Research News 2012

Research division at Sveriges Riksbank

SVERIGES RIKSBANK

CONTENTS

This newsletter describes the research activities and output of the research division at Sveriges Riksbank 2012.

Staff at the research division, 2012

Gustav Alfelt, research assistant
Roberto Billi, researcher (macroeconomics, monetary and fiscal policy)
Mikael Carlsson, consultant/visiting scholar (macroeconomics, econometrics, labor markets)
Ferre De Graeve, researcher (macro-finance, monetary policy, macroeconometrics, banking)
Tore Ellingsen, visiting scholar (contract theory and experimental economics)
Daria Finocchiaro, researcher (monetary economics, applied macro)
Martin Flodén, visiting scholar (until August 2012) (macroeconomics)
Paolo Giordani, researcher (Bayesian econometrics, forecasting, nonlinear models)
Tor Jacobson, head of research (econometrics, banking and credit risk)
Thomas Jansson, researcher (household finance, credit risk, and financial markets and institutions)
Per Krusell, visiting scholar (macroeconomics)
Mats Levander, (on leave for PhD studies at the Stockholm School of Economics) research assistant
Lena Löfgren, secretary
Virginia Queijo von Heideken, researcher (monetary economics, credit markets, empirical macro)
Matias Quiroz, (on leave for PhD studies at Stockholm University) research assistant
Kasper Roszbach, deputy head of the monetary policy department (banking, credit risk, corporate governance)
Dmytro Sheludchenko, research assistant
Per Sidén, research assistant
Peter van Santen, researcher (household finance, retirement savings, labor productivity, banking)
Erik von Schedvin, researcher (empirical banking, corporate finance, and bankruptcy- and credit-risk modeling)
Karl Walentin, researcher (macroeconomics, financial economics, labor markets)
Andreas Westermark, researcher (macroeconomics, labor markets)
Xin Zhang, reseacher (econometrics, financial economics, credit risk)

Reflections by the head of research

Going into 2012 the research division faced a double challenge of trying to preserve the level of excellent output achievements in 2011, and hire and introduce junior staff in order to expand in the financial stability area. We were very fortunate to be able to recruit three young scholars graduating from very good universities in the Netherlands: Peter van Santen, Erik von Schedvin, and Xin Zhang. They will surely extend and deepen, as well as broaden the research agenda of the Riksbank by contributing to fields such as pensions and household saving; bankruptcy- and credit-risk modeling; systemic risk modeling and time-series econometrics.

The new year will start by an attempt to fill the vacant positions held by Mikael Carlsson, Paolo Giordani, and Virginia Queijo von Heideken. These three have provided very valuable work for the division, first and above all by solid research work, secondly by conscientious policy work, and thirdly by their contributions to the division's work environment. I congratulate Uppsala University, Brummer and Partners, and the division for market analysis and operations at the Riksbank, respectively, on their excellent hirings. We cannot hope to replace them with similar researchers, but we will surely find new exciting candidates that will bring different strengths and perspectives onboard and ensure a dynamic and lively research environment for the coming years.

What about output? We certainly avoided a collapse and managed a number of fine publications. Moreover, the pipe-line remains strong and we may close this year with confidence. The introduction in 2012 of a new quality-adjusted output target and measure–benchmarking against leading central bank research institutions–has been unproblematic, and more or less in line with the prediction that the transition to a greater quality emphasis had taken place earlier in the research work, it was merely an adjustment of the measure itself that remained to be done.

The research division has two visitors that regularly spend entire workdays here at the Riksbank for the purpose of interacting with the research staff and provide appraisals of the research. This year professor Martin Flodén from Stockholm University resigned as research consultant and has been replaced by Tore Ellingsen, professor at the Stockholm School of Economics. Thanks to Martin Flodén for his efforts during the past two years. Tore Ellingsen has previously been an adviser to the Riksbank Board for a number of years and is thus only shifting his focus somewhat in this new position. The other consultant, Per Krusell, Stockholm University, remains. He was an initiator to the Greater Stockholm Macro Group–a monthly seminar series at the Riksbank, where macro oriented researchers from Stockholm and Uppsala meet to present and discuss ongoing research. Per also remains an active participant and organizer of these meetings.

This is also a good time to comment on the overall orientation of the division in terms of the topics that research and policy work aim to cover. We have, thanks to this year's recruitments, established equal-sized groups targeting financial stability and monetary policy, and we have had a focus on establishing better and more efficient links with the financial stability side of the Riksbank. This is very much work in progress and we are not there yet, but I think it is fair to say that we are going in the right direction. I also think that one can expect that the emerging research projects in the wake of the financial crisis will benefit from the expertise and the experience of the economists in the financial stability department of the Riksbank.

Finally, at the initiative of the Finance Department at the Stockholm School of Economics, we have decided to undertake a joint umbrella project entitled "Household finance, systemic risk measurement and corporate funding: Effects of financial stability and regulation". The research project is planned to run for 4 years. Each of the 6-7 (at least) sub-projects will be jointly conducted by researchers from both the Riksbank and the Stockholm School.

Tor Jacobson

Changes in the research staff

Mikael Carlsson, Paolo Giordani and **Virginia Queijo von Heideken** left their jobs as researchers during the year. Carlsson took up a position at Uppsala University and Giordani will start working at the hedge fund Brummer and Partners. Queijo von Heideken remains at the Riksbank, at the division for market analysis and operations within the monetary policy department.

Three new researchers were hired in 2012: **Peter van Santen, Erik von Schedvin** and **Xin Zhang**. Peter van Santen joined the research division in September 2012. Peter has spent the last four years writing a dissertation on household saving and retirement at the University of Groningen. He specialized in empirical microeconomics, with special emphasis on microeconometric techniques. In addition to working on pensions and household saving, he has interests in the broader area of household finance, in labor economics as well as in productivity dynamics. He will defend his PhD thesis in January 2013.

