

CONTENTS

Interview with Dirk Niepelt.....	2
Changes in the research staff.....	3
Featured article.....	3
Research projects pursued in 2021.....	4
Credit and banking	4
Econometrics	5
Financial theory	5
Fiscal policy	6
Growth	7
Household finance and savings	7
Labor markets	8
Macroeconomics	9
Monetary policy and theory	11
Refereed publications accepted in 2021.....	13
Working papers.....	14
Non-refereed publications.....	14
Other research activities.....	14
Upcoming events in 2022.....	15

This newsletter describes the research activities and output of the Research Division at Sveriges Riksbank in 2021.

Staff at the Research Division

Edvin Ahlander, research assistant
Niklas Armborg, economist
Christoph Bertsch, senior economist
Daniele Bianchi, visiting scholar
Roberto Billi, advisor
Mikael Carlsson, consultant
Daria Finocchiaro, advisor
Anna Grodecka-Messi, senior economist
Isaiah Hull, senior economist
Tor Jacobson, senior advisor
Thomas Jansson, advisor
Mathias Klein, senior economist
Per Krusell, consultant
Jesper Lindé, advisor (on leave)
Conny Olovsson, advisor (on leave)
Anna Rogantini Picco, economist
Ulf Söderström, head of research
Lena Sundvall, secretary
David Vestin, senior advisor
Karl Walentin, advisor (on leave)
Andreas Westermark, advisor
Xin Zhang, senior economist

Reflections by the Head of Research

Time flies, also during a pandemic. Also 2021 was characterized by various restrictions due to the coronavirus and by our effort to keep up with our work and our normal lives. As in many places, staff at the Research Division spent most of the spring working from home, with virtual meetings, research seminars and teaching. We got pretty good at it eventually, although we always missed true social interaction. We initiated a gradual return to the office after the summer, and we are really enjoying having meetings and seminars at least partially in person. Planning for the “new normal”, the Riksbank also started thinking hard about what our future workplace should be like, partly because the Riksbank is growing fast, and the Research Division has become quite involved in those discussions.

During the year we had some change in staff. Karl Walentin has been on leave at the Ministry of Finance for most of the year, and Conny Olovsson is on leave at the ECB. But we were happy to have Anna Grodecka-Messi join us in September, and Daniele Bianchi as a visiting scholar in October. We also hired a new research assistant in August, Edvin Ahlander, to replace Jacob Ewertzh.

As in 2020, research productivity seems not to have suffered much from the pandemic, although the long-term consequences are quite uncertain. Staff at the Research Division managed to keep up the good pace of research publications, with papers accepted in the *Journal of Political Economy*, *American Economic Review Insights*, *Journal of Public Economics*, the *Journal of Money, Credit and Banking*, among others. Our featured article this year, “Directed Technical Change as a Response to Resource Scarcity”, is written by Conny Olovsson together with John Hassler and Per Krusell at the International Institute of Economic Studies at Stockholm University. There is growing interest in climate change within the central banking world, and we are happy to have Conny in our team doing frontier research on the topic.

Another hot topic during the last couple of years has been the digitalization of payments, and the appearance of new types of money. This has led many central banks, also the Riksbank, to evaluate the possibility of launching a digital currency. In this newsletter, we therefore have an interview with Dirk Niepelt, Director of the Study Center Gerzensee and Professor at the University of Bern. Dirk also leads the Research and Policy Network on FinTech and Digital Currencies at the Centre for Economic Policy Research (CEPR) since 2021 and he has for many years explored issues at the heart of monetary theory, payment systems and digital currencies. It is exciting to hear his thoughts on digital payments and the challenges related to issuing a Central Bank Digital Currency.

With this, I wish you a good read of our Research News, happy holidays and a happy and productive 2022!

Ulf Söderström

Interview with Dirk Niepelt

Director of Study Center Gerzensee, Professor at University of Bern

You have been leader of the CEPR Research and Policy Network on FinTech and Digital Currencies since 2021 and explored issues at the heart of monetary theory and payment systems in your research. What do you think is new about digital central bank money and what makes it different from other digital means of payment?

Societies have been using digital means of payment for decades. Commercial banks use digital claims against the central bank, “reserves,” to pay each other. Households and firms use digital claims against commercial banks, “deposits,” as well as claims on such deposits, as money. Financial innovations typically improved the convenience for users or helped build additional layers of claims on top of each other, fostering fractional reserve banking and raising money multipliers.

