

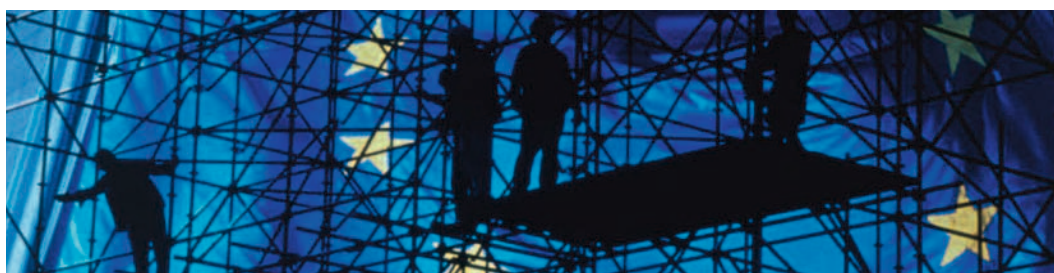


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INTRODUCING SYSTEMIC FINANCIAL INSTABILITY INTO MACROECONOMICS: HOW TO MEET THE CHALLENGE?

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By Philipp Hartmann, Kirstin Hubrich and Manfred Kremer

In times of systemic financial instability the behaviour of the macroeconomy changes fundamentally, in that both the volatility of financial shocks and the way they are transmitted through the economy change regime. This is the result of one empirical contribution to a novel literature that tries to incorporate systemic financial instability, and with it the lessons of centuries of financial crises, into standard macroeconomic models. The lead article in this issue of the Research Bulletin first reviews this literature and then presents the building blocks of the above contribution, including what it takes to empirically represent systemic financial instability.

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The results from the first wave of the Eurosystem Household Finance and Consumption Survey have recently been published and micro data are available to researchers. This article discusses the usefulness of these data for both policy-makers and researchers. A key advantage of the survey is that it allows an analysis of the considerable heterogeneity in the finances of euro area households, and how this is affected by cross-country differences in institutions and policies.

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INTRODUCING SYSTEMIC FINANCIAL INSTABILITY INTO MACROECONOMICS: HOW TO MEET THE CHALLENGE?

By Philipp Hartmann, Kirstin Hubrich and Manfred Kremer



How can widespread financial instability be incorporated into a macroeconomic model? This has proven to be a key challenge for the field of economics. Before the financial crisis economists primarily used macroeconomic models that assigned only a limited role to financial sectors – or none whatsoever. This article first reviews a selection of recent papers that make key steps towards characterisations of financial instability in macroeconomic theory. They feature, inter alia, asymmetric aggregate credit constraints, endogenous risk taking and regime changes, bank defaults in equilibrium and imbalances on banks' assets or liabilities sides. It then presents a specific example of recent empirical research in this area. It concerns a vector-autoregression model of the euro area that incorporates a careful representation of systemic instability in the financial sector and allows for regime changes in the macroeconomy. The results suggest that the behaviour of the economy changes fundamentally during episodes of high systemic financial instability, as compared to its behaviour in more tranquil times. Macroeconomic frameworks that do not take these non-linearities into account are, among other things, likely to substantially underestimate economic downturns associated with financial crises.

Economic history has shown that financial crises are a regular, if infrequent occurrence, observed over extended periods of time, across a range of countries, encompassing a variety of economic systems (see e.g. Kindleberger (1978) or Reinhart and Rogoff (2009)). The financial crisis unfolding particularly as of 2008 is just the latest example. And yet, despite a long historical experience with the common features of these events and their often dramatic social consequences, until recently the most widely used macroeconomic models did not reflect the financial sector very well, let alone allow for financial instability or systemic financial crises.

This has started to change. The literature has started to focus more heavily on financial factors in macroeconomics and a small group of scholars from academia and central banks are making progress in integrating financial instability into macroeconomic models. This article focuses on such work, which the European System of Central Banks very much promotes – because of its importance for supporting policy – through a dedicated work stream within its Macro-prudential Research Network (MaRs, see ECB (2012)). The article first reviews a selection of papers that have made significant progress on the theoretical side (section 1). It then describes in greater detail one recent contribution to the empirical side (section 2). Some of the theoretical and empirical research has been produced within the MaRs. The common thread governing the choice of research covered in this article is a judgement as to how convincing the advances are in truly capturing financial instability and also how widespread, i.e. “systemic”, the financial instability represented is.¹

Theoretical macro models with financial instability

An important first step in the characterisation of financial instability in theoretical macroeconomics has been the introduction of occasionally binding credit constraints upon agents, giving rise to a non-linearity and amplification of economic fluctuations after a bad shock (e.g. Mendoza (2002, 2010), Lorenzoni (2008), Bianchi (2011) or Korinek (2011)). Typically, agents are assumed to only be able to borrow against collateral, which they may have to sell after such a shock. The “fire sale” of assets depresses their prices, which affects borrowing agents even more adversely. This pecuniary externality and vicious circle is not internalised by private contracts, meaning that in good times financing may be excessive and in bad times the economy may be particularly depressed.

The next step taken in this literature has been to set such mechanisms in continuous time frameworks (with infinite horizons, as was already the case in the discrete-time model of Bianchi (2011)), in which financing specialists can invest their wealth in firm capital and the economy can endogenously change regime from a state of tranquillity to a highly volatile crisis state and back. He and Krishnamurthy (2012), for example, discuss the crucial role that the equity capital

¹ Since there is not enough space in this article for a comprehensive literature survey, it is unavoidable that the choice of papers summarised is somewhat subjective. Moreover, the previous research upon which these papers draw cannot be mentioned. The literature mentioned in the recent MaRs report is more elaborate (ECB 2012).

of financing specialists plays within such a framework as a constraint and a factor in the transition between periods of stability and times of crisis. He and Krishnamurthy (2013) calibrate a version of the model to US data, matching the dynamics of risk premia around the 1998 hedge fund stress and the 2008 subprime crisis. Brunnermeier and Sannikov (forthcoming) address, inter alia, the risks that emerge endogenously from the system and crisis situations as states far removed from the steady-state equilibrium. Moreover, when exogenous fundamental risks are low or agents can share idiosyncratic risks (e.g. through financial innovations), then equilibrium leverage builds up, causing the volatility in the crisis regime to be further enhanced.