Erik von Schedvin joined the research division in the summer of 2006 as a research assistant. He has been on leave for graduate studies at Tilburg University between September 2008 and June 2012, where he obtained a PhD in finance. Back at the bank, Erik works as a researcher with a focus on empirical banking, corporate finance, and bankruptcy- and credit-risk modeling.

Xin Zhang joined the research division in the autumn of 2012. Xin will finish his PhD studies at the Finance department of VU University Amsterdam and Tinbergen Institute in February 2013. He conducts research on Econometrics, Financial Economics and Credit Risk. He is currently working on economic and econometric frameworks for understanding and quantifying systemic risk, which are useful inputs to macroprudential supervision.

Martin Flodén left his position as visiting scholar. **Tore Ellingsen** from Stockholm School of Economics joined the division as a visiting scholar. Tore has contributed substantially to the literatures on contract theory and experimental economics, and published papers in many other fields as well.

Tommy von Brömsen and **Karl Harmenberg** both left the Riksbank to start their PhD studies at Stockholm School of Economics in the fall of 2011. Tommy is working part-time at the forecasting division of the monetary policy department.

The research division hired three new research assistants: **Gustav Alfelt**, **Dmytro Sheludchenko** and **Per Sidén**. Gustav Alfelt has been working as a research assistant since October 2012. Before coming to the Riksbank, he finished the bachelor program in mathematical modeling at Växjö University (now Linnéuniversitetet) and most recently the master program in financial mathematics at Gothenburg University. His work consists of data manipulation and model estimation by programming in SAS and Stata, among many other things.

Dmytro Sheludchenko has worked as a research assistant since August 2012. Dmytro graduated from Mälardalens Högskola in 2012, majoring in Financial Mathematics. He is working primarily with programming in SAS, Matlab and Stata as well as other programming languages.

Per Sidén started working as a research assistant in August 2012. Per has a M.Sc. in Engineering, Technical Mathematics with specialization towards financial modeling. He did his studies at Lund University from 2007 to 2012. His job at the research division mainly concerns programming in SAS and Matlab, as well as performing economic and statistical analyzes.

Summary of featured article

The following is a summary of the article by Daria Finocchiaro and Virginia Queijo von Heideken, forthcoming in Journal of Money, Credit and Banking with the title "Do Central Banks React to House Prices?"

In the last few decades, many industrialized economies have experienced major medium-run fluctuations in houses prices coupled with a substantial increase in household indebtedness. Since borrowing for housing constitutes the largest part of households' debt in most countries, the increase in indebtedness has made the overall macroeconomic situation more exposed to house price fluctuations. These events have drawn the attention of both policymakers and academics toward the developments in housing markets, their impact on financial stability and their potential implications for monetary policy.

In this context, two questions have been posed in the public debate: whether central banks should react to asset prices and whether central banks actually do respond to asset price fluctuations. In this article, we take a positive rather than normative stand and thus address the second question. Specifically, we study whether house prices entered directly into the monetary policy rule of the U.S. Fed, the Bank of

England and the Bank of Japan. Our study provides evidence that house price movements did indeed play a separate role in the reaction functions of these central banks.

For each country, we estimate a dynamic stochastic general equilibrium (DSGE) model where households and firms borrow against their collateral, thereby amplifying business cycle fluctuations. This model is embedded with a Taylor-type rule with a direct response to changes in house prices. The full-model treatment of the issue is necessary because, as we show, single-equation partial information approaches are biased. We also show that a more sophisticated, full-information method that eschews the cross-equation restrictions of the complete DSGE model is also problematic since the estimates are biased downward.

By using our proposed method and relying on model implied restrictions to identify the parameters of interest, we find evidence that house price inflation did play a separate role in the monetary policy reaction functions of the U.S., the U.K., and Japan. This result is robust to different specifications of the estimated rule.

Finally, we show that under strict inflation and output targeting, the gains from reacting to house price inflation are negligible. Nevertheless, some caution is needed when drawing normative conclusions from such a stylized set-up. The extent to which central banks should react to house prices remains an open question.

Research projects pursued in 2012

CREDIT AND BANKING

Trade Credit and the Propagation of Corporate Failure: An Empirical Analysis

Tor Jacobson and Erik von Schedvin

We quantify the importance of trade credit for the propagation of corporate bankruptcy by showing that trade creditors (suppliers) experience significant credit losses due to trade debtor (customer) failures. We further document that trade credit losses impose a substantially enhanced bankruptcy risk on trade creditors. The propagation mechanism is enhanced in R&D intensive industries, and in industries characterized by external financing dependence in the Rajan-Zingales sense. We also show that the propagation mechanism is mitigated for creditors that are less levered, cash rich, and highly profitable, and enhanced during economic downturns.

Optimal design: Firm's Cash and Liquidity Holdings Versus Long Term Investments

Tor Jacobson, Erik von Schedvin and Robert Townsend

Based on the bankruptcy data set covering all Swedish corporate firms between 1990 and 2011 we observe that firms go bankrupt due to cash-flow-based insolvency (a shortage of liquid assets to cover debt payments and ongoing expenditures) even if they are balance-sheet-based solvent (the value of the liabilities is less than that of the assets). These firms are presumably credit rationed, i.e., they have limited access to external financing to offset negative cash-flow shocks. Credit rationed firms face a higher bankruptcy cost. To compensate for higher bankruptcy costs, firms with limited access to external financing are presumed to hold more cash and liquid assets. So the next natural step is to show that cash and liquid asset holdings come at the expense of foregone long-term investments. The ultimate purpose is to quantify the real effects of firm failure events.

