] or the prevalence of terms such as economic uncertainty in the media. [8]

A widely used uncertainty indicator in the current empirical literature is the one developed by Baker et al, hereafter, the Policy Uncertainty Indicator. For the EU, this is a composite index based on both a news index indicator tracking the number of entries related to 'economic uncertainty' in the press, and dispersion in professional forecasts' about budget deficits and CPI inflation.

In addition to this Policy Uncertainty Indicator, the analysis presented in this focus section is based on two new indicators capturing uncertainty at the level of industry and consumers. The indicators are constructed for all EU Member States using the European Commission Business and Consumer Surveys (BCS). The industry indicator measures divergence in manufacturing firms' expectations about future production, whereas the consumer indicator measures divergence in the expectations of consumers' future financial situation (see Box I.1 for more details on the methodology).

The basic idea guiding the construction of the two BCS indicators is that a divergence of economic agents' expectations about future activity or financial situation should be a sign of higher uncertainty in the economy. The BCS uncertainty indicators represent a different concept from

standard economic confidence indicators — which measure average expectations about future economic conditions, but do not convey information on the dispersion of responses.

Although using dispersion measures to track uncertainty is not a new approach, survey-based uncertainty indicators have rarely been used for that purpose. They offer several advantages, including wide data availability (all EU countries) and the fact that uncertainty is measured directly at the level of the agents who make investment and consumption decisions.

I.3. Recent developments in uncertainty at the euro area level

Financial market uncertainty in the euro area has abated in recent months (Graph I.1). Stock market volatility has decreased to almost historically-low levels. Uncertainty in sovereign debt markets has also abated since the end of 2012, although it remains high by historical standards.

Graph I.1: **Financial Market uncertainty has abated in recent months (1) (2)**

(1997Q1-2013Q1)

Sovereign bonds 10Y spread (LHS)
Stock market volatility (RHS)
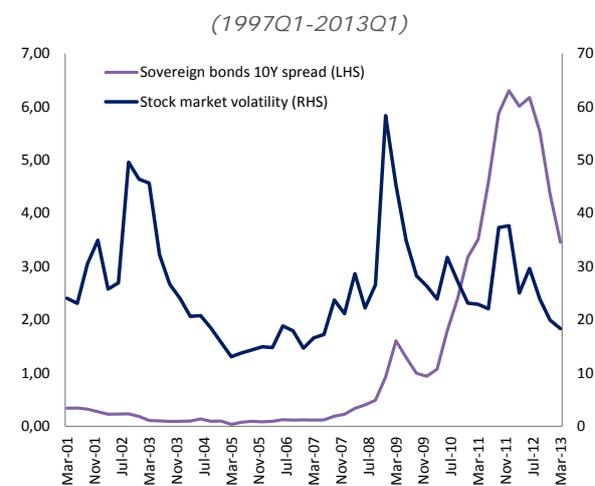
(1) Sovereign spreads represent the difference between the average 10-year government bond spreads of Ireland, Italy, Spain, and Portugal v. Germany, in p.p.
(2) Stock Market volatility represents the volatility of the Eurostoxx 50 option traded on Eurex.
Source: Bloomberg, Eurostat.

However, non-financial indicators of uncertainty paint a less encouraging picture (Graph II.2). The BCS indicators reveal that overall uncertainty remains unusually high for both consumers (green line) and industry (purple line). The EU-wide Policy Uncertainty Indicator (blue line) is also at almost record levels, despite having abated somewhat from its peak in mid-2012.

[5] There is a body of literature which has made a distinction between risk, which is understood to be measurable, and uncertainty, which is not; see 'Risk and uncertainty in euro area sovereign debt markets and their impact on economic activity', *Quarterly Report on the Euro Area*, Volume 11 No 4 (2012), DG ECFIN, European Commission. In this section, however, both concepts are used interchangeably.
[6] Kose, M., and M. Terrone (2012), 'How does uncertainty affect economic performance?', World Economic Outlook, Box 1.3, pp. 49–53; Bloom, (2007), 'The impact of uncertainty shocks,' *NBER Working Papers* 13385, National Bureau of Economic Research.
[7] Bachman, R., S. Esltner and E. Sims (2010), 'Uncertainty and economic activity: evidence from business survey data,' *NBER Working Papers* 16143; Baker, S., N. Bloom and S. Davies (2013), 'Measuring economic policy uncertainty', *Chicago Booth Research Paper* No. 13-02.
[8] Baker et al. (2013), op. cit. ; Knotek, E.S. and S. Khan (2011), 'How do households respond to uncertainty shocks?', *Economic Review, Federal Reserve Bank of Kansas City*, issue QII.