Recently, new digital instruments have appeared on the fringes of the financial system. Some think of them as currencies and others as mere database entries. These instruments exploit the fact that smart ways of managing information, and even smarter approaches to providing incentives in anonymous, decentralized networks can replicate some functions of conventional monies. Monetary theorists are not surprised. They have debated for decades to what extent money is, or is not a substitute for a large societal database. The information technology revolution has made this debate much less theoretical.

Of course, the new entrants such as Bitcoin have not been very successful so far when it comes to actually creating substitute monies. But they have been quite successful in terms of creating new assets, mostly bubbles. Bubbles are also a great mechanism for their creators to extract resources from other people.

What is new about digital central bank money for the general public (central bank digital currency, CBDC) is that households and firms would no longer be restricted to cash when they wanted to pay using a central bank (i.e., government) liability. That is, banks would lose a privilege and households and firms would gain an option. CBDC, which I like to think of as “Reserves for All,” seems natural when you consider the history of central banking. It also seems natural when you consider that many governments strongly discourage the use of cash. Nevertheless, compared with the status quo, “Reserves for All” would amount to a major structural change.

What do you think are the main challenges of issuing a CBDC?

From a macroeconomic perspective, introducing “Reserves for All” could have major implications. The balance sheets of central banks would likely expand while commercial banks would likely lose some deposits as a source of funding. Mechanically, they would reduce their asset holdings or attract other sources of funding. The question is, which assets they would shed, and subject to which terms and conditions they would attract new funding. These are important questions because banks play a key role in the transmission of monetary policy to main street.

While many central bankers are concerned about the implications of CBDC for bank assets and funding costs academic research conveys a mixed picture. To assess the consequences of “Reserves for All” it is natural to first ask what it would take to perfectly insulate banks and the real economy from the effects of CBDC issuance. As it turns out, the answer is “not much.” Under fairly general conditions the central bank holds a lot of power and can neutralize the implications of CBDC for macroeconomic outcomes.

Of course, central banks might choose to implement other than the neutral policies. In my view, this is in fact very likely, for reasons related to the political economy of banking and central banking. On the one hand, CBDC would make it even harder for central banks to defend their independence. On the other hand, CBDC would increase the transparency of the monetary system and trigger questions about the fair distribution of seignorage. On top of this, “Reserves for All” might trigger demands for the removal of other “bank privileges:” Interest groups might request LOLR-support, arguing that they are systemically important and just temporarily short of liquidity. Others might want to engage in open market operations with the central bank.

Beyond macroeconomics and political economy, CBDC could substantially change the microeconomics of banking and finance. In the current, two-tiered system there is ample room for complementarities between financing, lending, and payments. The information technology revolution strengthens these complementarities but it also generates new risks or inefficiencies. How the connections between money and information currently change is the subject of ongoing research. I don't think we have been able to draw robust conclusions yet as to what role CBDC would play in this respect.

Should we, and will we have CBDCs in the near future?

Some countries have already decided in favor. Others, like the Riksbank I believe, are still on the sidelines, thinking about the issues, watching, and preparing. Yet others have only recently taken the issue more seriously, mostly because of the Libra/Diem shock in June 2019, which made it clear to everybody that the status quo ceases to be an option.

I think the normative question is still unanswered. Not only does CBDC have many consequences, which we would like to better understand. There are also the unknown consequences that we might want to prepare ourselves for. Moreover, many of the problems that CBDC could potentially address might also allow for different solutions; the fact that CBDC could work does not mean that CBDC is the best option.

In a recent CEPR eBook* several authors share that view, which suggests a case-by-case approach. CBDC might be appropriate for one country but not for another, for instance because cash use has strongly declined in Sweden and this may favor CBDC (as Martin Flodén and Björn Segendorf discuss in their chapter) while the same does not apply in the US or elsewhere.

Regarding the positive question, I think that many more countries will decide to introduce “Reserves for All,” and quite a few of them in the next five years. One reason is that it is politically difficult to wait when others are moving ahead. Another is the fear of “dollarization,” not only in countries with less developed financial markets. The strongest factor, I believe, is the fear that central banks might lose their standing in financial markets. This is connected with the important question, which the Riksbank has been asking early on, whether in the absence of CBDC declining cash circulation could undermine trust in central bank money.

