EUROPEAN CENTRAL BANK

EUROSYSTEM

RESEARCH BULLETIN

No 16, SUMMER 2012

DOES REGULATION AT HOME AFFECT BANK RISK-TAKING ABROAD?

By Alexander Popov

Has banking integration increased risk-taking by foreign-owned banks that are exploiting regulatory differences between home and host countries? We provide the first empirical evidence that bank regulation is associated with cross-border spillover of risk through the lending activities of large multinational banks. Using micro data on business lending in 16 European countries, we find that lower barriers to entry and tighter restrictions on bank activities in domestic markets are associated with higher bank risk-taking abroad. This suggests that reducing the risk-taking of the banking sector in one market may simply push banks to reallocate risk abroad.

The increasing integration of the European banking industry offers the prospect of important gains in terms of efficiency and diversification, but it also creates potential risks. One such risk is associated with the possibility that multinational banks may shift risk across national borders, exploiting regulatory and supervisory differences between home and host countries. Three recent empirical observations motivate this hypothesis. First, bank risk-taking tends to respond to changes in domestic regulation (Barth, Caprio and Levine (2004); Laeven and Levine (2009)) and domestic supervision (Buch and DeLong (2008)). Indeed, many academics and policy-makers have blamed the recent financial crisis on poor regulation and supervision, resulting in excessive bank risk-taking prior to the crisis.[1] Second, financial institutions tend to shift poorly monitored risk exposures to taxpayers in markets where safety benefits are greater (Kane (2000); Carbo, Kane and Rodriguez-Fernandez (2009)). Third, international retail and syndicated bank lending reflects conditions in parent banks both during good times (De Haas and van Lelyveld (2010)) and during times of crisis (Cetorelli and Goldberg (2011); De Haas and van Horen (2011); Popov and Udell (2012)).

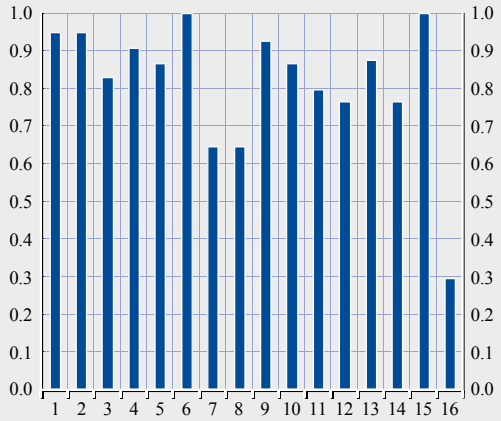
Multinational banks may shift risk across national borders, exploiting regulatory and supervisory differences between home and host countries

We build on these observations and study the link between home-country regulation and host-country bank risk-taking (Ongena, Popov and Udell (2012)). We take advantage of a dataset that uniquely connects banks and firms in a large cross-section of host countries whose local markets are dominated by subsidiaries of foreign banks. These data allow us to investigate whether business lending in local host-country markets is affected by how restrictive regulation (i.e. the rules that constrain bank conditions, behaviour and activities) is in the parent banks' home country. Crucially, we analyse the impact of home-country regulation on the *riskiness* of host-country lending. We also test whether regulation interacts with supervision (i.e. the regulatory monitoring of bank conditions, behaviour and activities) in determining bank risk-taking.

Our experimental setting is that of foreign-owned banks in central and eastern Europe and it provides an ideal laboratory to study the cross-border spillover of national regulation and supervision from home countries in western Europe. The corporate landscape in emerging Europe is dominated by small and medium-sized enterprises (SMEs), with up to 99% of all firms being classified as SMEs. With less developed capital markets and rudimentary corporate bond financing, banks are by far the main provider of external funds. In addition, foreign ownership in the banking sector grew dramatically in the last decade, and by 2008 foreign banks controlled around 80% of the assets in the region's banking industry (see Chart 1). Our identification strategy rests on observing firms' access to credit in local markets within the same country dominated by banks with parents domiciled in different home countries. This allows us to tease out the variation in bank lending standards and risk-taking associated with variations in the home-country regulatory environment.

[1] *For example, in a speech to the American Economic Association in January 2010, Ben Bernanke, Chairman of the US Federal Reserve, claimed that "stronger regulation and supervision aimed at problems with underwriting practices and lenders' risk management would have been a more effective and surgical approach to constraining the housing bubble [...]".*

Chart 1 Share bank assets owned by foreign banks



Source:

Research hypotheses

With regard to theory, there are three mutually exclusive hypotheses relating home-country regulation and bank risk-taking in foreign markets. In the simplest case, the restrictiveness of home-country regulation is uncorrelated with host-country bank lending standards. This may be, for example, because banks expand abroad through subsidiaries. Subsidiaries are separately capitalised and subject to host-country regulation by default. Therefore, how parent banks are regulated in their primary domestic market may be unrelated to how their subsidiaries abroad behave.

Second, stricter regulation at home may reduce a bank's incentives to engage in risk-taking in its primary domestic market. For example, capital regulations should reduce the risk-taking incentives for owners by forcing them to place more personal wealth at risk (Kim and Santomero (1994)). Regulators can also impose restrictions on various non-core bank activities in an attempt to contain bank risk. Moreover, they could also restrict competition if they fear that it may erode the charter value of existing banks and encourage them to pursue riskier policies in an attempt to maintain profit levels (Keeley (1990)). Such restrictive regulation may lead banks to develop more conservative business models, which they later export when they enter foreign markets.