Box I.1: **Assessing uncertainty with business and consumer survey data**

The Joint Harmonised EU Business and Consumer Surveys (BCS) coordinated by the European Commission provide a battery of indicators tracking consumer and business sentiment. This information is usually exploited to perform nowcasts or short-term forecasts of macroeconomic variables such as GDP, industrial production or consumption. This box argues that BCS data can also be used to construct uncertainty indicators. Using surveys to analyse uncertainty is appealing on several grounds:

- The BCS offer relatively long time series (in many cases back to the mid-1980s) available at monthly frequency. They are available for several sectors (e.g. consumers and manufacturers) and cover all EU countries, giving a greater degree of granularity in the analysis than most other uncertainty indicators.

- With survey data, economic uncertainty is measured 'at source', i.e. directly at the level of the economic agents who make investment and consumption spending decisions. This contrasts with other measures that capture uncertainty indirectly via financial market indicators, disagreement among professional forecasters or occurrences of certain words in the press.

The general idea guiding the construction of BCS-based uncertainty indicators is that divergence in the expectations of survey respondents can be interpreted as an indication of rising uncertainty. Using divergence in opinions to measure uncertainty is an old idea which has, however, so far been mostly applied to the opinions of professional forecasters. Only a handful of empirical studies have so far used business and consumer surveys in that context (see Bachmann et al (2012) and Fuss and Vermeulen (2004)).

To better capture potential differences in the perception of uncertainty by different economic agents, indicators of uncertainty can be constructed using the BCS consumer and industry surveys. The surveys include a range of questions, only some of which have a clear forward-looking dimension that lend themselves to measuring divergences in expectations. The industry survey only includes one such question:

Question 5: *How do you expect your production to develop over the next 3 months?*

The consumer survey includes several questions on consumers' expectations about the next 12 months. For the present analysis, two questions are selected covering, respectively, consumers' expectations about their personal situation and about the general macroeconomic outlook:

Question 2: *How do you expect the financial position of your household to change over the next 12 months?*
Question 4: *How do you expect the general economic situation in this country to develop over the next 12 months?*

Respondents to the industry survey must select one of three possible categories (+ increase, = remain unchanged, − decrease). In the consumer survey, respondents must choose between six categories (+ + get a lot better, + get a little better, = stay the same, − get a little worse, − − get a lot worse, N don't know).

Standard cyclical survey indicators are calculated as balances between positive and negative responses and therefore ignore the underlying heterogeneity of the responses. To measure this heterogeneity and thereby uncertainty, Theil's entropy formula can be used as follows:

$$uncertainy\ indicator\ for\ firms\ =\ (1/3) \times \sum_{i=1\,to\,3} \alpha_i \times Log(\alpha_i)$$

$$uncertainy\ indicator\ for\ consumers\ =\ (1/6) \times \sum_{i=1\,to\,6} \alpha_i \times Log(\alpha_i)$$

where α_i is the share of respondents choosing each of the categories described above.

The resulting indicators are shown in the two charts below. All indicators have a relatively high degree of cyclicality with uncertainty generally rising during downturns. In particular, all of them show a steep rise in uncertainty with the onset of the global financial crisis, followed by a fall and another rise during the sovereign crisis. However, the timing and magnitude of these recent swings vary depending on the indicator