Another important step in this recent literature has been the consideration of banks in macroeconomic models. In one general equilibrium approach, heterogeneous banks that can default in equilibrium are combined with multiple markets. On the one hand, many aspects of this approach are particularly realistic and it makes it possible to conduct welfare assessments for financial regulations (capturing potential benefits in terms of financial stability and potential costs in terms of reduced intermediation). On the other hand, it is highly complex and usually requires drastic simplifications to reach concrete conclusions. For example, Goodhart, Sunirand and Tsomocos (2006) discuss, inter alia, the welfare effects of capital regulation and the role of bank contagion. Goodhart, Kashyap, Tsomocos and Vardoulakis (2012) discuss a host of financial regulations (such as loan-to-value limits, capital and liquidity requirements, dynamic loan loss provisioning

One important step in this novel literature has been the introduction of heterogeneous banks into macroeconomic models in which bank default can occur as an equilibrium outcome.

and margin requirements on repurchase agreements) in terms of their ability to contain sources of financial instability and their overall welfare effects. They also illustrate the scope for regulatory arbitrage through shadow banks.

Another approach is to include heterogeneous defaultable banks in dynamic stochastic general equilibrium (DSGE) models of the macroeconomy, as they were widely used

before the present crisis. At the time, there was not usually any particular role assigned to the financial sector and the models were linearised around the steady-state equilibrium. In contrast, Martinez-Miera and Suarez (2012) embed the classical corporate finance view of bank moral hazard and the role of bank capital into a DSGE model and analyse – taking the associated non-linearities into account – how an endogenous share of banks assume systemic risk (which implies that they are exposed to shocks that make them fail together). Under the calibration chosen, the authors find that the optimal level of bank capital is quite high and should be introduced gradually. Clerc et al. (2013) allow for defaults of heterogeneous banks, households and firms in equilibrium. Covering the three main forms of systemic risk (contagion, aggregate shocks and unravelling of widespread imbalances; see ECB (2009)), their objective is to develop a non-linear quantitative tool to assess a range of macro-prudential regulatory policy instruments.

The third approach for capturing financial instability in macroeconomics related to the role of banks does not model in detail their default in equilibrium, but features other imperfections – originating on the liabilities or assets side of their balance sheet – that lead to amplified aggregate fluctuations. De Walque, Pierrard and Rouabah (2010) incorporate two banks, one lending and the other borrowing in the interbank market, in a linearised DSGE model. Negative shocks may impose “bankruptcy” disutility and costs upon them, which increase the interbank rate, reduce interbank lending and thereby amplify macroeconomic fluctuations. Financial instability in the (static) general equilibrium model of Boissay (2011) is represented as the scope for freezes of (runs on) banks’ wholesale funding markets. Banks differ in their ability to assess the investment projects they fund, but their financiers cannot observe their proficiency. As a consequence there may be multiple equilibria; a crisis equilibrium in which wholesale funding markets freeze – because financiers lose trust in banks’ investment choices – and economic activity collapses;





and a non-crisis equilibrium in which bank leverage and economic activity are high. Any shift from one equilibrium to the other is unpredictable and implies a major non-linearity in its economic impacts. Boissard, Collard and Smets (2013) introduce the possibility of wholesale bank funding market freezes in a DSGE model, showing how protracted credit booms can be followed by such liquidity crises (and without multiple equilibria). The crises can happen entirely endogenously and agents form expectations about them (anticipating their likelihoods). Calibrating the model to US data, they argue that the welfare losses of such wholesale funding market freezes tend to be more pronounced than is the case for occasionally binding credit constraints. Gertler and Kiyotaki (2013) incorporate self-fulfilling retail depositor runs in a DSGE. The shift from the no-run to the run equilibrium is again a major non-linearity, but in tranquil periods the possibility of a bank run is unanticipated. The existence of the bank run equilibrium depends on the balance-sheet strength of the banks and their endogenous liquidation value, so that a severe negative shock in tranquil periods can bring it into the picture. Aoki and Nikolov (2012) capture two types of non-linearities; one through the leverage constraint of banks hit by a negative shock and another one through switches between multiple equilibria. The multiple equilibria, however, do not originate from the liabilities side of the balance sheet, but from their incentives to not only lend to firms, but also to invest in assets whose values may deviate from fundamentals in a self-fulfilling manner. When trust in the valuation of these assets erodes, the equilibrium materialises in which banks make losses, they deleverage and the economy collapses.

Example of an empirical macro model with systemic financial instability

Earlier empirical literature is broadly divided into two branches. One branch looks at macroeconomic variables that explain or even predict banking or other financial crises (“early warnings”) (e.g. Gorton (1988), Demirgüç-Kunt and Detragiache (1998) or Goldstein et al. (2000)). The second branch estimates the adverse macroeconomic consequences of financial crises, such as their output losses or fiscal costs (e.g. Bordo et al. (2001), Hoggarth et al. (2002), Adrian, Moench and Shin (2009) or Barkbu et al. (2012)). Schularick and Taylor (2012) cover elements of both.

Empirical macroeconomic models that can capture the non-linearities associated with financial instability are extremely scarce and, until very recently, were non-existent. This is why we have chosen to describe in greater detail the contribution by Hartmann, Hubrich, Kremer and Tetlow (2013) in this article, as their paper introduces a representation of systemic financial instability in a macroeconomic model of the euro area that can exhibit structural instability. The emphasis is placed on the non-linear effects of systemic financial instability on economic activity.