Among the eBook authors, most but far from all expect that a CBDC in a developed economy would resemble deposits in terms of user experience. Almost everyone expects that private banks and service providers rather than the central bank itself would interact with end-users. I share these views. But there is disagreement as to whether digital currencies would be interest bearing and how strictly they would protect privacy. I believe that it is also unclear how strictly central banks would enforce KYC regulation or holding restrictions on foreigners. These two factors might critically affect the threats to monetary sovereignty in other countries, and as a consequence they might shape the chain reaction of adoptions.

What seems clear to me is that the implications of CBDC go far beyond the remit of central banks. Parliaments and voters therefore should have the final say.

* Dirk Niepelt (2021), editor: “CBDC: Considerations, Projects, Outlook”, CEPR eBook.

Changes in the research staff

Anna Grodecka-Messi joined the Research Division in September, while on leave from the Financial Stability Department. **Daniele Bianchi** (Senior Lecturer at Queen Mary University of London) joined the Research Division as visiting scholar since October. **Edvin Ahlander** joined the Research Division as research assistant in August, replacing **Jacob Ewertz** who left to take a position as data analyst at the Statistics Division. **Conny Olovsson** is on leave at the ECB Research Department since April, while **Karl Walentin** is on leave at the Swedish Ministry of Finance since February.

Featured article

The paper “**Directed Technical Change as a Response to Resource Scarcity**” by John Hassler, Per Krusell (both professors at the Institute for International Economic Studies at Stockholm University) and Conny Olovsson from the Research Division was recently published in the *Journal of Political Economy*. Conny shares the main insights of the paper in the following Q&A.

What are the key questions in your paper?

We ask two specific questions: (i) what is the future of our dependence on natural resources that are in finite supply, and (ii) how will consumption growth be affected by this scarcity? We then develop a quantitative theory to answer them, and apply it to the case of fossil-fuel-based energy as an input into production. Our interest in energy comes from the fact that it is a key issue in climate change.

The market's first response to scarcity is a rise in the price of the scarce resource, with reduced use as a result. The paper then focuses on an implication of a higher price: endogenous resource-saving technical change, i.e., the development of new techniques and products that allows us to save on the scarce input. The

theory is used to interpret the post-war U.S. experience on fossil-fuel dependence, but also to make predictions into the future.

What do you find?

The findings are striking: first, fossil-fuel saving was dormant until the oil shocks but then took off and grew rapidly; second, capital/labor saving grew more slowly after the oil shocks; and third, more generally, fossil-energy prices and saving on fossil energy co-move clearly even when excluding the large oil shocks in the 1970s.

The findings also show that it has been possible to sharply increase the growth rate in energy efficiency at relatively modest costs in terms of lower growth. In a scenario with declining energy use, long-term growth would be 1.7% per year if the historical relationships remain. This can be compared to the historical average growth rate of about 3% during the pre-war period.

Why is this important for a central bank?

First, our findings have something to say about the long-run growth rate, which is of obvious interest for central banks. Second, central banks have become increasingly concerned with both the consequences of climate change as well as with the question of to what extent they can and should try to contribute to mitigate it. Because climate change is a long-run phenomenon, an understanding of technical change is crucial for addressing both of these questions.

Research projects pursued in 2021

CREDIT AND BANKING

Understanding Working Capital Funding

Niklas Amberg and Tor Jacobson

Banks provide a set of products targeting firms' management of their working capital funding needs. Firms' short-term lending to customers, accounts receivable, is used as collateral backing firms' short-term bank lending; banks provide factoring services, i.e., purchases of firms' account receivables; and more recently, banks offer so called reverse factoring programs where (large) buyers and banks in formal agreements prolong the duration of buyers' accounts payable. In other words, banks are still very much engaged in increasing the liquidity of trade credit. Here we make use of an extraordinarily granular dataset on the above described products, provided by one of the largest Swedish commercial banks. Data describes the interactions between the bank, its customers, the customers' customers and sellers in inter-firm trade, at a daily frequency over 5-year period.

(Continuing project)

The Role of Government Guarantees in International Trade

Niklas Amberg, Tor Jacobson and Yingjie Qi

This paper studies the role of government guarantees in fostering relationships in international trade. Using a detailed dataset linking Swedish exporters to their foreign importers, we study how government guarantees increase exporting in both extensive and intensive margin, by (1) reducing information asymmetry, (2) reducing moral hazard issues, and (3) increasing credit access for both parties. The findings help to understand the barriers faced by firms trading cross borders, and have implications on the design of optimal government guarantees.

(Continuing project)

Why Trade Credit?