Identifying the Counterparty Risk in Trade Credit: Evidence from the 2008-2009 Trade Collapse

Laurent Bach, Tor Jacobson and Erik von Schedvin

It is well-known in macroeconomic theory that external demand shocks might affect not just those firms that are directly involved in transactions with the rest of the world but also those firms whose main clients are the exporters that are initially hit, thereby propagating the initial shock to the rest of the domestic economy. However, it is far less clear whether such a propagation mechanism simply acts through pure interrelated demand effects or whether it is largely amplified by the credit losses that firms extending trade credit to exporting firms have to face when their clients default on their payments (Kiyotaki and Moore, 1997). The size of such a counterparty risk embedded in trade credit contracts is precisely what we aim

to estimate empirically in this project, using the transmission of the global trade crash of late 2008–early 2009 to the Swedish economy as a case study.

A Microbased Macroprudential Indicator: Future Firm-Failure Frequencies

Tor Jacobson, Erik von Schedvin and Ingvar Strid

The purpose of this project is to explore stress testing of the Swedish corporate sector with respect to firm failure risks as a tool for enhanced macroprudential policy analysis. It can be shown that the aggregate firm failure frequency in Sweden is highly correlated with the Swedish bank's credit losses over time (.98 for the period 1990-2009). Hence, by means of reasonably accurate forecasts of future failure frequencies one could hope to make inference about future credit losses. Moreover, if such forecasts are model based, then the model can serve as a basis for stress testing the corporate sector's vulnerability in various scenarios. We propose to estimate a logistic model of firm failure similar to Jacobson, Lindé, and Roszbach (2011) and evaluate the model's forecasting properties for horizons up to 3 years. Firm-failure frequency forecasts will be calculated by conditioning on the macroeconomic scenarios generated by the Riksbank DSGE model "Ramses".

(continuing since previous year)

Taking the Twists into Account: Predicting Firm Bankruptcy Risk with Splines of Financial Ratios

Paolo Giordani, Tor Jacobson, Erik von Schedvin and Mattias Villani

We demonstrate improvements in predictive power when introducing spline functions to take account of highly non-linear relationships between firm failure and earnings, leverage, and liquidity in a logistic bankruptcy model. Our results show that modeling excessive non-linearities yields substantially improved bankruptcy predictions, on the order of 70 to 90 percent, compared with a standard logistic model. The spline model provides several important and surprising insights into non-monotonic bankruptcy relationships. We find that low-leveraged and highly profitable firms are riskier than given by a standard model. These features are remarkably stable over time, suggesting that they are of a structural nature.

(continuing since previous year)

Collateralization, Bank Loan Terms and Monitoring: Evidence from a Natural Experiment

Geraldo Cerqueiro, Steven Ongena and Kasper Roszbach

This paper identifies the value of collateralization and its impact on borrower quality and bank monitoring exploiting a change in the Swedish company mortgage law as a unique natural experiment that exogenously and unambiguously reduced the value of company mortgages. Using a differences-in-differences approach, we study the impact on the entire business loan portfolio of a major Swedish bank. We find that collateral is valuable for the bank and that following a loss in collateral value higher interest rate are charged on business loans, that borrowers credit ratings deteriorate and that monitoring efforts of collateral and borrower are reduced.

(continuing since previous year)

Credit Ratings and Bank Monitoring Ability

Leonard Nakamura and Kasper Roszbach

This paper uses credit rating data from two large Swedish banks to elicit evidence on banks' loan monitoring ability. Our tests reveal that banks' credit ratings indeed include valuable private information from monitoring, as theory suggests. However, our tests also reveal that publicly available information from a credit bureau is not efficiently impounded in the bank ratings. We investigate explanations for these findings and show that they are not due to the staggered timing of rating information updating and are unlikely to be due to the discrete nature of the ratings. We tentatively conclude that it has proved difficult to aggregate soft and hard information. The methods used in this paper represent a new basket of straightforward techniques that enable both financial institutions and regulators to assess the performance of credit rating systems In the meantime, risk analysis of the banks' portfolios should be based on both internal bank ratings and public credit bureau ratings.

(continuing since previous year)

Financial Stability and Central Bank Governance

Michael Koetter, Kasper Roszbach and Giancarlo Spagnolo

The financial crisis has ignited a debate about the appropriate objectives and the governance structure of Central Banks. We use novel survey data to investigate the relation between these traits and banking system stability focusing in particular on their role in micro-prudential supervision. We find that the separation of powers between single and multiple bank supervisors cannot explain credit risk prior or during the financial crisis. Similarly, a large number of Central Bank governance traits do not correlate with system fragility. Only the objective of currency stability exhibits a significant relation with non-performing loan levels in the run-up to the crisis. This effect is amplified for those countries with most frequent exposure to IMF missions in the past. Our results suggest that the current policy discussion whether to centralize prudential supervision under the Central Bank and the ensuing institutional changes some countries are enacting may not produce the improvements authorities are aiming at. Whether other potential improvements in prudential supervision due to, for example, external disciplinary devices, such as IMF conditional lending schemes, are better suited to increase financial stability requires further research

On the Non-Exclusivity of Loan Contracts: An Empirical Investigation

Hans Degryse, Vasso Ioannidou and Erik von Schedvin

Theory shows that the non-exclusivity of financial contracts generates important negative contractual externalities. Employing a unique dataset on bank loans, we identify how these externalities affect credit availability. Using internal information on a creditor's willingness to lend, we find that a creditor reduces its willingness to lend to a borrower when the borrower obtains a loan at another creditor ("outside loan"). Consistent with the theoretical literature, the effect is more pronounced the larger the outside loans and it is muted if the initial lender's existing and future loans retain seniority over outside loans and are secured with valuable collateral.