Also, they may be induced to act abroad "as if at home" by various mechanisms, like a reputational one. This type of behaviour would in general be consistent with the empirical literature that has found that foreign-owned banks operating in emerging markets are more prudent than domestic banks (e.g. Crystal, Dages and Goldberg (2002)). Finally, if banks expand abroad through branches, the home regulator has to assess the risk of the entire conglomerate. In these cases, the restrictiveness of home-country regulation is positively correlated with bank risk-taking in host markets.

The third hypothesis is that stricter home-country regulation may induce multinational banks to embark on a deliberate strategy of risk-taking abroad to "make up" for the inability to engage in risk-taking in their home-country market. For example, international banks may have an incentive to relegate their riskier activities to their foreign subsidiaries (i.e. the bank's "periphery") to which they limit their exposure (Powell and Majnoni (2007)). In that sense, risky behaviour abroad could reflect a "search for yield" (Rajan (2006); Goldberg (2009)). Another possibility is that stricter regulation leads to more risky behaviour both in domestic and in foreign markets. For example, capital regulation might lower lending standards if owners compensate for the loss of utility from more stringent capital requirements by selecting a riskier investment portfolio (Koehn and Santomero (1980); Buser, Chen and Kane (1981)).

In addition, restrictions on various bank activities could reduce the utility of owning a bank, intensifying the risk-taking incentives of the owners relative to the managers (Laeven and Levine (2009)). Finally, less competition among banks could result in higher interest rates being charged on business loans, leading to a higher borrower credit risk as a result of moral hazard (Boyd and De Nicolo (2005)). If this is the case, then the restrictiveness of home-country regulation is positively correlated with bank risk-taking in host markets.

Home-country regulation and host-country bank risk-taking: the evidence

Consistent with the theories outlined above, we focus on four different aspects of regulation. The first is barriers to entry, or the degree to which the regulator restricts bank competition in the home market. The second is restrictions on bank activities, or the regulatory impediments to banks engaging in non-core bank activities, like securities markets, insurance, real estate and ownership of non-financial firms. The third is capital stringency, which is a measure of regulatory constraints on bank capital over and above Basel II. Finally, we use an index of prudential supervision which captures the degree to which an active agency is involved in comprehensive and independent supervision of the banking sector. We take advantage of indices already developed by Barth, Caprio and Levine (2006) and by Abiad, Detragiache and Terrones (2008).

We proxy bank lending standards and risk-taking with lending to informationally opaque firms, i.e. firms that do not have their financial accounts verified by an external auditor. Audited statements allow banks to underwrite loans primarily based on financial statement ratios and covenants associated with those ratios (Berger and Udell (2006)). Information opacity is thus related to *ex ante risk* because for audits performed by an outside audit firm, risk assessment is a crucial stage before accepting an audit engagement. In addition, recent evidence suggests that many firms (especially SMEs) choose not to file a financial report when in distress, implying that firms that do not have their accounts verified by an external auditor are more likely to default (Jakobson, Linde and Roszbach (2012)). As a consequence, information opacity also captures an important dimension of *ex post risk*.

Lower barriers to entry and tighter restrictions on bank activities in domestic markets are associated with higher bank risk-taking abroad

Our empirical tests map these various types of home-country regulation and supervision into lending to informationally opaque firms in host countries. We find that competition-reducing regulation results in higher lending standards abroad, implied by less lending to informationally opaque firms. In particular, an informationally opaque firm has a significantly higher probability of being credit constrained if it is dealing with banks whose parents are domiciled in markets with higher barriers to entry. The combined evidence implies that multinational banks which, for regulatory reasons, face less competition at home tend to extend more loans abroad, and that this higher volume of lending is associated with somewhat higher risk-taking as proxied by lending to ex ante risky firms.

Also the type of home-country regulation that reduces the scope of (especially non-core) bank activities in domestic markets results in higher risk-taking abroad, implied by relatively more lending to informationally opaque firms. An informationally opaque firm has a significantly lower probability of being credit constrained if it is dealing with banks whose parents are domiciled in markets with higher restrictions on bank activities. The evidence thus suggests that restrictions on bank activities at home lead to lower lending standards abroad. To the degree that opaque firms tend to be both ex ante and ex post risky, this effect may be interpreted in the sense that banks look abroad for the risk they cannot take on at home.

Finally, we study how these effects interact with home-country supervision. We fnd that both effects are augmented when home-country supervision is less efficient. In addition, we find some evidence that higher regulatory home-country *capital stringency* over and above Basel II increases bank risk-taking abroad if coupled with less efficient home-country supervision. This result suggests that there are substitutabilities between regulation and supervision in inducing banks to take risk abroad. As such, our results relate to theories suggesting that, for example, restrictions on bank activities may be relatively more desirable in environments where the public sector lacks the ability to monitor banks because of inefficient official supervision. Similarly, capital regulations may be especially important in countries with a regulatory environment that does not encourage private monitoring (see Barth, Caprio and Levine (2004) for an exposition of these arguments).

Conclusions

We conduct the first empirical assessment of theories that relate bank lending and risk-taking by cross-border banks in foreign markets to home-country regulation and supervision. We assess this issue by first mapping the scope of the operations of large cross-border banks in 1,976 localities in 16 countries in emerging Europe, and then studying how the loan-granting process involving 9,613 small and medium corporate clients with varying risk profiles relates to the degree of regulation and supervision in the banks' home countries. We find that lower barriers to entry in home markets, as well as home-country regulation associated with higher restrictions on bank activities, result in laxer lending standards by cross-border banks in foreign markets. Second, these types of regulation are associated with even lower lending standards abroad if coupled with inefficient home-country supervision.