Niklas Amberg, Tore Ellingsen, Tor Jacobson and Erik von Schedvin

Why do all firms—even the wealthiest—borrow from their suppliers? Our theory says that when a supplier lends illiquid inputs, other investors become less worried about borrower moral hazard and more willing to lend liquid assets to fund complementary inputs. Thus, an additional dollar of trade credit generates more than a dollar of extra investment. While all firms take trade credit, more constrained firms depend more heavily on it and therefore employ less labor. The theory is inspired by a set of new empirical facts elicited from an invoice dataset covering 21 million transactions and 126,000 corporate customers.

(Continuing project)

Do Firms Want to Borrow to Bridge Shortfalls in Demand? An Analysis of Corporate Credit Demand during the COVID-19 Pandemic

Niklas Amberg, Tore Ellingsen and Tor Jacobson

This paper provides detailed empirical evidence on the evolution of corporate credit demand during the COVID-19 pandemic in Sweden using loan-level data from the official Swedish credit registry. The preliminary analysis shows that corporate credit demand did not increase during the crisis; instead, the results suggest that firms were sufficiently successful in cutting costs for short-term credit demand to have decreased somewhat on average. The firms' ability to cut costs and thereby reduce the need for working-capital financing appears to have been aided by the extensive government subsidies for short-term work—as evidenced by the fact that firms participating in the short-term work program reduced their utilization of pre-committed credit lines significantly more than other firms during the crisis.

(Continuing project)

ECONOMETRICS

Quantitative Easing and Bond Risk Premia: Evidence from Swedish Inflation-Indexed Bonds

Jens Christensen and Xin Zhang

We assess the impact of Sveriges Riksbank's large-scale asset purchases, commonly known as quantitative easing (QE), launched in 2015 on bond risk premia in the Swedish government bond market. Using an arbitrage-free dynamic term structure model of nominal and real bond prices that accounts for both bond-specific risk and the value of the deflation protection offered by inflation-indexed bonds, we find that bond-specific risk premia in both nominal and real bonds are time varying, but small and negative on average, i.e., they reflect safety premia, while deflation risk in Sweden only commands a tiny premium. Furthermore, investors' long-term inflation expectations have remained well anchored near the inflation target set by the Riksbank. Hence, most variation in breakeven inflation reflects changes in inflation risk premia. Finally, we examine the main transmission mechanisms for the QE program's effect on bond prices: the signalling channel, the portfolio balance channel, the scarcity/liquidity channel, and the tail risk channel. We also document spillover effects of European Central Bank's QE program.

(New project)

Modeling Extreme Events: Time-Varying Extreme Tail Shape

Bernd Schwaab, André Lucas and Xin Zhang

We propose a dynamic semi-parametric framework to study time variation in tail parameters. The framework builds on the Generalized Pareto Distribution (GPD) for modeling peaks over thresholds as in Extreme Value Theory, but casts the model in a conditional framework to allow for time-variation in the tail shape parameters. The score-driven updates used improve the expected Kullback-Leibler divergence between the model and the true data generating process on every step even if the GPD only fits approximately and the model is misspecified, as will be the case in any finite sample. This is confirmed in simulations. Using the model, we find that Eurosystem sovereign bond purchases during the euro area sovereign debt crisis had a beneficial impact on extreme upper tail quantiles, leaning against the risk of extremely adverse market outcomes while active.

(Continuing project)

FINANCIAL THEORY

A Wake-Up Call Theory of Contagion

Toni Ahnert and Christoph Bertsch

We offer a theory of financial contagion based on the information choice of investors after observing a financial crisis elsewhere. We study global coordination games of regime change in two regions linked by an initially unobserved macro shock. A crisis in region 1 is a wake-up call to investors in region 2. It induces them to reassess the regional fundamental and acquire information about the macro shock. Contagion can occur even after investors learn that region 2 has no ex-post exposure to region 1. We explore normative and testable implications of the model. In particular, our results rationalize evidence about contagious currency crises and bank runs after wake-up calls and provide some guidance for future empirical work.