(Continued on the next page)

considered. In particular, the consumer measure of uncertainty based on question 2 (as opposed to Q4, the more general macroeconomic question) seems to have been affected earlier than the other indicators by the global financial crisis and more severely by the sovereign crisis. As shown in Box I.3, this indicator is also the one that is the most closely linked to private consumption and produces the most meaningful results in a consumption regression.
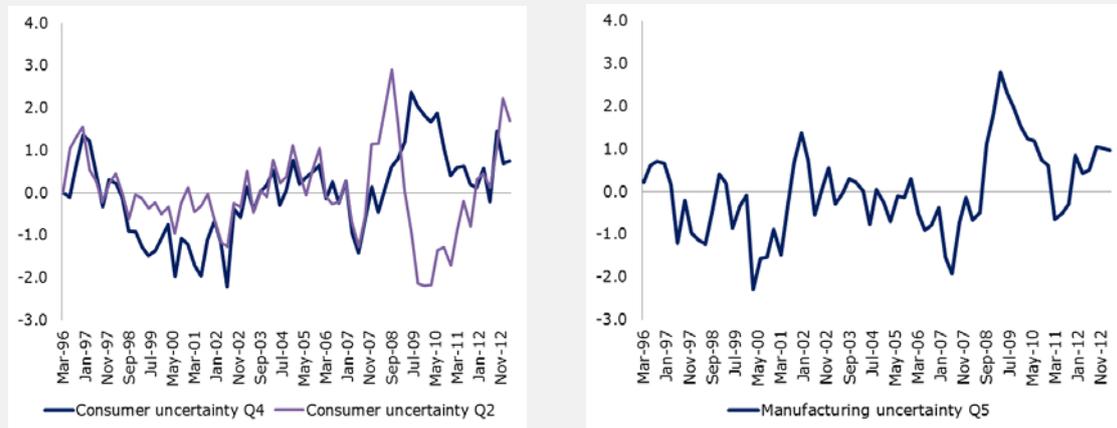

References:

Bachmann, R., Elstner, S. and E.R. Sims (2010), 'Uncertainty and economic activity: evidence from business survey data', *National Bureau of Economic Research*, Working Paper No. 16143, June.

Fuss, C and P. Vermeulen, (2004), 'Firms' investment decisions in response to demand and price uncertainty', *European Central Bank*, Working Paper Series No. 347, April.

Graph I.2: **Uncertainty is highly counter-cyclical (1)**

(1997Q1-2013Q1)
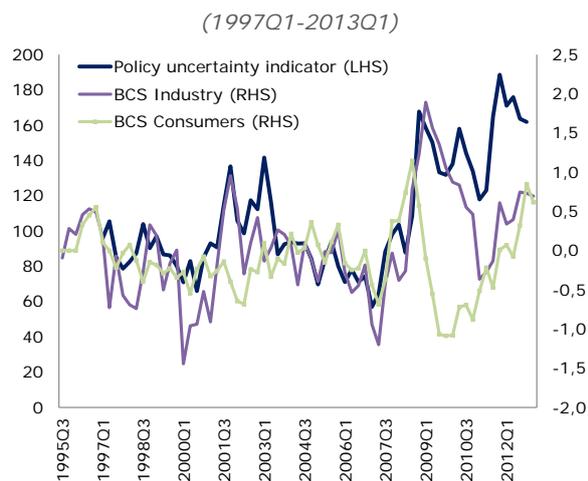
(1) LHS: Index of Policy Uncertainty; RHS: Index of uncertainty based on dispersion of BCS responses.
Source: Baker, Bloom and Davies (2013); DG ECFIN calculations based on EU Business and Consumer Surveys.

All three measures of uncertainty represented in Graph I.2 are correlated with the business cycle,

rising during recessions, and falling during boom times, although in the case of consumers this is less pronounced than for the other two indicators. However, during the last cycle (2008-12), uncertainty has reached exceptionally high levels, and has oscillated sharply.

For the BCS industry and the Policy Uncertainty indicators, uncertainty increased sharply in 2008 to reach unprecedented levels, and it has remained high since then, despite a decrease in 2009-10. Policy uncertainty abated again since the beginning of 2012, which may largely be due to improvements in the governance of the euro. The BCS indicator has shown only very modest improvements since the beginning of 2013. Overall, the correlation between the BCS industry uncertainty indicator and the Policy Uncertainty Indicator is strikingly high (0.7), given that the two measures are based on completely different methods and capture different concepts of uncertainty.

By contrast, the BCS consumer uncertainty indicator has followed a somewhat different

evolution throughout this cycle. As the other two indicators did, it increased sharply in the early stages of the recession but then it dropped much more rapidly. It increased again between 2010 and 2012, but more steeply than the other two indicators did. This points to a bigger impact of the sovereign crisis on consumer uncertainty.