Bank Loan Supply and Corporate Capital Structure

Hans Degryse, Vasso Ioannidou and Erik von Schedvin

This paper studies the importance of credit supply frictions on corporate capital structure. Using internal information on a bank's willingness to lend, we study how increases in the bank's maximum willingness to lend to a firm affect the firm's borrowing at the bank as well as its total borrowing and the composition of its total debt. We find that a $1 increase in the bank's willingness to lend leads to an average increase in total debt of 31 cents. This increase is attributed solely to the increase in debt taken at the bank that increases its credit availability and occurs within the first year after the increase in the credit availability. We do not find economically significant substitution effects away from other financing sources such as bank debt at other banks or trade credit. These results are in line with the hypothesis that binding credit constraints are important determinants of firms' capital structure and that the relaxation of such constraints allows firms to increase their total leverage.

The Importance of Slack in Reallocating Profits in Restructuring Industries: Evidence from European and US Banking

Jaap Bos and Peter van Santen

We examine the effects of a changing market structure on productivity in the European and US banking sectors in the period of 1995 to 2009. Specifically, we ask whether the restructuring of both industries has contributed to an efficient reallocation of productive output. Using a revised decomposition framework, we find that banks winning (losing) market share, both in the US and the EU, increase (decrease) industry productivity. However, we find no evidence of efficiency gains in the restructuring process. Exploiting economies of scale drives firm-level reallocations of assets, and increases industry productivity, but at the cost of productive output efficiency.

HOUSEHOLD SAVING

Uncertain Pension Income and Household Saving

Peter van Santen

I study the relationship between household saving and pensions, and estimate both the displacement effect of pensions on private saving and the precautionary saving effect due to uncertainty in pension income. Using a lifecycle framework, current consumption is derived as a function of expected pension benefits, pension risk and mortality risk. I estimate the saving rate equation implied by the model using panel data for Dutch households. Pension benefits and survival expectations are elicited probabilistically. Quantile regression results show that more affluent households displace saving with expected pension income, and that households save more due to pension income uncertainty and to lifetime uncertainty, as predicted by the theory. These results are robust to the inclusion of correlated random household effects.

Demand for Annuities: A Multivariate Binary Response Model with Misclassification

Rob Alessie, Adriaan Kalwij and Peter van Santen

Recent literature has investigated the 'Annuity puzzle': Only a fraction of households annuitize their wealth, despite the theoretical attractiveness of annuities as a hedge against lifespan uncertainty. In this paper, we use survey data from The Netherlands to analyze which households do own annuities. We analyze the ownership of both annuities and endowment policies. Our empirical model accounts for misclassification errors of these products, which is both a potential source of biased estimates as well as a potential candidate for solving the annuity puzzle. Our estimates of the misclassification probabilities suggest that part of the annuity puzzle can partly be explained by underreporting ownership of annuities. For endowments policies, we find no evidence of misreporting ownership.

Pension Wealth and Household Savings in Europe: Evidence from SHARELIFE

Rob Alessie, Viola Angelini and Peter van Santen

We use recently collected retrospective survey data to estimate the displacement effect of pension wealth on household savings. The third wave of the Survey of Health, Ageing and Retirement in Europe, SHARELIFE, collects information on the entire job history of the respondent, a feature missing in most previous studies. We show that addressing measurement error problems is crucial to estimate the displacement effect when using survey data. We find that each euro of pension wealth is associated with a 47 (61) cent decline in non-pension wealth using robust (median) regression. In the presence of biases from measurement errors and omitted (unobserved) variables, we estimate a lower bound to the true offset between 17% and 30%, significantly different from zero. Instrumental variables regression estimates, although less precise, suggest full displacement.

(continuing since previous year)

Culture and Household Financial Behavior

Thomas Jansson, Yigitcan Karabulut and Michalis Haliassos

Recent research has shown that stock market participation rates differ widely across countries. In principle, these differences can be attributed to the economic environment (relevant institutions and markets etc.) and to cultural factors. Attribution of the observed cross-country differences to these two factors is important, not only for understanding the role of each in shaping financial behavior but also for understanding the scope for reducing undesirable differences across countries by harmonization of institutions.

Still, the role of culture on household financial behavior is largely unmapped due to lack of high quality micro data. In this paper, we plan to address this problem by considering data of unmatched precision and quality on individuals living in Sweden. As we can observe a wide range of individual characteristics, including country of birth and individual holdings of financial and real assets, our plan is to compare the financial behavior of immigrants with the financial behavior of individuals born in Sweden with similar characteristics. As all face the same institutions, observed differences will be more directly attributable to culture, and we can study magnitudes, directions, and persistence through time.

HOUSING

Do Central Banks React to House Prices?

Daria Finocchiaro and Virginia Queijo von Heideken

We estimate the Federal Reserve's, the Bank of England's, and the Bank of Japan's response to house prices. We show that generalized method of moments estimates of a Taylor rule augmented with house prices are biased and dispersed. We then use full-information methods and estimate the policy rule together with a VAR for the non-policy variables. These estimates are also biased. We propose an alternative approach and estimate a DSGE model embedded with a monetary rule with a direct response to house prices. We find that house prices played a separate role in the reaction functions of these central banks

(accepted for publication)

Housing Demand in an Overlapping Generation Model

Peter Englund, Thomas Jansson and Todd Sinai

In this project we use a detailed panel data set of Swedish households to investigate the impact of bequests on households' saving and investment decisions. By estimating correlations between the housing costs of parents and grown-up children we get household-specific estimates of the effective house price risk and investment horizon, which we in the second step use to estimate parents' and grown-up childrens' optimal investments in owner-occupied housing.

(continuing since previous year)

Owner-occupied Housing and the Composition of the Financial Portfolio

Thomas Jansson

In this project I use a detailed panel data set of Swedish households to investigate the impact of real estate holdings on the composition of the financial portfolio. Since local macroeconomic shocks hit households and firms within a certain geographical area in a similar way, home prices are more correlated to the returns of local stocks than to the returns of global stocks. My empirical findings indicate that homeowners who are highly exposed to the local housing market reduce their exposure to directly-held local stocks and increase their exposure to globally diversified equity mutual funds. The results are statistically and economically significant.