An empirical representation of systemic financial instability

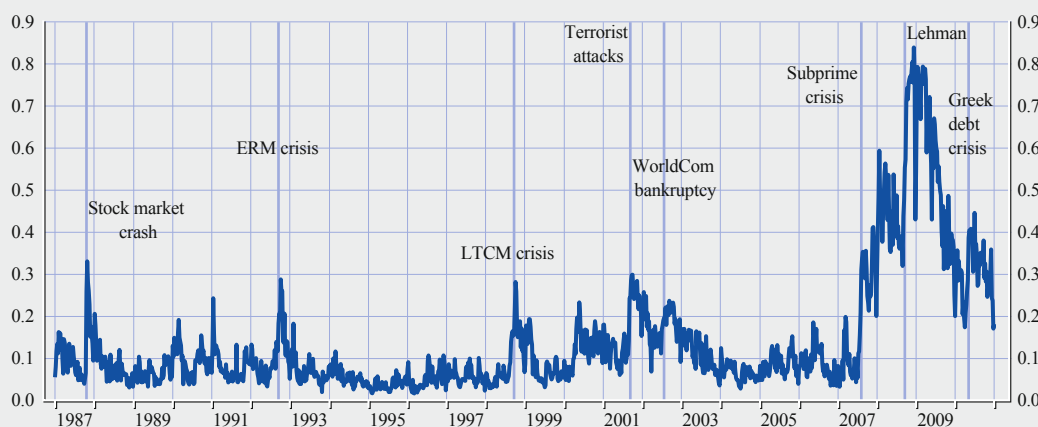
An important starting point is to fully capture the extent of systemic financial instability at a given juncture. The authors employ the novel Composite Indicator of Systemic Stress (CISS; Hollo, Kremer and Lo Duca (2012)) displayed in Chart 1. This indicator has been designed in line with the standard definitions of systemic risk, covering stress levels in the major components

A broad financial stress indicator with time-varying dependence between the different components of a financial system, emphasising the systemic dimension of financial instability, is integrated into an empirical macro model that allows for regime changes.

of financial systems and how they relate to each other. For each component – financial intermediaries, money, bond, equity and foreign exchange markets – stress is captured mainly through a set of volatility and spread measures. The *systemic* character, emphasising situations in which *many* sectors of a financial system are highly stressed *at the same time*, distinguishes the CISS from most other financial stability indicators. Its scope is wider and more systematic and the

Chart 1 Euro area Composite Indicator of Systemic Stress – CISS

(defined over the range from 0 to 1)



Source:

individual components are aggregated using a novel approach that applies basic portfolio theory, enabling the interdependence of stress levels in the main types of markets and intermediaries to vary over time.

General model setup, non-linearities and feedback effects

The CISS is incorporated along with four other major macroeconomic and financial variables (industrial production growth, inflation, three-month money market rate, loan growth) in a multivariate econometric model that takes all their interdependencies into account, allowing for feedback and amplification effects. The two-way interaction between the financial and real side of the economy is one important feature that distinguishes this approach from standard stress-testing.

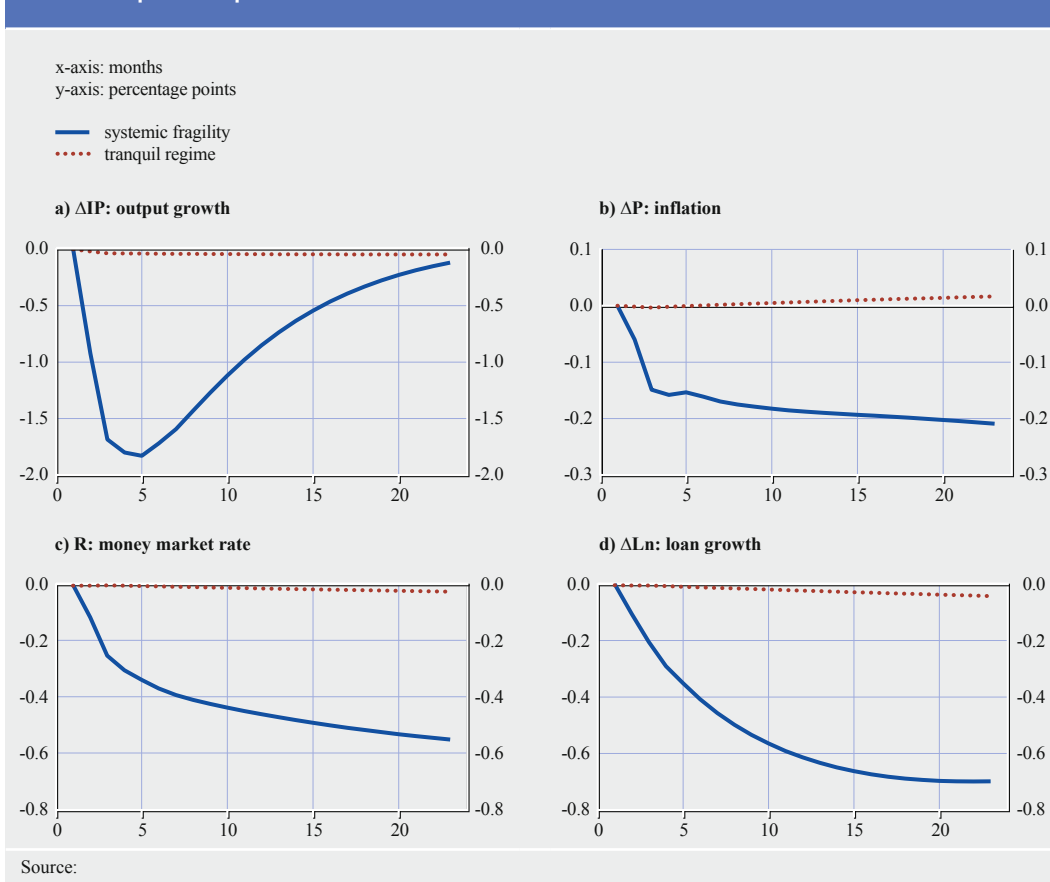
The existence of potential non-linearities is investigated in a richly specified Markov-Switching vector-autoregression (MS-VAR) model estimated with Bayesian methods, as developed by Sims, Waggoner and Zha (2008) and employed by Hubrich and Tetlow (2012) to study the interaction between financial stress, economic dynamics and monetary policy in the US economy. The Markov switching framework allows for discontinuous adjustments among and between the different financial and macroeconomic variables, as the theory and practice of financial crises suggests. The model is estimated on monthly data for the euro area over the period from January 1987 to December 2010.