I.3.1. Country dimension of uncertainty

Whereas the euro area-wide BCS uncertainty indicators for industry and consumers have clearly followed a crisis-related pattern, their evolution at the country level has shown a high degree of heterogeneity.

For the BCS consumer indicator, there has been a distinct pattern between 'core' and 'peripheral' countries since as early as 2002 (Graph I.3). Consumer uncertainty increased in the core countries between 2002 and 2006, but it decreased

Graph I.3: **BCS consumer uncertainty is at record levels in peripheral countries (1)(2)**

(1) Core: Ireland, Italy, Spain and Portugal; Periphery: Austria, Belgium, Finland, France, Germany and Netherlands.
(2) Index of uncertainty based on dispersion of BCS responses.
Source: DG ECFIN calculations based on EU Business and Consumer Surveys.

in peripheral countries. It increased sharply for both country groups in the very early stages of the crisis, before decreasing again in 2009. Since 2010, uncertainty has been on an increasing trend for both country groups, but whereas uncertainty in the periphery now is at record-high levels, it remains low in the core.

At present, all peripheral countries (Spain, Italy, Portugal, and Ireland) are suffering from

exceptionally high levels of uncertainty. However, for the core countries, the evolution of uncertainty has been more heterogeneous. For instance, whereas uncertainty in Germany is at a record-low level, France is experiencing a high level of uncertainty by historical standards.

The BCS industry indicator also shows substantial differences by country. However, it is difficult to draw any meaningful pattern from country developments. Regression work also shows that the overall euro area industry uncertainty indicator correlates better with investment fluctuations at the country level than the individual country industry indicators. This suggests that, contrary to the consumer indicator, the country dimension of the industry indicator is probably not very robust and that the analysis of this indicator should be limited to the aggregate euro area level.
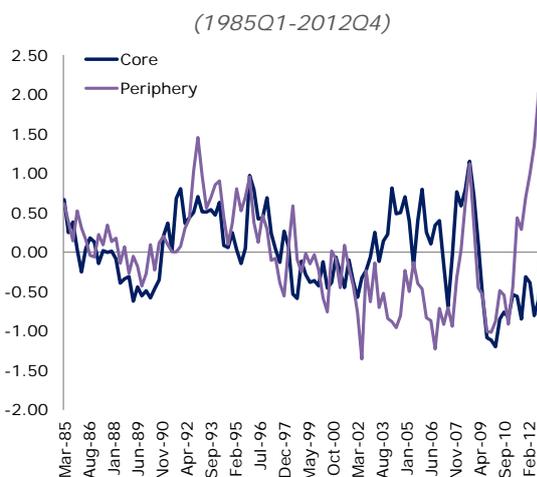
I.4. Estimation of the macroeconomic impact of uncertainty

Some insights from the empirical literature

So far, most empirical research has tried to estimate the impact of uncertainty on investment or GDP based on some of the existing uncertainty measures listed in section I.1 using VAR models. Although existing research has established a negative correlation between uncertainty and investment, there is no real consensus regarding the magnitude of the effect. For instance, Baker, Bloom and Davies (2013) estimate that an increase in uncertainty of the same magnitude as the one experienced between 2006 and 2011 results in a decline of investment of about 14% in levels, and a fall in GDP of about 2.6 %. Kose and Terrone (2012) estimate that a one standard deviation increase in uncertainty reduces investment growth by between 0.7 and 2.2 p.p.

By contrast, other authors such as Bachman et al. (2012) (⁹) conclude that uncertainty has a limite impact on economic activity. They argue that high uncertainty is a mere epiphenomenon of bad economic times, and that recessions breed uncertainty. A number of other researchers have concluded that the direction of causality runs from uncertainty to the business cycle but, so far, the sense of the causality is not firmly established.

(⁹) Bachman et al. (2010), op. cit.

Box I.2: **The impact of uncertainty on productive investment**

Based on the neo-classical framework of investment (Jorgenson, 1971), an investment equation is estimated in an error correction framework. The long-term equilibrium is identified as a co-integrating equation that relates productive investment to traditional long-term determinants, such as the cost of capital, to which variables that express the financial position of the corporate sector are added. The short-term dynamic equation links changes in investment to its own lags, lagged changes in GDP, lagged changes in the cost of capital, (¹) lagged changes in the ratio of equity liabilities to total liabilities, lagged deviation of investment from its long-term value (the error correction term) and lagged changes in several economic activity and policy uncertainty indicators. The estimation methodology was originally proposed by Stock and Watson (1993) and extended to a panel context by Kao and Chiang (2000). The analysis includes nine euro-area Member States during the period 1996 q2 - 2011 q4. Cyprus, Estonia, Greece, Ireland, Luxembourg, Malta, Slovenia and Slovakia were not included in the panel due to data availability problems.