(Continuing project)

Optimal Bank Leverage and Recapitalization in Crowded Markets

Christoph Bertsch and Mike Mariathan

We study banks' optimal leverage in general equilibrium and banks' response to under-capitalization. Making progress towards a "pecking order theory" for private recapitalizations, our benchmark model identifies equity issuance as individually and socially optimal compared to asset sales, as well as conditions that invert the individually optimal ranking. Financial market segmentation and an imperfectly elastic supply of specialized investment capital paired with incomplete financial markets gives rise to inefficiently high leverage ex-ante, leading to excessive capital shortfalls and insolvencies during systemic capital short-fall events. Our mechanism does not rely on moral hazard or informational asymmetries and holds for different bankruptcy procedures. We provide a novel rationale and new insights for macroprudential capital regulation, as well as new testable implications about banks' capital structure management.

(Continuing project)

FISCAL POLICY

Pension Reform and its Effect on Wealth Inequality: Evidence from Denmark

Torben M. Andersen, Joydeep Bhattacharya, Anna Grodecka-Messi, Katja Mann

A growing literature explores reasons for rising wealth inequality, but surprisingly, downplays the role of pension systems despite their well-understood influence on life-cycle saving. In theory and according to available evidence, both pay-as-you-go (PAYG) and full funded (FF) pension schemes crowd out voluntary retirement saving; they differ because aggregate saving (wealth) decreases in the former but increases under the latter system. These effects may be most potent for low- and middle-income families. This paper employs unique Danish registry data for the entire population and studies the effect on wealth inequality of a transition of the Danish system from a mostly PAYG to a more FF system. Using a calibrated life cycle model, we show that the transition reduced wealth inequality in Denmark, matching the data well.

(Continuing project)

Who is Afraid of Eurobonds?

Francesco Bianchi, Leonardo Melosi and Anna Rogantini Picco

The low interest rate environment and the growing asymmetry in the size of fiscal imbalances pose a serious challenge to the macroeconomic stability of the Euro Area (EA). We show that the current monetary and fiscal framework weakens economic growth even in low-debt countries because of the zero lower bound (ZLB) constraint. We study a new framework that allows EA policymakers to separate the need for short-run macroeconomic stabilization from the issue of long-run fiscal sustainability. The central bank tolerates the increase in inflation needed to stabilize the amount of Eurobonds issued in response to large EA recessions. National governments remain responsible to back their country level debt by fiscal adjustments. The policy acts as an automatic stabilizer that benefits both high-debt and low-debt countries, generating a moderate increase in inflation that mitigates the recession and allows the central bank to move away from the ZLB.

(New project)

Seemingly Irresponsible but Welfare Improving Fiscal Policy at the Lower Bound

Roberto Billi and Carl Walsh

In this paper, we evaluate the consequences of super-active fiscal policy rules—that is, rules that call for tax cuts and/or spending increases as the government's debt level rises—by using a standard New Keynesian model subject to an occasionally-binding zero lower bound on the monetary policy interest rate. We show that such seemingly irresponsible, debt-financed fiscal stimulus at the ZLB, unbacked by any promise of future tax increases or spending cuts, not only improves economic stability by acting as an automatic stabilizer, but also, somewhat paradoxically, reduces government debt accumulation. Fiscal rules calibrated to the U.S. response during both the Great Recession and COVID recession, combined with a weak monetary policy response to inflation, outperform a monetary policy that responds strongly to inflation and reduce the frequency of episodes at the ZLB.

(Continuing project)

The Effects of Government Spending in the Eurozone

Ricardo Duque Gabriel, Mathias Klein and Ana Sofia Pessoa

Using a newly assembled rich dataset at the regional level, this paper provides novel empirical evidence on the fiscal transmission mechanism in the Eurozone. Our baseline estimates reveal a government spending relative output multiplier around 2, an employment multiplier of 1.4, and a cost per job created of approximately

€30,000. Moreover, we find that a regional fiscal stimulus leads to a significant increase in private investment, productivity, durable consumption, and the labor share together with a significant rise in total hours worked driven by changes in the extensive margin (total employment), whereas the intensive margin (hours per worker) barely reacts. Contrarily to the common policy narrative of strong positive spillover effects, we estimate only small regional fiscal spillovers. Finally, our findings reveal strong heterogeneities across industries, states of the economy, and member states.