The dual nature of regime changes: Economic structure and size of shocks

The results support the view that the macroeconomy functions fundamentally differently during times of widespread financial instability, as compared to how it functions during tranquil periods. First, the model identifies two regimes for the estimated parameters, describing the structure of the economy and therefore the transmission of shocks through it. One parameter regime implies strong financial-real linkages and the other implies weak ones. Second, the results suggest the existence of three regimes for the model error variances, describing the average sizes of shocks hitting the economy. One of them can be clearly associated with times of large systemic financial shocks due to the vast increase in the variance of CISS innovations. We classify the regime joining the largest shock variances with the strongest financial-real linkages as “systemic fragility”, because the economy is most vulnerable overall under such circumstances.



Chart 2 Impulse responses to a CISS shock



The effect of systemic financial instability on the real economy

Chart 2 presents the impulse responses of the other endogenous variables to shocks in the CISS. In general, the effects of such systemic financial shocks in the regime with the most extreme changes

The effects of systemic financial shocks on output growth in regimes of high systemic instability are much larger than in tranquil periods.

in model parameters and shock variances (“systemic fragility”) are much larger than they are during tranquil periods. For example, an increase of the CISS by only 0.1 leads to a sharp decline in output growth by 2 percentage points over the first five months, only recovering gradually (solid red line in the upper left-hand panel of Chart 2), despite lower money market rates likely reflecting an accommodating monetary policy reaction (lower left-hand panel). Changes to loan growth seem to play an important role in the adjustment process (lower right-hand panel). In contrast, the impulse response functions of similar financial

shocks in the tranquil regime (characterised by low variances and weak financial-real linkages) shows almost no growth losses and responses of the remaining variables, respectively (dashed blue lines in Chart 2).

The euro area economy moved to the “systemic fragility” regime in May 2008, i.e. between the Bear Stearns takeover and the Lehman Brothers failure. Before that time a financial turmoil regime had prevailed, which was characterised by high variances and low financial-real linkages. A few months later the systemic financial crisis broke out, also illustrated by the CISS in Chart 1, giving rise to the “meltdown” of the euro area economy observed in late 2008 and early 2009.

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WEALTH HETEROGENEITY AND THE RESPONSE OF CONSUMPTION TO SHOCKS¹

By Jiri Slacalek



According to survey data in a number of developed economies, income and wealth are unevenly distributed between individual households. In the United States for instance, while a large proportion of all households accumulate very little wealth, the wealthiest 10% of households hold roughly 70% of total wealth in the United States. The reasons for this heterogeneity have important policy implications. This is shown by simulating an economy with a similar wealth inequality, in which households face realistically calibrated income uncertainty. Households with little wealth and few liquid assets find it difficult to smooth consumption and thus consume up to 50 cents from each additional euro received (i.e., a marginal propensity to consume (MPC) of up to 0.50). Because these households make up a substantial part of the economy's population, the aggregate MPC in such an economy is around 0.2-0.4. This corresponds well with the empirical estimates of the vast microeconomic literature. Accordingly, a transitory fiscal stimulus can be quite effective in stimulating aggregate spending, especially when transfers target low-wealth or unemployed households.

Income and wealth heterogeneity

Casual observation and micro data indicate that individual households differ in many demographic and economic dimensions. A striking example of this heterogeneity relates to income and wealth.

*Wealth is unevenly distributed:
The wealthiest 10% of households hold roughly 70% of total net wealth in the United States and just above a half of total net wealth in the euro area.*

For example, data from the Eurosystem Household Finance and Consumption Survey (HFCS) and the US Survey of Consumer Finances document that the highest earning 10% of households in the euro area and the United States earn 31% and 44% of total gross income, respectively.

Heterogeneity in net wealth is even more pronounced.² The wealthiest 10% of households hold roughly 70% of total net wealth in the United States and just above a half of total net wealth in the euro area. At the other end of the wealth spectrum, a substantial proportion of households have very few assets. For example, the least wealthy 50% of households hold 1% of aggregate wealth in the United States and 6% in the euro area.³

The concavity of the consumption function and the marginal propensity to consume

Large uninsurable income shocks, e.g. due to unemployment, are required for economic models to match wealth heterogeneity observed in the data. According to standard economic theory, households facing these risks should engage in saving for precautionary reasons. They would like to accumulate a buffer of wealth to protect their consumption from adverse shocks.

This precautionary motive is especially strong for households with low wealth, as they will be eager to restore their stock of savings to an adequate target level particularly quickly. These households have to depress their spending and boost saving. In contrast, for households with higher holdings of net wealth the precautionary motive is lower, and decreases sharply as net wealth increases. Consequently, the consumption function is concave over net wealth; it has a high slope at low levels of wealth and is flat for wealthy households.

¹ This article is based on the works co-authored with C. Carroll (Johns Hopkins University, United States) and K. Tokuoka (Ministry of Finance, Japan): Carroll, Slacalek and Tokuoka (2013a) and Carroll, Slacalek and Tokuoka (2013b).

² Net wealth is defined as the sum of real assets (including housing) and financial assets net of total liabilities.

³ For roughly 5% of households in the euro area liabilities exceed assets, meaning that their net wealth is negative. This figure is somewhat higher for the United States.

Chart 3 shows how much this non-linearity matters from a quantitative perspective by plotting consumer spending as a function of the wealth-income ratio (thick black line). The consumption function displays a substantial concavity, being very steep for poorer households, whose net wealth is just below twice their quarterly income, and quite flat for richer households. A key reason for this strong non-linearity is that households in the simulated economy are subject to income shocks which are realistically calibrated to household-level data and thus feature a significant volatility.⁴ As a result, the precautionary saving motive for poorer households is strong.