Our results imply that home-country regulation that restricts banks from risk-taking in their primary domestic market, either through reducing their charter value or through restricting them from engaging in certain risky activities, may lead banks to look for risk abroad by lowering their lending standards when dealing with risky corporate customers. Determining the exact mechanism through which the effects we observe are realised is beyond the scope of our research. Our findings nevertheless suggest that domestic bank regulation and supervision have important spillover effects through the activities of cross-border banks. While the current policy debate in the EU is focused on implementing a stricter regulatory framework, our paper cautions that restrictive regulation may not eliminate risk, but simply reallocate it across markets through the actions of multinational banks.

Strict regulation may not eliminate risk, but simply reallocate it across markets through the actions of multinational banks

REFERENCES

Abiad, A., Detragiache, E. and Tressel, T. (2008), "A new database of financial reforms", *IMF Working Papers*, 08/266.

Barth, J., Caprio, G. and Levine, R. (2004), "Bank regulation and supervision: What works best?", *Journal of Financial Intermediation*, 13, pp. 205-248.

Barth, J., Caprio, G. and Levine, R. (2006), *Rethinking Bank Regulation: Till Angels Govern*, Cambridge University Press, New York.

Berger, A. and Udell, G. (2006), "A more complete conceptual framework for SME finance", *Journal of Banking & Finance*, 30, pp. 2945-2966.

Boyd, J. and De Nicolo, G. (2005), "The theory of bank risk-taking and competition revisited", *Journal of Finance*, 60, pp. 1329-1344.

Buch, C. and DeLong, G. (2008), "Do weak supervisory systems encourage bank risk-taking?", *Journal of Financial Stability*, 4, pp. 23-39.

Buser, S., Chen, A. and Kane, E. (1981), "Federal deposit insurance, regulatory policy, and optimal bank capital", *Journal of Finance*, 36, pp. 51-60.

Carbo, S., Kane, E. and Rodriguez-Fernandez, F. (2009), "Evidence of regulatory arbitrage in cross-border mergers of banks in the EU", *NBER Working Papers*, 15447.

Cetorelli, N. and Goldberg, L. (2011), "Global banks and international shock transmission: Evidence from the crisis", *International Monetary Fund Economic Review*, 59, pp. 41-76.

Crystal, J., Dages, B. and Goldberg, L. (2002), "Has foreign bank entry led to sounder banks in Latin America?", *Current Issues in Economics and Finance*, 8, Federal Reserve Bank of New York.

De Haas, R. and van Lelyveld, I. (2010), "Internal capital markets and lending by multinational bank subsidiaries", *Journal of Financial Intermediation*, 19, pp. 1-25.

De Haas, R. and van Horen, N. (2011), "Running for the exit: International banks and crisis transmission", *DNB Working Papers*, 279.

Goldberg, L. (2009), "Understanding banking sector globalization", *International Monetary Fund Staff Papers*, 56/1, pp. 171-197.

Jacobson, T., Linde, J. and Roszbach, K. (2012), "Firm default and aggregate fluctuations", *Journal of the European Economic Association*, forthcoming.

Kane, E. (2000), "Incentives for banking megamergers: What motives might regulators infer from event-study evidence?", *Journal of Money, Credit and Banking*, 32, pp. 671-705.

Keeley, M. (1990), "Deposit insurance, risk, and market power in banking", *American Economic Review*, 80, pp. 1183-1200.

Kim, D., and Santomero, A. (1994), "Risks in banking and capital regulation", *Journal of Finance*, 43, pp. 1219-1233.

Koehn, M. and Santomero, A. (1980), "Regulation of bank capital and portfolio risk", *Journal of Finance*, 35, pp. 1235-1244.

Laeven, L. and Levine, R. (2009), "Bank governance, regulation and lending standards", *Journal of Financial Economics*, 93, pp. 259-275.

Ongena, S., Popov, A. and Udell, G. (2012), *"When the cat's away, the mice will play": Does regulation at home affect bank risk-taking abroad?*, ECB, mimeo.

Popov, A. and Udell, G. (2012), "Cross-border banking, credit access, and the financial crisis", *Journal of International Economics*, forthcoming.

Powell, A. and Majnoni, G. (2007), "International banks, cross-border guarantees, and regulation", in Evanoff, D., Kaufman, G. and LaBrosse, J. (eds.), *International Financial Instability: Global Banking and National Regulation, World Scientific Studies in International Economics*, 2, pp. 279-298.

Rajan, R. (2006), "Has finance made the world riskier?", *European Financial Management*, 12, pp. 499-533.

CYCLICAL PRECAUTIONARY SAVING AND MONETARY POLICY

By Bianca De Paoli and Pawel Zabczyk

This article analyses the conduct of monetary policy in an environment in which cyclical swings in risk appetite affect households' propensity to save. It shows that the associated swings in precautionary saving motives justify an accommodative policy bias in the face of persistent, adverse disturbances. The article also argues that ignoring this channel could lead to larger policy errors in turbulent times.