Results

In the long term, the volume of productive investment is determined by real GDP, the real cost of capital and a measure of the corporate sector financial position calculated as the ratio of equity liabilities to total liabilities. The latter variable gives an indirect measure of the external financing premium attached to the corporate sector. The higher the ratio, the lower the external financing premium should be. The long-term elasticities are shown in the table below for the period 1996 q2 - 2007 q4, for which investment seems to be explained by its long-term determinants, as estimated in the co-integrating equation. In the long term, a 1% increase in the cost of capital will lead to a decrease in investment of 0.6%, while a 1% decrease in the ratio of equity liabilities to total liabilities will dampen investment by 0.15%. From 2008 q1 to 2011 q4, a structural break in the long-term relationship disconnects investment levels from its long run fundamentals.

	Productive investment	Real GDP	Real cost of capital	Equity liabilities/Total liabilities
Long run elasticities	1	-1,16	0,64	-0,15

Note: The variables are all non-stationary. Group tests for the null of co-interation were performed. The real cost of capital is calculated as log(1+real cost of capital). All variables are in logs. The model was estimated by DOLS. All estimated coefficients are significant at 1%.

Short-term elasticity is illustrated in the table below. Columns (1) and (2) show the estimates for the period 1996 q4 - 2007 q4, for which the long-term investment equilibrium is given by the co-integrating relation. Columns (3) to (5) show the estimates for the period 1996 q4 - 2011 q4, using for the deviations from the long-term equilibrium for the period 2008 q1 - 2011 q4 theoretical model-based estimates of the error correction term (ECT). The ECT is also interacted with a time dummy for periods after 2008 to account for the structural break. Column (4) gives the estimates when both activity uncertainty and policy uncertainty are taken into account. Column (5) gives the estimates when the BCS balance is used to account for the cycle.

Variable	1	2	3	4	5
Error correction term (t-1)	-0.1309***	-0.1548***	-0.1015***	-0.1169***	-0.1011***
2008 Dummy*Error correction term (t-1)			0.0201	0.0313	0.017
Changes in productive investment (t-2)	0.2607***	0.2593***	0.1283***	0.1322***	0.1108**
Changes inr real GDP (t-1)	0.6252***	0.4770**	0.9154***	0.8275***	0.8172***
Changes in equity/total liabilities (t-1)	0.1854***	0.1998***	0.1487**	0.1672***	0.1245**
Changes in the BCS industry uncertainty indicator (t-2)	-0.0016	-0.0012	-0.0028***	-0.0027***	-0.0026***
Policy uncertainty based on Stanford indicator (t-1)		-0.0124**		-0.0184***	
BCS balance (Q5) (t-1)					0.0002**
2008 Dummy			-0.0117***	-0.0117***	-0.0114***

*Note: ***, ** and * denote respectively statistical significance at 1, 5 and 10%.*

(¹) For details on the construction of the real cost of capital variable, see 'Prospects for non-residential investment in the euro area, Box 8: The real cost of capital', in *Quarterly Report on the Euro Area* (2008), Vol.7, No 4.

(Continued on the next page)

Box (continued)

The estimated parameters in the short-term dynamics bring several interesting results for the period considered:

- For the pre-crisis period, 1996q4 - 2007 q4 (*Column (1) and (2)*), when investment deviates from its long-term determinants, the ECT term brings the system back to the long-term equilibrium from the following quarter (i.e. the estimate on the ECT is significant at 1%). Normal time economic activity uncertainty over the cycle has no impact on the short-term dynamics when investment is determined by fundamentals (i.e. the estimate on the BCS uncertainty indicator in industry is insignificant, *Columns (1) and (2)*). However, policy uncertainty is negatively correlated with investment growth (*Column (2)*).