Chart 3 also shows a histogram for the empirical distribution of the ratio of net wealth to income for US households. The bars illustrate that a substantial proportion of households have little net wealth; this group inhabits the steep region of the consumption function.⁵

The precautionary saving motive for poorer households is strong. These households' marginal propensities to consume thus tend to be large.

These households' marginal propensities to consume thus tend to be large, at around 0.5. This aspect has important policy implications, in fiscal policy, for instance. If policy-makers want to maximise the effect of a fiscal stimulus on spending, transfers should be targeted at low-wealth households or the unemployed.

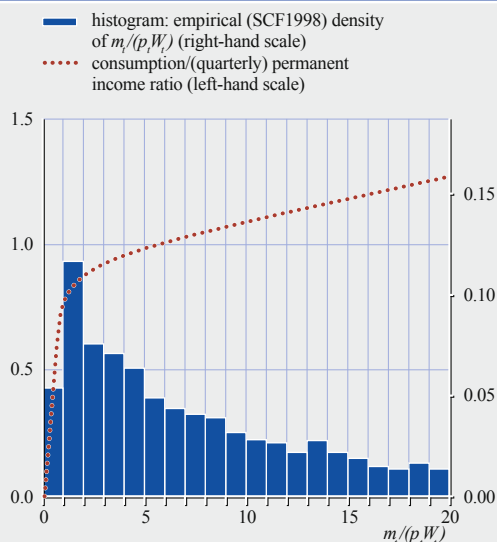
The reaction of aggregate spending to a fiscal stimulus

Carroll, Slacalek and Tokuoka have investigated the effect of a fiscal stimulus on a simulated economy in which the cross-sectional distribution of wealth matches the empirical US distribution. Such an economy displays a strong spending response to transitory transfers, with an aggregate MPC of around 0.2 (i.e. 20 cents per one dollar of transfers). Alternatively, the economy can be calibrated to a different measure of wealth. For example, when we target the US distribution of liquid and retirement assets instead of net wealth, the aggregate MPC rises to around 0.4. The reason for this increase is that in the United States the distribution of liquid assets is more concentrated around the origin than is the case for the distribution of net wealth.

Moreover, the recent data document that US households have been hit by large negative shocks to net wealth (due to the decline in house prices and financial assets), meaning that the empirical histogram in Chart 3 must shift toward the origin.⁶ Consequently, the aggregate MPC during the Great Recession could have increased slightly, as compared to the previous years.

This model calibrated to the euro area data on wealth heterogeneity and income uncertainty, implies a somewhat lower figure for the aggregate MPC, up to 0.4. The euro area MPC is found somewhat

Chart 3 The consumption function and the empirical wealth distribution



Source: Author's calculations and the Survey of Consumer Finances.



⁴ The income process has a permanent component and a purely transitory component. The functional form is based on extensive empirical literature on estimating income processes in household-level data (see Carroll, Slacalek and Tokuoka, 2013a for a summary). This form also builds on the description given in Milton Friedman's seminal work (1957) on the permanent income hypothesis.

⁵ The histogram also demonstrates that the wealth distribution is very uneven.

⁶ In particular, the Survey of Consumer Finances documents that, for example, the median ratio of net wealth to quarterly income fell from 8.5 in 2007 to 5.6 in 2010; see also Bricker et al. (2012).



smaller because the distribution of the wealth-income ratio in the euro area tends to lie to the right of the distribution in the United States. Also, estimates of income uncertainty in the euro area tend to be lower because there is a more generous system of social benefits than in the United States, implying a less steep consumption function close to the origin.

A figure for the MPC out of transitory income of around 0.2-0.4 is very much in line with the extensive empirical literature, which estimates a similar range for the MPC in response to tax rebates.⁷

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⁷ See the work of Parker (1999), Shapiro and Slemrod (2009) and Jappelli and Pistaferri (2013) and many others; see also Carroll, Slacalek and Tokuoka (2013b) for an overview of this literature.

THE EUROSISTEM HOUSEHOLD FINANCE AND CONSUMPTION SURVEY: AN IMPORTANT RESOURCE FOR POLICY-MAKERS AND RESEARCHERS

By Dimitris Christelis and Sébastien Pérez-Duarte



The newly available data from the Eurosystem Household Finance and Consumption Survey capture the considerable heterogeneity in households' finances, both within and across countries. As a result, the Survey provides policy-makers with the granular information needed for informed policy evaluation, while also enabling researchers to study a richly varied pattern of household economic decisions and outcomes.

The European Central Bank, in cooperation with the national central banks of the Eurosystem and several national statistical institutes, published the results from the first wave of the Eurosystem

The HFCS is the first harmonised survey of households' finances in Europe

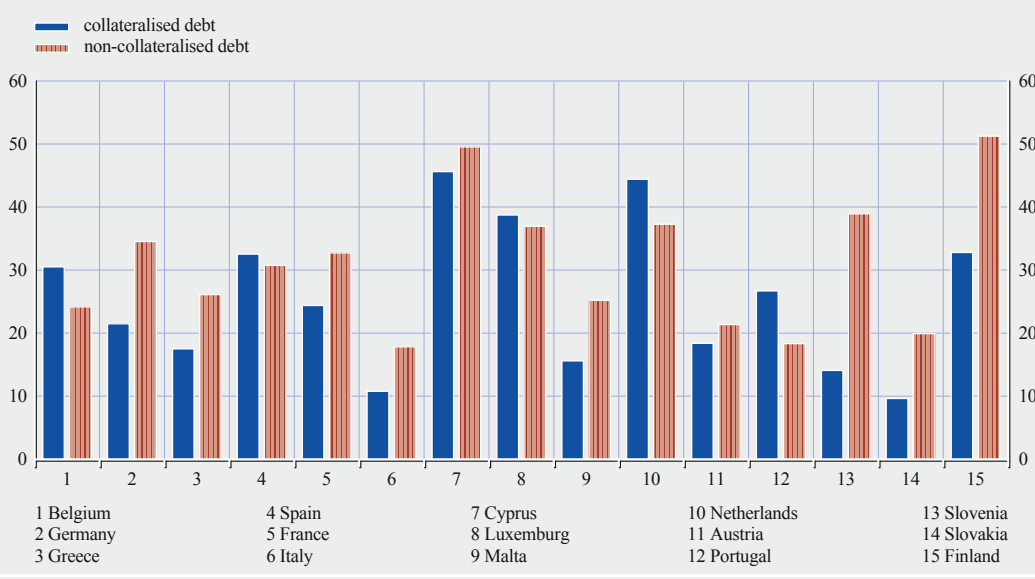
Household Finance and Consumption Survey (HFCS) in April 2013, and also started making the underlying micro data available to researchers. Approximately 62,000 households participated in the survey and were asked detailed questions on their financial position as reflected in their assets, liabilities and income items, also taking into account gifts and inheritances received. The survey also provides information on various additional topics, including family and employment status, education, consumption indicators and access to credit. The sample in each country is representative of the population.¹