Policy-making in central banks calls for an understanding of how the economy responds to economic shocks. A significant portion of the associated analyses are conducted in linear frameworks (see, for example, Woodford (2003)). That is, the underlying solutions of the models, which will often be non-linear, are approximated using "first-order" or linearised relationships. While these may be able to replicate salient features of macroeconomic dynamics, there are important areas in which their ability to "match data" is less satisfactory. In particular, all such models ignore the impact of uncertainty on the transmission mechanism of shocks.

All linear models ignore the impact of uncertainty on the transmission mechanism of shocks.

Specifically, there are two important aspects of household behaviour that cannot be captured within a linear framework. First, households in such models only care about average expected returns on assets, and not the volatility or any other "higher-order" characteristic of these returns. This implies that they require no compensation for riskier investments, i.e. the risk premia in these models are, by construction, equal to zero. Second, for the exact same reasons, households have no desire to amass precautionary savings, i.e. to build up reserves of wealth which could act as a buffer against the possibility of episodes of bad luck that might lead to very low consumption. Accordingly, the fact that risk premia do appear to be significant drivers of asset prices (e.g. Cochrane (2003)) and precautionary motives feature prominently in macroeconomic data (Carroll and Samwick (1988); Carrol, Slacalek and Sommer (2012)) suggests that linear(-ised) models may be misspecified. Clearly, this may also have systematic implications for policy recommendations based on such models – an issue which this article investigates.

In order to address the points above, we modify the standard policy framework to ensure that uncertainty can affect household behaviour. As discussed in De Paoli and Zabczyk (2010), to simplify the analysis, we focus on a single manifestation of risk, namely precautionary behaviour. We use two features to introduce it into our setup. First, by accounting for "higher-order" terms missing from linearised models, we allow for a precautionary channel, with direct consequences for equilibrium interest rates. Second, in the spirit of Campbell and Cochrane (1999), we further assume that the utility households get from consumption is driven by persistent "external habits". That is, households value consumption according to the difference between its current realisation and a slow-moving reference level.

External habits have desirable implications for the size and dynamics of the equity risk premium, which we use as a metric for assessing whether our model is capable of correctly accounting for risk. More specifically, as shown in De Paoli and Zabczyk (2012), with sufficient persistence of shocks, external habits imply counter-cyclical risk premium dynamics – as seen in the data. De Paoli and Zabczyk (2010) further demonstrate that the same conditions also guarantee realistic cyclicality in the desire to save for precautionary reasons, i.e. a model in which risk premia vary in line with the data is likely to generate higher precautionary savings during recessions than in "boom" periods. The critical result for the policy-maker, however, is that the resulting cyclical swings in risk attitudes have a bearing on monetary policy.

For analytical tractability, we first characterise monetary policy consistent with maintaining price stability at all times. We can then rely on

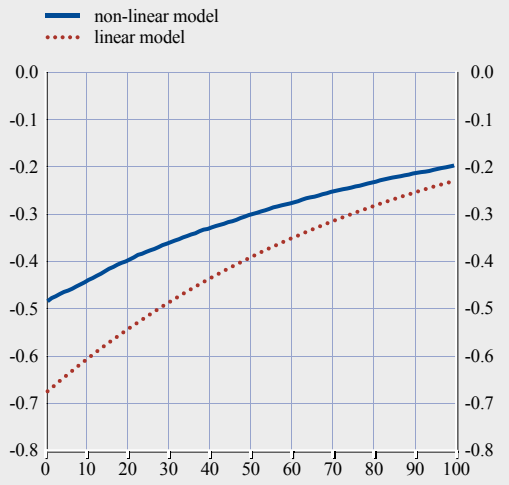
the notion of a "natural" rate of interest, i.e. the rate that would prevail if prices were fully flexible. The natural interest rate is, of course, also the one frequently referred to in linear analyses, making it easier for us to establish traction with the existing policy literature. In particular, to understand the policy implications of swings in precautionary saving, we compare expressions for the natural rate derived in a linear setup to those when counter-cyclical precautionary motives are also introduced. However, as Amato and Laubach (2004) have shown that price stability is not fully optimal in the presence of habits, we subsequently conduct numerical simulations under fully optimal policy. These confirm that the simpler intuition continues to hold.

Broadly speaking, we find that properly accounting for swings in risk appetite and the desire to save in this way reduces the optimal monetary policy response to supply shocks. This is shown in Charts 1 and 2 where the response of the policy rate in the non-linear model is smaller, in absolute terms, than that in the linear model. The intuition is as follows: after a positive supply shock, coming from either an increase in productivity (Chart 1) or a fall in the monopolistic markup, central bankers striving to maintain price stability cut rates to boost demand and prevent falls in the price level. However, a persistent positive supply shock also reduces households' desire to save, as it is akin to a boom (during which precautionary savings fall and so demand tends to be higher). Accordingly, the cut in rates required to boost demand in order to ensure no price movement is smaller. In other words, the desire to smooth consumption is partially offset by the desire to save for precautionary reasons (a symmetric argument holds for the case of a markup increase, depicted in Chart 2).

We find that properly accounting for swings in risk appetite reduces the optimal size of monetary policy responses to supply shocks.