- During the crisis period, 2008 q1 - 2011 q4 (*Columns (3) to (5)*), investment is no longer given by its long-term determinants, the long-run relationship displaying a structural break. For this period, the long-term determinants of investment do not matter for the short-term investment dynamics (i.e. the estimate on the ECT interacted with the 2008 time dummy is insignificant). However, the impact of the uncertainty indicators increases. The BCS indicator in industry become significant in the short term (*Columns (3) and (5)*), while the impact of policy uncertainty increases (*Column (4)*). During the crisis period, both the economic activity and the policy uncertainty indicator are negatively correlated with investment growth.

References

Jorgenson, D. (1971). 'Econometric Studies of Investment Behaviour: A Review', *Journal of Economic Literature* 9, No. 4: pp. 1111-1147.

Kao, C. and M.H. Chiang (2000), 'On the estimation and inference of a co-integrated regression in panel data', in Baltagi B. (ed.), 'Non-stationary panels, panel co-integration, and dynamic panels', *Advances in Econometrics*, Vol.15, Amsterdam: JAI Press, pp. 179-222.

Stock, J. and M. Watson (1993), 'A simple estimator of co-integrating vectors in higher order integrated systems', *Econometrica*, 61(4), pp. 783-820.

A less-explored channel has been the impact of uncertainty on consumer spending. The theoretical impact of uncertainty on consumer spending is also based on the principle that, when purchases of durable goods such as homes are costly to revert, households respond to increases in uncertainty (e.g. over their future income or taxes) by reducing their consumption of durable goods below their normal levels. However, empirical research by Knotek and Khan concludes that changes in uncertainty account for only a small part of the total fluctuations in household spending. [10] Another channel through with uncertainty can impact consumer expenditure is through employment: Arpaia and Turrini [11] find that changes in policy uncertainty make the unemployment rate more responsive to changes in output as employers become more reluctant to hire when the policy environment becomes more uncertain.

The approach followed in this focus section bypasses some of the shortcomings of using VAR models. A drawback of VAR models is that they may omit important explanatory variables and may therefore overestimate the impact of uncertainty on economic activity.

By using fully-specified consumption and investment equations, the bias due to omitted variables is likely to be reduced significantly. Another advantage of the current approach is that it estimates uncertainty using country-specific measures of uncertainty, allowing to better match country-specific conditions. Finally, most of the empirical work so far has estimated the impact of uncertainty on either investment or consumption in isolation. In this focus section, the impact of uncertainty is estimated for both industry and consumers.

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[10] Knotek, E.S. and S. Khan (2011), op. cit.
[11] Arpaia, A. and A. Turrini (2013), 'Policy-related uncertainty and the euro-zone labour market'; *ECFIN Economic Brief* Issue 24, European Commission.

Box I.3: The impact of uncertainty on private consumption

This box presents an assessment of the impact of uncertainty on private consumption based on an estimated consumption model. The model is an error correction model composed of a medium-term co-integrating equation and a short-term equation. It is estimated for a panel of eight euro-area countries (DE, EL, ES, FR, IT, AT, PT, FI) over the period 1999 Q1 to 2012 Q4. The choice of the countries and relatively short time sample were dictated by data availability.

The medium-term co-integrating equation relates consumption to its traditional determinants: disposable income, net financial wealth and house prices (all in real terms). To capture the effect of credit constraints on consumption, it also includes the ratio of household credit to house prices. The ratio is assumed to be correlated with banks' loan-to-value ratios, meaning that an increase can be interpreted as an easing of credit constraints, which should have a positive impact on consumption. This is in line with recent research showing that, for the euro area as a whole, households' savings and mortgage demand can be modelled jointly as a system of two co-integrating relationships and that the ratio of mortgage to household wealth is then a meaningful component of the savings co-integrating relationship (Balta and Ruscher (2012)). The medium-term relationship is estimated with dynamic OLS (including a time trend). The results are presented in the table below.

	Real consumption	Real disp income	Real net foreign assets	Real house prices	Ratio of credit to house prices
Coefficient	1	-0.1950***	-0.0436***	-0.2195***	-0.1702***

Note: All variables are in logs. The model was estimated by DOLS. All estimated coefficients are significant at 1%.