(continuing since previous year)

Households' Mortgage Debts

Thomas Jansson, Tor Jacobson and Paolo Sodini

Empirical research on households' financial decisions has been hampered due to lack of high-quality household micro data. For this project we have access to a new unique micro dataset, which includes detailed information not only on a large sample of Swedish households' financial and real assets but also on their liabilities. In the dataset the exact composition of households' asset portfolios and the conditions of their debt (amounts, interest rates, variable or fixed rates, collateral etc.) are reported. Hence, our dataset enables us to estimate a household's total exposure to various risk factors. One of the purposes of this project is to use the micro data to test theoretical models that models households' optimal choice between variable and fixed interest rates, depending on the composition of their asset portfolio, their labor income risk etc. From a systemic risk perspective, we will also estimate how sensitive single borrowers are for changes in interest rates, shocks to their labor income etc.

(continuing since previous year)

Housing Collateral and the Monetary Transmission Mechanism

Karl Walentin

This paper quantifies the implications for the monetary transmission mechanism of the increase in the housing loan-to-value (LTV) ratio that has taken place in the last two decades. We set up a two sector DSGE model with collateral constraints and production of goods and housing. Using Bayesian methods we quantify the component of the monetary transmission mechanism that is generated by housing

collateral. We find that this component is substantial and strongly increasing in the LTV. We conclude that to properly understand the monetary transmission mechanism we need to take into account the effects of housing related collateral constraints and their changing nature over time.

(continuing since previous year)

Business Cycle Implications of Mortgage Spreads

Karl Walentin

What are the business cycle effects of the substantial time variation in residential mortgage interest rate spreads over the corresponding maturity government bond? Surprisingly, this question is almost unexplored in the business cycle literature. Using a structural VAR we find that exogenous innovations to mortgage spreads have negative effects on house prices and real quantities, and by magnitudes that are comparable to the effects of an equal sized monetary policy shock. In terms of variance decomposition of GDP the mortgage spread shock is roughly as important as the excess corporate bond premium shock documented by Gilchrist and Zakrajšek (2012) in their analogous exercise for corporate spreads.

LABOR MARKET

Labor Market Distortions and Optimal Inflation

Mikael Carlsson and Andreas Westermark

Most central banks today target an inflation rate of two percent, wheras the current monetary models prescribes an (Ramsey) optimal steady state inflation rate that is sligthly negative. This reflects a trade off between, on the one hand, a motive for pushing the opportunity cost of holding money towards zero by setting nominal interest rates to zero (the Friedman rule) and, on the other hand, the desire of price stability in the presence of nominal rigidities. In this project we study how far adding labor-market search frictions and staggered wage barganing can take us in understanding the inflation target choice of most central banks.

(continuing since previous year)

The Optimal Inflation Target under Downward Nominal Wage Rigidity

Mikael Carlsson and Andreas Westermark

The starting point for this project is the empirical observation that nominal wages almost never falls. To study the effect on downward nominal wage rigidity on the optimal steady state inflation, we develop a general equilibrium model where this rigidity is a rational outcome, steming from that the bargaining parties facing asymmetric conflict-costs in the bargaining problem between firms and workers (see Holden, 1994, European Economic Review and Carlsson och Westermark, 2008, B.E. Journal of Macroeconomics, Advances).

(continuing since previous year)

Wage Adjustment and Productivity Shocks

Mikael Carlsson

Differences in wages paid between firms are a large and growing part of the overall wage dispersion in many countries (Lazear and Shaw, 2009, University of Chicago Press). From the extensive literature building on Abowd, Kramarz, and Margolis (1999) Econometrica, it is by now an established fact that some firms pay higher wages than others, even to identical workers. In parallel, a large literature has established an empirical association between wages and firm level profits. Yet, surprisingly little is known regarding the deep determinants of these persistent differences. In this project, we aim to study how individual wage growth is affected by firm/sector specific TFP driven variation in labor productivity using matched employeer-employee data.

(continuing since previous year)

Firms, Shocks and Labor Adjustment

Mikael Carlsson

In this project, we aim to extend the analysis in the project discussed above (Wage Adjustment and Productivity Shocks) by identifying and studying the effects of a richer set of structural firm-level disturbances on the firm's labor adjustment margins by applying structural VAR methods to the matched employeer-employee data.

(continuing since previous year)

The Aggregate Significance of Labor Reallocation

Mikael Carlsson

Building on the empirical observation that some firms pay higher wages than others, even to identical workers (Abowd, Kramarz, and Margolis, 1999, Econometrica, AKM) we study how reallocation of identical workers (constructed using the methods devoloped by AKM) between firms with different productivity affect aggregate productivity and output using a matched employer-employee dataset covering the Swedish private sector between 1996 and 2004.

(continuing since previous year)

The Replacement Rate, Unemployment and Wage Setting

Vesna Corbo and Andreas Westermark

The project aims at empirically evaluating the effect of changes in the replacement rate on wage setting behavior and unemployment in a standard DSGE model incorporating firm-specific labor and bargaining between the firm and the workers with staggered wage and price contracts. Moreover, the relationship between the replacement rate and wage setting and unemployment will also be studied using reduced form IV methods that is standard in the literature to investigate whether general equilibrium DSGE models performs better than reduced form methods.

(continuing since previous year)

Involuntary Unemployment and the Business Cycle

Lawrence Christiano, Mathias Trabandt and Karl Walentin

Can a model with limited labor market insurance explain standard macro- and labor market data jointly? We seek to construct a monetary model in which: i) the unemployed are worse off than the employed, i.e. unemployment is involuntary and ii) the labor force participation rate varies with the business cycle. To illustrate key features of our model, we start with the simplest possible New Keynesian framework with no capital. We then integrate the model into a medium sized DSGE model and show that the resulting model does as well as existing models at accounting for the response of standard macroeconomic variables to monetary policy shocks and two technology shocks. In addition, the model does well at accounting for the response of the labor force and unemployment rate to these three shocks.