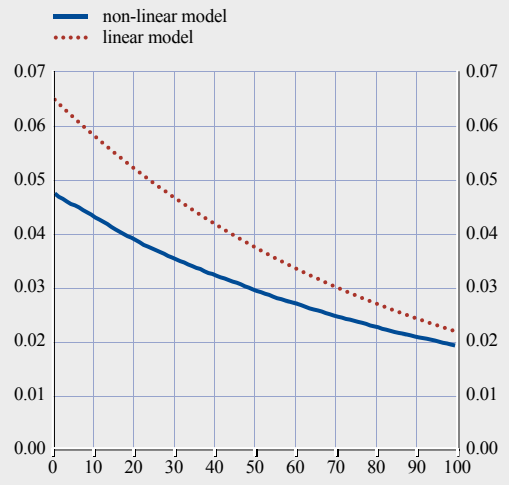
Conversely, negative demand shocks, which may have played a role in the recent crisis, merit interest rate cuts, the aim of which is to prevent inflation from falling. As in the case of a negative productivity shock, however, a negative demand shock is also associated with increases in the desire to save for precautionary reasons. This further exacerbates any initial falls in demand. Accordingly, policy-makers in a world in which risk aversion and precautionary motives fluctuate in this manner need to respond more strongly than when

Chart 1 Response of the policy rate to a positive productivity shock in a linear and non-linear setup



Source:

Chart 2 Response of the policy rate to a positive mark-up shock in a linear and non-linear setup



Source:

these extra factors are not accounted for. In short, the precautionary channel introduces a contractionary tendency during booms, and an accommodative slant during downturns.

A comparison of Charts 1 and 2 shows that the absolute difference between the appropriate policy response to shocks in a linear and non-linear setup can strongly vary with the type of the shock – it appears greater for productivity shocks than for markup shocks. This is because the strength of changes in precautionary motives, which is the key determinant of this difference, depends on how big and persistent the implied boom or recession is. In our model calibration, productivity shocks were assumed to have longer-lasting effects and so were associated with larger swings in risk aversion and precautionary saving.

Similarly, our analytical expressions show that the size of the "precautionary correction" increases, the greater the degree of shock volatility. The immediate implication of this is that ignoring the impact of swings in risk appetite and precautionary behaviour would tend to lead to larger systematic policy mistakes in highly turbulent times, when shock volatility is large (and smaller errors in tranquil periods). Accordingly, in our model, an episode of good luck – i.e. low macroeconomic volatility – would also translate into a period of good policy, i.e. small mistakes made when relying on a standard, linear framework.

REFERENCES

Amato, J. D. and Laubach, T. (2004), "Implications of habit formation for optimal monetary policy", *Journal of Monetary Economics*, 51(2), pp. 305-325.

Campbell, J.Y. and Cochrane, J.H. (1999), "By force of habit: A consumption-based explanation of aggregate stock market behaviour", *Journal of Political Economy*, 107, pp. 205-51.

Carroll, C. and Samwick, A.A. (1998), "How important is precautionary saving?", *The Review of Economics and Statistics*, 80(3), pp. 410-419.

Carrol, C., Slacalek, J. and Sommer, M. (2012), "Dissecting saving dynamics: Measuring credit, wealth and precautionary effects", John Hopkins University, mimeo., March.

Cochrane, J.H. (2005), *Asset pricing*, Princeton University Press, Princeton NJ.

De Paoli, B. and Zabczyk, P. (2010), "Cyclical risk aversion, precautionary saving and monetary policy", *Working Paper Series*, No 418, Bank of England, London, April.

De Paoli, B. and Zabczyk, P. (2012), "Why do risk premia vary over time? A theoretical investigation under habit formation", *Macroeconomic Dynamics*, forthcoming.

Woodford, M. (2003), *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press, Princeton NJ.

WHAT DRIVES THE US PERSONAL SAVING RATE? THE ROLE OF WEALTH, CREDIT AND UNCERTAINTY

By Jiri Slacalek

The rise in US personal saving during the Great Recession sparked fresh interest in the determinants of the saving rate. In a series of papers my co-authors and I explore the role of wealth, credit supply and uncertainty. We find that a parsimonious buffer-stock saving model incorporating these three elements is effective in capturing the evolution of the saving rate over the past 50 years. Our empirical estimates imply that the saving rate will remain elevated above the pre-recession level for several years to come.

Since the beginning of the Great Recession at the end of 2007, US households have received a triple dose of bad news: a collapse of asset values, a sharp tightening of credit availability and an extensive increase in economic and financial uncertainty.

US households received a triple dose of bad news: a collapse of asset values, a tightening of credit availability and an increase in uncertainty.

First, net worth – our preferred measure of household wealth – fell from its record high of close to 650% of annual disposable income in the second quarter of 2007 to the most recent value of 496% in the third quarter of 2011 (see the thin line in Chart 1). This development was driven by the decline in nonfinancial/housing assets to 202% of disposable income and, in parallel, the decline in financial assets to 413% of disposable income. The reduction in total liabilities to 119% of disposable income (from the peak of 134% in the second quarter of 2007) slightly alleviated the decline in net worth.

Second, the funding difficulties and deleveraging of financial institutions during the Great Recession resulted in a significant *tightening in credit conditions*. As a proxy for credit conditions we use an indicator based on the Senior Loan Officer Opinion Survey data of the US Federal Reserve Board on instalment loans. The broad trends revealed by the indicator seem to reflect accurately the key developments in US financial market institutions. Technological progress leading to new financial instruments and better credit screening methods, the larger role played by non-banking financial institutions and the increased use of securitisation all contributed to the dramatic rise in credit availability from the early 1980s until the onset of the Great Recession in 2007.