The next table shows a number of variants of the short-term equation relating consumption to the same determinants as in the medium-term equation (all in first differences) and the error correction terms from the medium-term equation. The real long-term interest rate is an additional regressor entered in levels as tests indicate that the variable is stationary. The equation allows testing the impact of three measures of uncertainty: two indicators based on consumer survey data and the policy uncertainty indicator constructed by Baker et al. The survey-based indicators are stationary and can therefore be tested in levels. However, the policy uncertainty indicator is not stationary, and therefore enters the equation in first differences.

Variable	1	2	3	4	5
Cointegrating equation residual (-1)	-0.2883***	-0.2878***	-0.2803***	-0.3475***	-0.3195***
Δlog_net foreign assets (-1)	0.0851***	0.0858***	0.0774***	0.0563***	0.0980***
Δlog_credit / house prices (-1)	0.1250***	0.1242***	0.1275***	0.0375	0.0568
Δlog_real house prices (-2)	0.1230***	0.1219***	0.1239***	0.0283	0.0496
Long-term interest rate (-1)	-0.0011***	-0.0011***	-0.0011***	-0.0008**	-0.0009***
Consumer uncertainty Q2 (-2)	-0.0020***	-0.0020***	-0.0019***	-0.0010**	-0.0011**
Consumer uncertainty Q4 (-2)		-0.0001			
ΔStanford indicator (-1)			-0.0001**		
BCS balance consumer Q2 (-1)				0.0005***	
Crisis dummy * Cons.uncertainty Q2 (-2)					-0.0026***
Crisis dummy					-0.0047***

*Note: ***, ** and * denote respectively statistical significance at 1, 5 and 10%.*

Results show that the regression coefficient of the uncertainty indicator based on the Q2 question of the consumer survey (*consumers' expected financial situation*) is meaningful and negative, i.e. consumer uncertainty has a negative impact on consumption (column 1). The uncertainty indicator based on the Q4 question (*consumers' expectations regarding the general economic situation*) is also statistically significant but its impact is less strong and becomes statistically insignificant when estimated jointly with the other consumer indicator (Col 2). Adding the policy uncertainty indicator does not alter significantly the results obtained for the survey based indicator Q2 (column 3). The two uncertainty indicators are negatively and meaningfully correlated with consumption although the survey indicator shows some lead relative to the policy one as the former is lagged by two quarters and the latter by only one quarter. As the policy indicator enters the

Box (continued)

equation in first differences, it appears to have a less persistent effect than the survey indicator. The survey indicator of uncertainty also remains significant when the simple balances to the corresponding survey question (Q2) come into the equation (column 4). This suggests that the measure of uncertainty derived from the consumer survey adds information to traditional consumer confidence indicators. The same applies when the more general indicator of consumer confidence is used (not shown in the table). Finally, tests with a crisis dummy (set to 1 since 2009) indicate that the effect of uncertainty on consumption may have increased since the crisis (column 5). This suggests that consumers may now be more sensitive to uncertainty, which may reflect negative interactions between uncertainty and credit constraints: increases in uncertainty may be more difficult to cope with when credit constraints are more binding.

Overall, the Q2 survey indicator of uncertainty appears to be better correlated with consumption than the policy indicator, once the long-term determinants of consumption have been taken into account. On the basis of this indicator, uncertainty appears to have a substantial impact on private consumption. In countries such as Spain, Italy, France or Portugal, where uncertainty appears particularly high at the current juncture, a return of uncertainty to its pre-crisis long-term average could boost consumption by 1.5-2.0 % over 18 months. The effect could be even stronger (2.0-3.0%) if consumers' apparently stronger sensitivity to uncertainty since the crisis is taken into account.

Reference:

Balta, N. and E. Ruscher (2012), 'Household savings and mortgage decisions: the role of the 'down-payment channel' in the euro area', *European Economy, Economic Papers*, No. 445, September.

I.4.1. Assessing the impact of uncertainty on investment and consumption

The BCS and Policy Uncertainty indicators are tested in fully specified investment and consumption models using panel estimations of Error Correction Models (ECM) — see further explanations in Box I.2 for the investment equation and Box I.3 for the consumer equations.

The investment model has the following medium-term explanatory variables: GDP, the real cost of capital, and a balance sheet variable (equity / total liabilities in the non-financial corporation sector). For the consumption model, the medium-term determinants are disposable income, net financial wealth, house prices, and household credit to house prices (to capture the effect of credit constraints on consumption).