(continuing since previous year)

MONETARY POLICY

Output Gaps and Robust Monetary Policy Rules

Roberto Billi

Policymakers often use the output gap, a noisy signal of economic activity, as a guide for setting monetary policy. Noise in the data argues for policy caution. At the same time, the zero bound on nominal interest rates constrains the central bank's ability to stimulate the economy during downturns. In such an environment, greater policy stimulus may be needed to stabilize the economy. Thus, noisy data and the zero bound present policymakers with a dilemma in deciding the appropriate stance for monetary policy. I investigate this dilemma in a small New Keynesian model, and show that policymakers should pay more attention to output gaps than suggested by previous research.

(continuing since previous year)

Price Stabilization and the Zero Lower Bound

Roberto Billi

In the presence of the zero lower bound on nominal interest rates, a price-level target can significantly improve monetary policy relative to an inflation target. I show this improvement in a small New Keynesian model, in which the only policy instrument is a short-term nominal interest rate that occasionally hits the zero bound. I consider both discretionary policy and simple rules with smoothing. And I find that, without resorting to other policy tools, such as deficit spending or asset purchases, a price-level target makes the economy very resilient to zero-bound episodes.

(continuing since previous year)

Monetary Regime Change and Business Cycles

Vasco Curdia and Daria Finocchiaro

This paper proposes a method to structurally estimate a model with a regime shift and evaluates the importance of acknowledging the break in the estimation. We estimate a DSGE model on Swedish data taking into account the regime change in 1993, from exchange rate targeting to inflation targeting. Ignoring the break leads to spurious estimates. Accounting for the break suggests that monetary policy reacted strongly to exchange rate movements in the first regime, and mostly to inflation in the second. The sources of business cycles and their transmission mechanism are significantly affected by the exchange rate regime.

(accepted for publication)

Debt, Equity and Optimal Monetary Policy

Daria Finocchiaro and Caterina Mendicino

This paper studies the optimal conduct of monetary policy in an economy subject to changes in the financing conditions of firms. To this purpose, we extend Kiyotaki and Moore (1997)'s model to include both credit and equity financing, and nominal price rigidities. In the face of adverse shocks, entrepreneurs, limited in their capital holding by the existence of an occasionally binding collateral constraint, may raise external funds throughout a reduction in their equity payout. An equity payout cost is introduced to account for rigidities affecting the substitution between debt and equity. The model features two sources of macroeconomic fluctuations: a productivity shock and a shock originated in the credit market.

Welfare analyses show that, in addition to inflation, an interest-rate response to output and credit growth is optimal. Further, the interest-rate response to this financial variable increases with the degree of rigidities in the substitution between debt and equity financing. Credit shocks account for most of the gains from a policy response to credit growth. Asset prices feedback effects on the collateral constraints turn out to be crucial for these results.

PRICE SETTING

Selection Effects in Price Setting

Mikael Carlsson

In this project, we study to what extent the probability of a firm to change its price is dependent on the realization of its marginal costs. This is done using using the Swedish firm-level microdata set on costs and prices used in Carlsson and Nordström Skans (2012) American Economic Review. This type of self-selection effect is active in Menu Costs models of price setting and may have potentially strong implications for the degree of monetary non-neutrality in macro-economic models.

Refining Stylized Facts from Factor Models of Inflation

Ferre De Graeve and Karl Walentin

Factor models in the literature suggest that sectoral shocks generate the bulk of sectoral inflation variance, but no persistence. Aggregate shocks, by contrast, cause sectoral inflation persistence, but have negligible relative variance. We show that simple factor models do not cope well with essential features of price data. Features as measurement error, sales and item substitutions blow up the variance of sectoral shocks, while reducing their persistence. Controlling for such effects we find that inflation variance is driven by

both aggregate and sectoral shocks. Sectoral shocks, too, generate substantial inflation persistence. This has implications for the foundations of price stickiness.

(continuing since previous year)

FISCAL-MONETARY INTERACTION

Distortionary Fiscal Policy and Monetary Policy Goals

Roberto Billi and Klaus Adam

We study interactions between monetary policy, which sets nominal interest rates, and fiscal policy, which levies distortionary income taxes to finance public goods, in a standard, sticky-price economy with monopolistic competition. Policymakers' inability to commit in advance to future policies gives rise to excessive inflation and excessive public spending, resulting in welfare losses equivalent to several percentage points of consumption each period. We show how appointing a conservative monetary authority, which dislikes inflation more than society does, can considerably reduce these welfare losses and that under optimal policy the monetary authority is mainly concerned about inflation. Exclusive focus on inflation, however, can lead to severely suboptimal economic outcomes.

(continuing since previous year)

Fiscal Multipliers under Downward Nominal Wage Rigidity

Mikael Carlsson and Andreas Westermark

The purpose of this paper is to analyze whether fiscal multipliers are asymmetric in the presence of downward nominal wage rigidities. Specifically, spending shocks might have smaller effects on wages in recessions than in booms, implying that multipliers vary across the cycle.

On Fiscal Policy in Contemporary DSGE Models

Ferre De Graeve and Virginia Queijo von Heideken

The role of fiscal policy in DSGE models has long been ignored. Recent evidence from reduced-form VARs (Sims (2011)), event-studies (Leeper et al. (2012)) and structural models (Fernández-Villaverde et al. (2012)) shows that information about fiscal variables can add to macroeconomic models. To strongly convey the point that DSGE models should take fiscal policy seriously, we show that even without any information on fiscal variables standard contemporary DSGE models map historical fluctuations to fiscal policy. We estimate a version of the Smets-Wouters model and show that the model interprets changes in long-term interest rates, unrelated to current short rates, as news about fiscal policy through the effect it may have on future inflation. This interpretation is exactly the one Sims (2011) and Leeper and Walker (2012) argue for.