Third, following the start of the 2007 recession, *uncertainty* increased, and to a certain extent continues to do so. We measure macroeconomic and financial uncertainty using two indicators: (i) unemployment expectations according to the Thomson Reuters/University of Michigan Survey of Consumers; and (ii) a measure presented by Bloom et al. (2009) based on a number of proxies for uncertainty (aggregate output growth volatility, stock market return volatility, market participants' disagreement about GDP and unemployment rate forecasts, the dispersion of firm-level sales growth and stock market returns, and the dispersion of industry-level output and productivity growth).

Modelling the saving rate

Carroll et al. (2012) present a stylised buffer-stock saving model which incorporates the three elements listed above in a transparent manner. According to the model, when facing labour income uncertainty, consumers aim to accumulate a stock of precautionary wealth to protect their spending from adverse shocks. The size of the desired buffer of wealth depends on uncertainty, expected income, expected interest rates, the availability of credit, and other parameters. The model is useful for organising thoughts on how shocks to wealth, uncertainty and credit conditions affect household saving behaviour.

To quantify the effects of these three variables on the dynamics of saving over the past 50 years, Carroll et al. (2012) and Slacalek and Sommer (2012) go on to estimate this stylised model using three econometric methods, i.e. by means of: (i) reduced-form

regressions; (ii) an unobserved components model; and (iii) a structural model with precautionary saving.

Each method has its advantages. Reduced-form regressions provide simple summary statistics, extracting the key stylised facts about the data. Unobserved components models make it possible to estimate households' unobserved "target" wealth and to assess the extent of deleveraging (which is reflected in the gap between actual and target wealth). Structural modelling helps to interpret the results by linking the structural parameters (such as unemployment risk) to the saving rate.

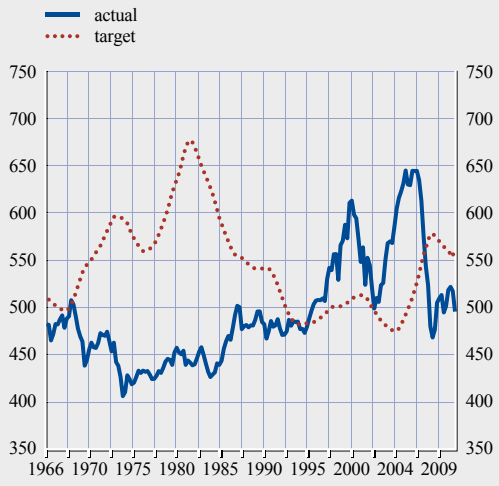
All three estimation methods explain the fluctuations in the saving rate effectively, capturing roughly 90% of variations in the rate, and can be useful for predictions relating to the rate's dynamics in the near future. These dynamics will substantially affect the speed of the recovery from recession.

Target wealth and the extent of household deleveraging

The unobserved components model identifies the unobserved time-varying target wealth, which rises with uncertainty for precautionary reasons, as households want to increase their wealth buffers when facing higher risk. It also increases with higher interest rates, which make saving more attractive, and falls with higher expected income growth, which induces households to consume more (and save less) in the present. Target wealth (see the dotted line in Chart 1) varies substantially over time, mostly fluctuating between 450% and 600% of disposable income. The target rose above 650% of disposable income in the early 1980s owing to elevated uncertainty and high real interest rates. At the other extreme, the target fell almost to 450% of disposable income midway between 2000 and 2010 when perceived uncertainty was unusually low (arguably owing to the Great Moderation) and the real interest rate fell to within-sample lows. While the wealth gap has recently diminished owing both to the partial alleviation of uncertainty and to the partial rebound of net worth, it still remains negative, with actual wealth lying below the target by roughly 50% of disposable income.

Chart 1 Actual and target household wealth

(percentage of disposable income)



Sources: US Flow of Funds Accounts, Federal Reserve Board, and Slacalek and Sommer (2012).
Notes: The last observation refers to the third quarter of 2011.

When actual wealth is below its target level – i.e. the wealth gap is negative – households save more to close the gap. However, both theory on this subject and our estimation results suggest that the wealth gap closes only gradually, as it is dominated by fluctuations in actual wealth, which are hard to mitigate quickly because households primarily want to smooth spending.

In addition to the wealth gap, saving is affected by credit conditions. Credit tightening, such as that experienced after the onset of the Great Recession, increases the saving rate because fewer households can access credit and have to consume less than they would otherwise. In contrast to the wealth gap, which understandably does not exhibit any trend (as our data spans a long time period), credit conditions tended to loosen for most of the sample prior to 2007, accounting for the bulk of the declining trend in the personal saving rate (see the fitted values in Chart 2).

The negative wealth gap suggests that the saving rate will continue to exceed its pre-crisis level.

Chart 2 Actual and fitted personal saving rate

(percentage of disposable income)

Sources: The Bureau of Economic Analysis of the US Department of Commerce, and Slacalek and Sommer (2012).
Notes: The last observation refers to the third quarter of 2011.

The outlook for the saving rate

At present, the negative wealth gap, which indicates that household deleveraging will persist, suggests that the saving rate will for some time continue to substantially exceed its pre-crisis level, weakening the pace of the recovery in the United States. At the same time, however, as the wealth gap closes and as uncertainty diminishes, upward pressure on the saving rate is likely to wane.

REFERENCES

Bloom, N., Floetotto, M. and Jaimovich, N. (2009), "Really uncertain business cycles", mimeo, Stanford University.

Carroll, C., Slacalek, J. and Sommer, M. (2012), "Dissecting saving dynamics: Measuring credit, wealth and precautionary effects", mimeo, Johns Hopkins University, European Central Bank and International Monetary Fund.