The HFCS represents the first attempt to conduct a harmonised household wealth survey across the euro area and incorporates to that effect a number of already existing national wealth surveys, including the Italian Survey of Household Income and Wealth (SHIW), the Spanish Survey of Household Finances (EFF) and the Household Survey of De Nederlandsche Bank (DHS). The HFCS questionnaire is also, to a large extent, compatible with that of the Federal Reserve's Survey of Consumer Finances (SCF), which is the most important source of information on household wealth in the United States. Hence, by using the HFCS and the SCF it is possible to compare the finances of euro area households with those of their US counterparts.

¹ See the survey website, http://www.ecb.int/home/html/researcher_hfcs.en.html, for detailed documentation of the HFCS, including a set of additional descriptive statistics, and for access to the data request form.

Chart 4 Prevalence of collateralised and non-collateralised debt

(percentages of households)





Heterogeneity within countries

By now it is widely understood that micro data on households' finances provide important insights into economic developments. The significant heterogeneity in households' asset and debt holdings (as documented, for example, in Campbell, 2006) implies that the reaction to and the consequences of the various shocks hitting a country's economy will differ across the population. This fact cannot be captured by aggregate statistics.²

As an example, the effects of an appreciation in house prices or the stock market will depend on whether the households own the relevant assets or not (Campbell and Cocco, 2007). While home owners might feel more comfortable spending more when the price of their property is perceived to increase, the opposite is true for renters, who may feel the need to save more if they want to eventually buy their own home. Similarly, a rise in interest rates will have different implications for borrowers as compared to savers, and for borrowers who have fixed interest rate mortgages as compared to those with adjustable interest rate mortgages, leading to a heterogeneous transmission mechanism of monetary policy. Finally, a tightening of credit conditions will disproportionately affect younger households that need to borrow to smooth their consumption over time or those that must cope with the consequences of an adverse employment or health shock.

The ageing of the population in many industrialised countries has serious implications for the sustainability of their public pension systems, and thus points to the importance of having adequate savings for retirement. Micro-data surveys, such as the HFCS can provide detailed information on the number and characteristics of households that are in a precarious position with respect to their retirement savings. As a result, policy-makers can make more informed decisions on how to encourage household saving among particular population groups (for example, by implementing targeted financial literacy programmes or by subsidising particular financial products).

The HFCS also documents the rich heterogeneity in various dimensions of households' economic profiles, such as their demographic characteristics, education, employment history and pattern, risk preferences, expectations about their future income and inheritances and gifts received. This wealth of information can help researchers investigate the determinants of numerous economic outcomes recorded in the survey, including portfolio choices, the burden of debt, spending and retirement decisions.³

Heterogeneity between countries

The heterogeneity in household economic decisions and outcomes recorded in the HFCS is also the result of cross-country differences in history, institutions and policies followed. For example, differences in the quality of publicly provided services, such as education and health care, can have important implications for household saving. This can happen because households living in countries with a lower quality of such services may increase their saving, as they may anticipate having to pay out of their own pocket for some of these services. On the other hand, a relatively generous pension system that is perceived by households to be in sound financial shape can reduce their incentive to save for retirement (Bottazzi et al., 2006).

On the financial liabilities side, there are considerable differences between countries in the tax deductibility of mortgage interest, the down-payment on the home required by the financial institution granting a mortgage, and the ease with which a household is allowed by law to declare

² The heterogeneous impact on households of the crisis and of monetary policy during the crisis has recently been discussed by several policy makers; see, for example, Bernanke (2013) and Cœuré (2013).

³ For earlier contributions using previously existing datasets see, for example, Guiso et al. (2002), Eckel and Grossman (2008), van Rooij et al. (2011), Malmendier and Nagel (2011) and Hryshko et al. (2012).

bankruptcy. These differences in access to household debt, its tax treatment and its disposal can lead to a significant cross-country variation in household debt holdings. Indeed, in Chart 4 it is possible to see that the prevalence of both collateralised and non-collateralised debt varies substantially between HFCS countries.

The cross-country variability in households' asset and debt holdings can be traced back to differences in the prevalence of demographic and economic characteristics that influence such holdings and to differences in the amount of influence these characteristics have on such outcomes (Christelis et al., 2013). Clearly, harmonised cross-country surveys, such as the HFCS, provide rich material for researchers interested in studying the factors behind international differences in households' financial decisions and outcomes.

Conclusions

The HFCS is an important source of information on the financial and economic situations of households in the euro area, by virtue of its scope, harmonisation across countries, and future time course (a new wave is to be conducted in 2013-2014, and additional surveys are in the planning stage). This granular information can help policy-makers better understand the effects that their monetary policy and financial stability decisions have on various segments of the population. The micro data are made available to researchers and will hopefully provide a fertile new basis for research that can enhance our understanding of economic decision-making by households in the euro area.