ECONOMETRICS

Long-Lag VARs

Ferre De Graeve and Andreas Westermark

Despite methodological critiques, macroeconomic research often relies on structural vector autoregressions (SVARs) to uncover empirical regularities. In large part, critics argue the method goes awry due to lag truncation. Reduced form models with short lag lengths provide poor approximations to DSGE models. Yet short lag lengths are deemed a necessity as increased parametrization would lead to prohibitively large uncertainty. We show that the trivial solution to the critique, i.e. dramatically increasing lag length, actually works. Truncation is a form of misspecification. In the face of misspecification, increasing lag length may in fact reduce uncertainty. This overturns conventional wisdom. As a result, VARs with lag lengths of several years can lead to unbiased and precise inference. We document this tradeoff between bias reduction, degrees of freedom reduction and its resulting increase in uncertainty, and misspecification. For standard DSGE models reducing truncation leads to unbiased and more precise inference, with better coverage. The implication is that long-lag VARs are a viable tool for empirical macro.

(continuing since previous year)

Efficient Estimation of Covariance Matrices

Paolo Giordani, Robert Kohn and Xiuyan Mun

This paper provides an approach to the regularization of covariance matrices that can be applied to any model for which the likelihood is available in closed form, and is computationally feasible in dimensions (e.g. number of assets) up to a few hundreds. We are aware of no alternative solution to the problem of covariance matrix regularization that is both equally general and practical in medium and large problems. Efficient estimation of covariance matrices is important for portfolio choice, and it is well documented that standard, un-regularized estimates are statistically inefficient, unstable, and often lead to poor portfolio selection. The problem of covariance estimation for financial returns is compounded by the fact that the normality assumption is typically inappropriate. Our approach is ideally suited to more complex models and distributions, and we document very promising performance of our approach in several models of interest to financial econometrics (student t; mixtures of normals, mixtures of experts, copulas, etc), for both simulated and real data.

(accepted for publication)

Flexible Multivariate Density Estimation with Marginal Adaptation

Paolo Giordani, Xiuyan Mun, Minh-Ngoc Tran and Robert Kohn

This paper is concerned with multivariate density estimation. We discuss deficiencies in two popular multivariate density estimators – mixture and copula estimators, and propose a new class of estimators which combines the advantages of both mixture and copula modelling while being more robust to their weaknesses. Out method adapts any multivariate density estimator using information obtained by separately estimating the marginals. We propose two marginally adapted estimators based on multivariate mixture of normal and mixture of factor analyzers estimators. Simulations and real data examples show that the marginally adapted estimators are capable of improving on their original estimators and compare favourably with other existing models.

(accepted for publication)

Quasi-Copulas for Flexible Multivariate Density Estimation

Paolo Giordani, Minh-Ngoc Tran, Xiuyan Mun and Robert Kohn

We propose a new class of densities called quasi-copulas, which includes normal and t copula and standard multivariate densities as special cases. Like copulas, quasi-copulas allow the marginal densities to be modeled separately from the joint dependence. However, whereas copulas are only computationally tractable in medium and high dimensions if a very simple from, such as a normal distribution, is assumed for the joint dependence, quasi-copulas can handle highly complex joint dependence structures. Based on mixtures of t models, we construct quasi-copulas which are far more flexible than current copula densities, and outperform them in several real data sets.

Modeling Dynamic Volatilities and Correlations under Skewness and Fat Tails

Xin Zhang, Drew Creal, Siem Jan Koopman and André Lucas

We propose a new model for dynamic volatilities and correlations of skewed and heavy-tailed data. Our model endows a non-normal distribution with time-varying parameters driven by the information from the observation density function. The key novelty in our approach is the fact that the skewed and fat-tailed shape of the distribution directly affects the dynamic behavior of the time-varying parameters. We present simulated and empirical evidence that shows that the model outperforms its close competitors.

(continuing since previous year)

Conditional Probabilities for Euro Area Sovereign Default Risk

Xin Zhang, Bernd Schwaab and André Lucas

We propose a new empirical framework to assess the likelihood of joint and conditional failure for Euro area sovereigns. Our model is based on a dynamic non-normal copula which captures all the salient features of the data, including non-normal changes in the price of Credit Default Swap (CDS) protection against sovereign default, as well as dynamic volatilities and correlations. We apply the framework to Euro area sovereign CDS spread changes. Our results reveal significant time-variation in risk dependence

and considerable spill-over effects in the likelihood of sovereign failures. We also investigate distress dependence around a key policy announcement by Euro area heads of state on May 9, 2010.

(continuing since previous year)

Measuring Credit Risk in a Large Banking System: Econometric Modeling and Empirics

Xin Zhang, André Lucas and Bernd Schwaab

Two new measures for systemic risk are computed based on the time-varying conditional and unconditional probability of simultaneous failures of several financial institutions. Our model can be interpreted as a Merton model with correlated Lévy drivers. The correlation estimates are robust against possible outliers and influential observations. For very large cross-sectional dimensions, we propose an approximation based on a conditional Law of Large Numbers to compute extreme joint default probabilities. We apply the model to assess the risk of joint financial firm failure in the European Union during the financial crisis. By augmenting the model with a few economic variables that capture situations of systemic stress, we find that including extra economic variables helps to explain systemic correlation dynamics.

Publications accepted in 2012

Carlsson, Mikael, Stefan Eriksson and Nils Gottfries, "Product Market Imperfections and Employment Dynamics", forthcoming in *Oxford Economic Papers*.