Slacalek, J. and Sommer, M. (2012), "What drives the saving rate? Examining the role of household target wealth", mimeo, European Central Bank and International Monetary Fund.

Box 1

SEVENTH CONFERENCE OF THE INTERNATIONAL RESEARCH FORUM ON MONETARY POLICY

On 16 and 17 March 2012 the European Central Bank hosted the seventh conference of the International Research Forum on Monetary Policy. The Forum is sponsored by the European Central Bank, the Board of Governors of the Federal Reserve System in Washington, the Center for German and European Studies at Georgetown University and the Center for Financial Studies at Goethe University Frankfurt.

Since its inception in 2002, the purpose of the Forum has been to foster dialogue on the implications of research findings for policy-making by bringing together central bankers and academics from both sides of the Atlantic. In particular, the Forum aims at promoting discussion on innovative research on both theoretical and empirical macroeconomic issues of relevance for monetary policy.

The seventh conference of the Forum took place in an economic environment in which many advanced economies are still struggling with the effects of the global financial crisis and in which sovereign debt problems have emerged in several economies, notably in the euro area periphery. Accordingly, central bank and academic researchers were invited to present work on, inter alia, the causes and consequences of financial crises, fiscal sustainability, and the conduct of monetary policy in times of crisis.

Research presented by Alan Taylor documented that, before financial crises, in many economies there was a build-up of credit in the private sector. As a consequence, necessary balance sheet repair needs to take place in the aftermath of the crises. This, however, takes time and often leads to recoveries which are slow. In a similar vein, Thomas Philippon highlighted the strong association between large changes in household leverage and large declines in activity during the recent recession. He presented a model with home-equity borrowing and cash-in-advance constraints, in which large liquidity shocks in conjunction with falling house prices can replicate this salient feature of the recent recession.

Researchers also presented work on the dynamics of debt crises, on the sustainability of fiscal deficits and the limits to taxation, and on how sovereign default risk is transmitted to private sector borrowing costs. In particular, Harald Uhlig presented a theoretical framework to analyse the dynamics of the sovereign debt crisis of a member country in a monetary union and the role of various bail-out mechanisms. Mathias Trabandt presented a paper which aimed at understanding how Laffer curves differ across countries in the United Stated and the European Union. As an application, he analysed the consequences of crisis-related increases in government spending and their consequences for the sustainability of current debt levels when interest rates are higher owing to sovereign default risk. Giancarlo Corsetti presented a model with a "sovereign risk channel" through which sovereign default risk spills over to the rest of the economy by raising private sector borrowing costs. He showed that this channel can exacerbate macroeconomic instability if monetary policy is constrained in offsetting the adverse effects on private sector borrowing.

Iván Werning revisited the conduct of monetary and fiscal policy when the nominal interest rate has reached its zero lower bound using a simple New Keynesian model which is formulated in continuous time and allows for a simple graphical analysis. A new result which emerges from the analysis is that the interest rate should be kept at the zero lower bound after the natural rate of interest becomes positive, but jump discretely upon exiting from the zero lower bound.

Finally, Jordi Galí presented a paper which studies the conduct of monetary policy in the presence of a rational asset price bubble within an overlapping generations model. He finds that optimal monetary policy seeks to strike a balance between stabilisation of the bubble and stabilisation of aggregate demand, calling into question the theoretical foundation of the case for "leaning against the wind".

The conference also featured a high-level panel discussion with Alberto Alesina, Otmar Issing, Harald Uhlig and José Viñals on issues related to monetary and fiscal policy interactions in an environment characterised by high debt levels. From the discussion the view emerged that sound public finances are a prerequisite for long-term sustainable growth and that there is certainly no alternative to fiscal consolidation, even if this, in the short term, may lead to a further contraction of activity. Sound finances are important for the confidence of investors, consumers and firms. However, sound finances alone are not enough. Equally important are the efficiency of public spending and of the tax system, the quality of the institutions which govern product, services and labour markets, and the independence of monetary policy.

The full set of contributions to this conference can be downloaded from the ECB's website at: http://www.ecb.europa.eu/events/conferences/html/researchforum7.en.html

Box 2

THE COMPETITIVENESS RESEARCH NETWORK

Background

From a policy perspective, competitiveness issues have been identified as one of the root causes of the ongoing crisis and have therefore been explicitly incorporated into the surveillance processes being established at the EU/euro area and the G20 level. Yet, we still lack a commonly agreed unified framework which connects determinants of competitiveness with outcomes. Moreover, there are various "views" and definitions of competitiveness, which tend to remain rather polarised and are rarely cross-checked.

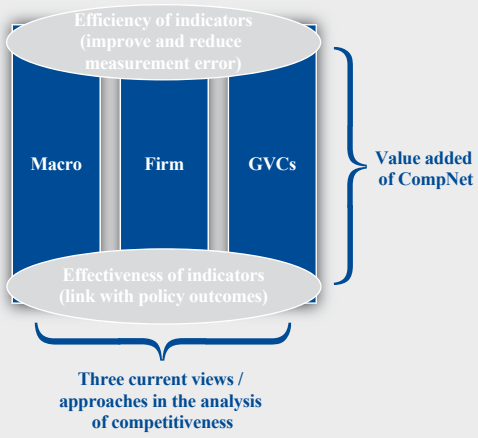
In order to fill this research gap, the Competitiveness Research Network, or CompNet , was established at the end of 2011. The network comprises participants from all ESCB national central banks (NCBs), as well as from international organisations with an interest in competitiveness issues.