Box

ABOUT THE EUROSISTEM HOUSEHOLD FINANCE AND CONSUMPTION SURVEY

The Eurosystem Household Finance and Consumption Survey (HFCS) is a joint project of all the central banks of the Eurosystem, and covers all countries in the euro area (currently excluding Ireland and Estonia, which will be conducting the HFCS as of the second wave). Access to the micro data is available, exclusively for research purposes, on the survey website http://www.ecb.int/home/html/researcher_hfcn.en.html. The data are not for the faint-hearted as they comprise 1.8GB of data, 26 files, 5 implicates (see infra), 1000 replicate weights, over 450 core variables and their associated shadow variables, over 210 non-core variables and 35 derived variables.

A total of 62,000 households were interviewed for the survey, with achieved sample sizes in each country of between 340 and 15,000 households; this corresponds to 154,000 persons. The fieldwork was conducted between the end of 2008 and the middle of 2011. Flow variables (e.g. income) refer to a period of 12 months, either the 12 months preceding the interview or a calendar year, while stock variables (e.g. assets and liabilities) refer to one particular date, either 31 December or the day of the interview. Most surveys were carried out with 2010 as the reference year for assets and liabilities, and 2009 as the reference year for income variables.

The statistical unit of analysis of this report is the "household", which, for the purpose of this survey, is defined as a person living alone or a group of people living together in the same private dwelling and sharing expenditures, including the joint provision of the essentials of living. The target reference population is all private households; it therefore excludes people living in collective households or institutions.





Estimating the sampling error

The HFCS uses advanced sampling and survey methods to ensure the best possible coverage of the assets and liabilities of households. One source of uncertainty in the estimates derives from the randomness of the sample selection. Sampling variance is an estimate of this randomness, and depends on the specifics of the sample selection and size. In the HFCS, sampling variance estimates are provided through bootstrap replicate weights (Rao and Wu, 1988). In several country surveys, particular care has been taken to oversample the wealthiest households to achieve higher precision.

Multiple imputation in the HFCS to correct for item non-response

All questions referring to household income, consumption and wealth that households did not know the answer to or did not wish to answer have been imputed. For the HFCS, a multiple imputation technique has been used, whereby the missing data are imputed several times independently, to produce five “implicates”, which are complete datasets that can be analysed separately using standard complete-data techniques, and then combined to produce one result (Rubin, 1996). This allows the uncertainty in the imputation to be reflected. The imputation variance is then combined with the sampling variance, and the resulting standard errors reflect both sampling and imputation variability.

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Box 1

THE COMPETITIVENESS RESEARCH NETWORK (COMPNET): FIRST-YEAR RESULTS

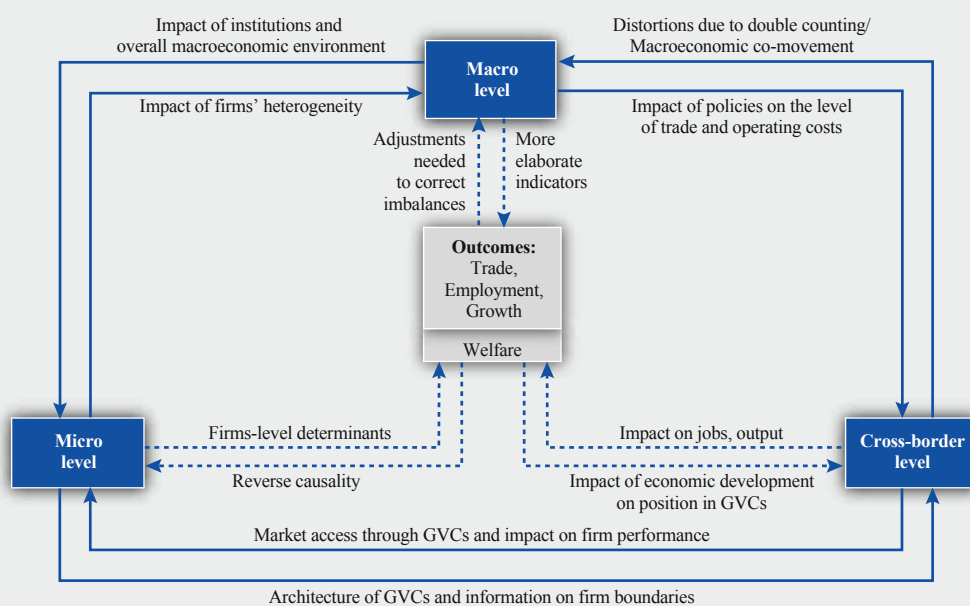
The Competitiveness Research Network (CompNet) was set up with two main objectives: (i) to improve existing frameworks and indicators of competitiveness across all dimensions (macro, micro and cross-border) and (ii) to establish a more solid connection between identified competitiveness drivers and resulting outcomes (trade, aggregate productivity, employment, growth and, essentially, welfare). Its ultimate task is to assess the impact of and provide support for the design of structural policies that aim to enhance competitiveness.

During its first year of activity, the Network has improved the existing indicators of competitiveness across all dimensions and has integrated them into a diagnostic toolkit (based on macro and firm-level information), which is designed to be used for competitiveness assessments on a regular basis.

A number of initial research results are worth mentioning. On the aggregate, macro side, additional “non-price” factors are confirmed as playing a key role in explaining trade results. To this end, CompNet has developed a number of indicators, which are more sophisticated than the ones traditionally used for policy analysis, partly because they are based on detailed six-digit product-level statistics (e.g. about 5,000 product categories). These indicators include (i) quality-adjusted export prices, (ii) product and geographical specialisation, (iii) the barometer of competitiveness pressures and (iv) the extensive and intensive margins of trade.

At the micro level, CompNet research has confirmed the crucial role played by firm-level factors (such as size, ownership and technological capacity) in understanding the determinants of productivity and, therefore, of competitiveness. In order to make progress in this field, CompNet has created an active network of 13 country teams, which are independently running a common

The CompNet approach to competitiveness assessment



Source: ECB.

algorithm to compute indicators related to sectoral labour and total factor productivity dynamics; this approach was chosen in order to deal with the problem of firm-level data confidentiality.