Finocchiaro, Daria and Vasco Cúrdia, "Monetary Regime Change and Business Cycles", forthcoming in *Journal of Economic Dynamics and Control.*

Finocchiaro, Daria and Virginia Queijo von Heideken, "Do Central Banks React to House Prices?", forthcoming in *Journal of Money Credit and Banking,*

Giordani, Paolo, Mun Xiuyan and Robert Kohn, "Efficient Estimation of Covariance Matrices using Posterior Mode Multiple Shrinkage", forthcoming in *Journal of Financial Econometrics*.

Giordani, Paolo, Mun Xiuyan, Minh-Ngoc Tran and Robert Kohn, "Flexible Multivariate Density Estimation with Marginal Adaptation," forthcoming in *Journal of Computational and Graphical Statistics*.

Pitt, Michael, Ralph Silva, Paolo Giordani and Robert Kohn, "Auxiliary Particle Filter within Adaptive Metropolis-Hastings Sampling," forthcoming in *Journal of Econometrics*.

Villani, Mattias, Robert Kohn and David Nott, "Generalized Smooth Finite Mixtures", forthcoming in *Journal of Econometrics*.

Working papers

No. 264, Luca Sala, Ulf Söderström and Antonella Trigari, "Structural and Cyclical Forces in the Labor Market During the Great Recession: Cross-Country Evidence"

No. 263 Tor Jacobson and Erik von Schedvin, "Trade Credit and the Propagation of Corporate Failure: An Empirical Analysis"

No. 262 Björn Segendorf and Thomas Jansson, "The Cost of Consumer Payments in Sweden"

No. 261 Mikael Apel and Marianna Blix Grimaldi, "The Information Content of Central Bank Minutes"

No. 260 Roberto M. Billi, "Output Gaps and Robust Monetary Policy Rules"

No. 259 Mikael Carlsson and Andreas Westermark, "Labor-Market Frictions and Optimal Inflation"

No. 258 Hans Degryse, Vasso Ioannidou and Erik von Schedvin, "On the Non-Exclusivity of Loan Contracts: An Empirical Investigation"

No. 257 Geraldo Cerqueiro, Steven Ongena and Kasper Roszbach, "Collateralization, Bank Loan Rates and Monitoring: Evidence from a Natural Experiment"

Other research activities

Conferences

The research division organized a conference on "Sovereign Debt and Default". Leading researchers and policymakers in the field discussed the (dis-)incentives affecting sovereign borrowers' decisions to default, to increase borrowing, or to deflate their debt, as well as the incentives for lenders to forgive debt. A vast body of empirical work provided evidence on the transmission of sovereign crises across countries and through banks, on the construction of measures of sovereign risk and on how having dealt with a crisis in the past affects countries' ability to borrow in the future.

External computing cluster

Monetary policy and financial stability analysis are making increasing use of models and methods that require high-performance computing solutions. The Gothenburg-based firm GridCore hosts an external computing cluster dedicated to the Riksbank. The cluster currently has 72 cores for parallel computing in Linux with Matlab, C/C++, Fortran and Dynare. The manager of the cluster is Roberto Billi.

Greater Stockholm Macro Group

Together with Per Krusell (IIES, Stockholm University) we continue to organize a monthly internal seminar series for macro researchers from all major institutions in Stockholm and Uppsala. The series is called "Greater Stockholm Macro Group". The purpose is to strengthen the macro research field by encouraging exchange of ideas and cooperation.

Internship program

As usual, the research division hosted four PhD interns in 2012. This year's interns were Maria Gustafsson (EUI), Paola Morales Acevedo (Tilburg), Stefan Pitschner (UPF) and Federica Romei (Luiss).

Reading group on financial stability

Since 2011 the research division and the Financial Stability Department are jointly organizing a financial stability reading group. The purpose of this reading group is to read and discuss research frontier papers in finance and financial stability with a direct relevance for policy. For questions regarding the reading group please contact Kasper Roszbach or Martin W. Johansson.

Research seminars

The research division organizes weekly research seminars, mainly by invited international visitors. The seminars normally take place on Tuesdays at 1 pm and attendance is open to Riksbank employees as well as to all academics. See http://www.riksbank.se/en/The-Riksbank/Research/Seminars/ for listings of upcoming and historical seminars.

Sabbaticals

During March to June 2012 Daria Finocchiaro visited the Federal Reserve Bank of New York. She spent her time there mainly working on research projects on optimal monetary and macroprudential policies in the presence of credit frictions. She also worked on the project "Monetary Regime Change and Business Cycles" with Vasco Cúrdia.

Karl Walentin visited the Federal Reserve Bank of San Francisco for the fall semester. Most of the visit was spent working on business cycle implications of mortgage interest rate spreads.

Teaching

Ferre De Graeve and Kasper Roszbach taught half of an MSc course on "Financial Stability and Regulation" at Stockholm School of Economics both during the spring and the fall. This course gives MSc students in finance and economics an overview of drivers behind financial crisis, regulatory responses to the recent financial crisis and the role and workings of central banks and banking supervision.

Andreas Westermark taught a part of the second graduate first-year course in macroeconomics at Uppsala University. His part of the course covered macroeconomic fluctuations, wage and price adjustment and monetary policy.

Upcoming events in 2013

Upcoming courses

Since 2011, a second year PhD course on monetary economics has been given at the bank during the spring. The course is taught by faculty from Stockholm and Uppsala University, as well as by Lars E.O. Svensson, deputy governor at the Riksbank.

The purpose of the course is to introduce students to modern New Keynesian models for monetary policy and business cycle analysis. These models are dynamic stochastic general equilibrium models based on optimizing behavior and rational expectations. At the same time, they incorporate price and wage rigidity, permitting an important role for aggregate demand shocks and monetary policy to affect activity. They have become a standard tool for central banks and they are used as a framework for much modern research in macroeconomics.

The course will cover the basic New Keynesian model, optimal policy, labor market frictions, open economy, and also introduce methods for solution and simulation. Throughout, we will emphasize the microeconomic foundations of these models. We hope that, after finishing this course, participants will feel comfortable working with these models.

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