Objectives

The network's objectives are twofold: first, to develop a more consistent analytical framework for competitiveness assessment, in which micro data are systematically used to complement the macro assessment against the background of a globalised world; and second, to facilitate a closer correspondence between competitiveness determinants and policy outcomes (e.g. trade performance and/or broader welfare indicators).

CompNet research activities are organised within three work-streams. Following an initial phase, and in the pursuit of the above objectives, the three work-streams are expected to interact in a systematic fashion (see Chart 1).

Chart 1 CompNet activities



Source: ECB.

The first work-stream (WS1) will handle the macro-aggregate analysis, which relies on measures of competitiveness at the country level. This will include all analyses aimed at explaining trade results that are dependent on price factors (e.g. real effective exchange rates deflated by different means) and non-price factors (e.g. quality, research content and the revealed comparative advantage). This work-stream will also handle analyses that draw on more detailed trade statistics at the product level, since conceptually even the most detailed product decomposition is logically very different from the firm-level analysis.

The second work-stream (WS2) will concentrate on the research undertaken in the field of competitiveness, starting with firm-level data. Conceptually, the analysis of this data is mostly based on the rather extensive literature – including a high number of contributions by NCBs – assessing the relationship

between production internationalisation, firm-level costs and productivity on the one hand, and additional firm characteristics on the other (multinational status, comparative advantage, price-cost margins, multiple products, quality, financial constraints, etc.). A general task that remains ahead is further consideration of the relationship between these competitiveness-related findings from disaggregated data and the economy's aggregate response. We intend to tackle this research issue within work-stream 2. On the data front, work-stream 2 will aim to verify firm-level data availability across EU countries, in order to collect a minimum set of comparable data to be used for aggregate competitiveness analysis, with due respect for confidentiality issues, of course.

Finally, the third work-stream (WS3) will concentrate on the globalisation of production processes and the impact this has on traditional assessments of trade and competitiveness. While work within the ESCB on the subject has been rather limited, there will be considerable scope for interaction with other international organisations that have shown an interest in joining CompNet[1], such as the OECD, the US International Trade Commission and the World Bank. Against this background, it is expected that this work-stream's initial activities will consist in performing two major tasks. First, the creation of common platforms for sharing available information on global value chain (GVC) operations, and, possibly, for matching the information available in Europe with that available throughout the rest of the world. Second, the exchange of information on best practices in the construction of indicators able to measure the impact of GVCs on competitiveness assessment.

1 For more information on the activities of the Network, please consult its website, http://www.ecb.europa.eu/home/html/researcher_compnet.en.html.

RESEARCH BULLETIN 16
RECENT JOURNAL PUBLICATIONS BY ECB STAFF

Amisano, G., and Geweke, J. (2012), "Prediction with misspecified models", *American Economic Review, Papers and Proceedings*, Vol. 102, Issue 3, pp. 482–486.

Coenen, G., Erceg, C., Freedman, C., Furceri, D., Kumhof, Lalonde, M., Laxton, D., Lindé, J., Mourougane, A., Muir, D., Mursula, S., Resende, C. de, Roberts, J., Roeger, W., Snudden, S., Trabandt, M., and Veld, J. in 't (2012), "Effects of fiscal stimulus in structural models", *American Economic Journal: Macroeconomics*, Vol. 4, Issue 1, pp. 22-68.

Coenen, G., Straub, R., and Trabandt, M. (2012), "Fiscal policy and the Great Recession in the euro area", *American Economic Review, Papers and Proceedings*, Vol. 102, Issue 3, pp. 71-76.

Ehrmann, M., Fratzscher, M. and Rigobon, R. (2011), "Stocks, bonds, money markets and exchange rates: measuring international financial transmission", *Journal of Applied Econometrics*, Vol. 26, pp. 948-974.

Ferrucci, G., Rodríguez, R.J., and Onorante, L. (2012), "Food price pass-through in the euro area: non-linearities and the role of the common agricultural policy", *International Journal of Central Banking*, Vol. 8, Issue 1, pp. 179-218.

Habib, M. and Stracca, L. (2012), "Getting beyond carry trade: What makes a safe haven currency?", *Journal of International Economics*, Vol. 87, Issue 1, pp. 50–64.

Maćkowiak, B. and Wiederholt, M. (2012), "Information processing and limited liability", *American Economic Review, Papers and Proceedings*, Vol. 102, Issue 3, pp. 30-34.

Popov, A., and Udell, G. (2012), "Cross-border banking, credit access, and the financial crisis", *Journal of International Economics*, Vol. 87, Issue 1, pp. 147–161.

Imprint
The opinions expressed in this publication are those of the authors and do not necessarily reflect those of the European Central Bank. Editors: Günter Coenen, Michael Ehrmann, Philipp Hartmann, Cornelia Holthausen, Geoff Kenny, Filippo di Mauro and Oreste Tristani. Responsible editor for this edition: Filippo di Mauro. Assistance to editors: Christina Werner and Sabine Wiedemann. Contact for general information and subscription to the Research Bulletin: ECB-ResearchBulletin@ecb.europa.eu

Address: Kaiserstrasse 29, D-60311 Frankfurt am Main, Germany
Telephone: +49 69 1344 0
Fax: +49 69 1344 6000
Internet: http://www.ecb.europa.eu

ISSN 1977-12x (online)