The BCS and the Policy Uncertainty indicators are tested in the short-term dynamics of the consumption and investment equations. The main findings of the exercise are:

Result 1: Uncertainty has a significant effect on both investment and consumption. If uncertainty was to return to its average pre-crisis levels, investment would increase upon impact by 1.4 %. For a similar decrease in uncertainty, consumption would experience a cumulative

increase of by between 2 and 3 % over six quarters in those countries where uncertainty is exceptionally high (i.e. in Spain, France, Italy, and Portugal).

Although the magnitude of the effects are not directly comparable (the consumption and investment equations have different dynamics specification), the results indicate that uncertainty can have a significant effect on consumption too. This is a relatively new finding, given that most research on uncertainty has focused on its impact on investment and has to a large extent neglected the consumption channel. It is worth stressing that there is no reason a-priori to assume that investment should be more affected than consumption. If anything, it could be expected that firms are better at managing uncertainty than consumers, as they have more tools at their disposal to reduce their risk exposure and see through uncertainty (hedging techniques, analytical capacity etc.).

Result 2: The effect of uncertainty on activity goes beyond traditional cyclical effects. To account for variations in the business cycle, the traditional balances of responses to the BCS consumer and industry surveys (i.e. the traditional BCS sentiment indicators) were tested alongside the uncertainty indicators. When confidence indicators are included in the estimations,

uncertainty indicators remain statistically significant, suggesting that uncertainty has an impact on economic activity, even when correcting for the business cycle.

Result 3: The effect of uncertainty has increased since the crisis. Both the BCS industry and the Policy Uncertainty Indicator are statistically significant and negatively correlated with investment, once the determinants of investment are taken into account. However, the effect of uncertainty increases in the post-crisis period. For consumption, both the BCS consumer and the Policy Uncertainty indicators are also statistically significant and negatively correlated with consumption once the determinants of consumption are included. As for industry, the detrimental effect of uncertainty on consumption has increased since the crisis.

Result 4: The BCS consumer indicator appears to be a more robust measure of uncertainty affecting consumption decisions than its industry counterpart is for investment. ([12])

The BCS consumer uncertainty indicator outperforms the Policy Uncertainty Indicator for consumption, but the industry indicator appears less significant for investment than the policy indicator.

There are several reasons that could explain why, by construction, the BCS consumer indicator could be a more robust measure of uncertainty than the BCS industry indicator. First, whereas companies are asked about their production expectations in the next 3 months, households are asked about their financial situation in the next 12 months, and it is likely that a longer time horizon yields a more robust assessment of uncertainty in expectations. Second, responses to survey questions can fall into five categories for consumers against only three for industry. This higher granularity is likely to make the consumer indicator more responsive to changes in economic conditions.

Overall, the econometric analysis shows that uncertainty can have a meaningful effect on both consumption and investment decisions. It is worth stressing, however, that this effect is probably underestimated since some of the effects of

uncertainty are likely to have been captured by other explanatory variables, such as interest rates or consumer wealth through increased risk-premia. Obviously, this analysis ignores possible second-round 'Keynesian' effects, as uncertainty may depress investment and thereby economic activity, disposable income and consumption.

I.5. Conclusion

Although financial market uncertainty has abated significantly in recent months, other forms of macroeconomic uncertainty remain high. Measures of policy uncertainty or measures of divergence in consumers' and firms' expectations have shown sharp rises since the beginning of the crisis. They remain close to historical highs and have so far shown only limited signs of improvement. Some uncertainty indicators point to particularly high uncertainty in peripheral countries, but also in some other Member States such as France.

The econometric analysis presented in this focus section indicates that uncertainty is hindering economic activity significantly in the euro area, and having a negative effect on both consumption and investment spending.

The impact of uncertainty on economic activity has increased significantly since the financial crisis. Although further research is needed to understand the causes of this change, possible explanations include credit constraints and balance sheet effects as well as non-linear effects of uncertainty on activity.

Overall, the policy measures taken both at the euro area/ EU and the Member State level to improve the governance of EMU, address perceived redenomination risks and reform Member Sates' economies have helped to reduce uncertainty on financial markets substantially. However, for businesses and households, uncertainty remains unusually high, which calls for policy action to make the road ahead more predictable.

([12]) Further work needs to be undertaken to understand the reasons behind this discrepancy.