Firm-level indicators highlight two main stylised facts: (i) firms' productivity is highly heterogeneous across sectors, but even more so within sectors; (ii) there is a positive relationship between labour productivity and size, and with export activities. These results imply that there is substantial potential to boost overall productivity by fostering the reallocation of resources within and across industries, over and above enhancing the productivity of incumbent firms.

Finally, at the cross-border level, CompNet research aims to examine the impact of integration into global value chains (GVC) on the assessment of competitiveness. To this end, CompNet has functioned as a hub for databases and methodologies, by collaborating with a number of institutions that have conducted advanced research on constructing appropriate databases (e.g. the World Trade Organization, the Organisation for Economic Co-operation and Development and the United States International Trade Commission).

Focusing on European countries, CompNet has computed a number of indicators, including (i) the decomposition of the value added embodied in national exports, (ii) their degree of integration into GVCs, and (iii) their position in GVCs. The early results indicate that European countries are highly and increasingly integrated into GVCs. Additionally, most European-centred GVCs have moved upstream along the production chain, which is consistent with the general increase in the length of GVCs and with the outsourcing phenomenon.

In future the Network will seek to further refine the competitiveness indicators across all three dimensions, most notably by fully exploiting the newly created firm-level indicator database for EU countries. Furthermore, several projects are continuing to connect determinants of competitiveness with the most relevant outcomes (trade, growth and welfare), using contemporaneous information coming from the micro, macro and cross-border level.



Box 2

FOURTH ECB WORKSHOP ON NON-STANDARD MONETARY POLICY MEASURES

Exceptional times call for exceptional policy measures. Since the onset of the financial crisis in 2007, central banks around the globe have implemented both standard and non-standard monetary policy measures in an attempt to contain financial instability and to counter pronounced declines in economic activity.

On 17 and 18 June 2013 the European Central Bank hosted its fourth workshop on non-standard monetary policy measures. A key goal of this workshop was to assess the impact of a wide range of non-standard monetary policy measures on financial markets and on the macroeconomic environment, as well as to discuss new theoretical frameworks. The workshop included two keynote speeches, three invited paper sessions and a panel discussion.

Professors John Cochrane (University of Chicago) and Nobuhiro Kiyotaki (Princeton University) delivered keynote lectures. John Cochrane challenged the effectiveness of quantitative easing policies, cautioned against overburdening the central banks with new goals and responsibilities and emphasised the importance of fiscal backing for anti-inflationary policies, especially in times of high sovereign debt. He also voiced criticism about the effectiveness of forward guidance



announcements, arguing that their credibility is limited by their inherent time-inconsistency: central banks have strong incentives to renege on their earlier commitment to keep interest rates low after the economy emerges from recession. Nobuhiro Kiyotaki presented a new macroeconomic model with systemic bank runs, and emphasised that even the risk of such a run under an ineffective liquidity policy can pose a significant obstacle to recovery.

The first session focused on the impact of non-standard measures, such as the fixed rate full allotment policies and asset purchases, on financial markets (e.g. the secured lending (repo) market or government bond markets) and on the unsecured interbank money market. Angelo Ranaldo (University of St. Gallen) quantified the extent to which excess central bank liquidity can reduce repo market spreads, but argued that it may cease to be effective after a certain satiation point. Stefania D'Amico (Board of Governors of the Federal Reserve System) challenged the prevailing view that the effectiveness of large-scale asset purchases (LSAP) is diminishing over time; the smaller observed effects, instead, reflect improved market forecasts, and thus smaller surprises embodied in subsequent LSAP announcements. Guillaume Roussellet (Banque de France) demonstrated that liquidity policies also affect interbank lending rates, in particular the credit and liquidity risk components.

The second session focused on the impact that non-standard monetary policy measures have had on the macroeconomic environment. Roberto de Santis (ECB) quantified the impact of the ECB's three-year LTROs in terms of the improvements seen in the credit supply conditions in the euro area, and Tomasz Wieladek (Bank of England) assessed the applicability and estimated impact of a hypothetical shadow short-term interest rate on real output in the United Kingdom and the United States when the observed interest rate is stuck at the zero lower bound. David Skeie (Federal Reserve Bank of New York) argued that large central bank reserves do not necessarily constrain the central bank's ability to control inflation, provided that it can manage the remuneration rates, and François Koulischer (European Centre for Advanced Research in Economics and Statistics) showed that collateral policies could be effectively used to mitigate the effects of asymmetrical shocks within a monetary union.

A third and final session focused on theoretical frameworks. Volha Audzei (Centre for Economic Research and Graduate Education – Economics Institute) presented research that was based on a macro-financial model with heterogeneous rational beliefs (rather than standard rational expectations), which challenged the effectiveness of non-standard policies if they are unable to improve the banks' outlook, and Leonardo Melosi (Federal Reserve Bank of Chicago) argued that the puzzlingly stable inflation developments during the crisis could be the result of agents' uncertainty regarding policy-makers' commitments against ultimately using inflation to reduce the real value of the crisis-related debt.

Finally, a policy panel reviewed non-standard measures based on the respective experiences of the panel representatives: Massimo Rostagno (ECB), Shuji Kobayakawa (Bank of Japan), Mike Joyce (Bank of England), Daniel Thornton (Federal Reserve) and Huw Pill (Goldman Sachs). The policy panel discussion picked up on earlier questions relating to how best to reconcile fiscal and monetary policy interaction, in particular to avoid fiscal dominance in times of political uncertainty and crisis-related public debt. Overall, the emerging consensus was in line with the views expressed by Benoît Cœuré (ECB) that non-standard measures present potent tools to mitigate the effects of the financial crisis, that they should be targeted towards the markets that are the most impaired, for example by adopting fully demand-driven liquidity policies, and that they need to carefully trade off insurance benefits against moral hazard concerns, for example by providing only partial insurance and explicit conditionality.

The contributions to the conference can be downloaded from the ECB's website at: http://www.ecb.int/events/conferences/html/2013_ws_non-stmopomeas.en.html

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