(Continuing project)

The Impact of Local Taxes and Public Services on Property Values

Anna Grodecka-Messi and Isaiah Hull

How do property prices respond to changes in local taxes? Attempts to measure this, starting with Oates (1969), have suffered from a lack of local public service controls. We revisit this vast literature with a novel dataset of 947 time-varying local characteristic and public service controls for all municipalities in Sweden over the 2010-2016 period. To make use of the high dimensional vector of controls, as well as time and geographic fixed effects, we employ a novel empirical approach that modifies the recently-introduced debiased machine learning estimator by coupling it with a deep-wide neural network. We find that existing estimates of tax capitalization in the literature, including quasi-experimental work, may understate the impact of taxes on house prices by as much as 50%. We also exploit the unique features of our dataset to test core assumptions of the Tiebout hypothesis and to measure the impact of public services, education, and crime on house prices and the effect of local taxes on migration. We find that local taxes and public services have a substantially larger effect on house prices and migration in urban areas, where municipal competition is higher.

(Continuing project)

GROWTH

A Traffic Jam Theory of Growth

Daria Finocchiaro and Philippe Weil

Financial development affects investment, innovation and growth while growth enhances the profitability of finance. This creates a two-way finance-growth nexus which we investigate in a Schumpeterian endogenous growth model with search frictions in credit and innovation markets. Firms that wish to innovate face a double bottleneck: the probability they will find the financier they need to finance their R&D depends negatively on credit market tension, while the probability their R&D results in innovation is negatively affected by congestion effects in science. By easing the first bottleneck, financial liberalization contributes positively to growth yet it might aggravate congestion in science. Once all general equilibrium feedback effects are taken into account, the interplay between the two congestion frictions generates a non-linear relationship between finance and productivity growth in line with what observed in the data.

(Continuing project)

HOUSEHOLD FINANCE AND SAVINGS

Do the Rich Gamble in the Stock Market? Low Risk Anomalies and Wealthy Households

Turan G. Bali, A. Doruk Gunaydin, Thomas Jansson and Yigitcan Karabulut

Contrary to the theoretical principle that higher risk is compensated with higher expected return, the literature shows that low-risk stocks outperform high-risk stocks. Using a large-scale household dataset, we provide an explanation for this puzzling result that the anomalous negative risk-return relation is only confined to those stocks held by rich households, whereas the anomaly disappears for stocks held by non-rich households and institutional investors. We find that skewness preference and optimism of rich households as well as their attention to lottery stocks explain wealthy investors' demand for high-risk stocks, leading to overpricing and low future returns for such stocks.

(Continuing project)

Does Wealth Play a Role in Socially Responsible Mutual Fund Investing?

Charlotte Christiansen, Thomas Jansson, Malene Kallestrup Lamb and Vicke Norén

We use a large administrative panel data set to study which characteristics are related to households' investments in socially responsible investing (SRI) mutual funds. To isolate financial and non-financial preferences for SRI investments, we distinguish between two types of SRI funds; ESG and charitable funds. We also analyze to what extent affluence and age play a role in SRI. We find that participation in SRI funds is lower for young and retired investors. Moreover, we find that young adults are more often ESG investors,

while retired investors are more likely to participate in charitable funds. Further, financial wealth is important for SRI participation but becomes less relevant once investors are sufficiently rich. For the exposure to SRI funds, the overall picture is quite different as it is negatively related to wealth, income, risky share, and education.

(Continuing project)

Do Robots Increase Wealth Dispersion?

Thomas Jansson and Yigitcan Karabulut

We demonstrate that increased automation has a significant negative impact on distribution of wealth. Households who are more exposed to industrial robots at work accumulate less wealth and experience greater downward mobility in the wealth distribution. The negative wealth effects of robots are not merely a consequence of differences in earned incomes or differential saving rates. We provide evidence that the adverse effects of rapid robotization on individual workers' human capital, and thereby, on their financial risk taking and investment behavior represent an additional important mechanism. Overall, the portfolio channel amplifies the inequality-enhancing effects of increased automation.

(Continuing project)

Wealth Inequality: Opportunity or Unfairness?

Michael Haliassos, Thomas Jansson and Yigitcan Karabulut

This paper presents evidence of a new propagation mechanism for wealth inequality, based on differential responses, by education, to greater inequality at the start of economic life. It is motivated by a novel positive cross-country relationship between wealth inequality and perceptions of opportunity and fairness, which holds only for the more educated. Using unique administrative micro data and a quasi-field experiment of exogenous allocation of households, the paper finds that exposure to a greater top 10% wealth share at the start of economic life in the country leads only the more educated placed in locations with above-median wealth mobility to attain higher wealth levels and position in the cohort-specific wealth distribution later on. Underlying this effect is greater participation in risky financial and real assets and in self-employment, with no evidence for a labor income, unemployment risk, or human capital investment channel. This differential response is robust to controlling for initial exposure to fixed or other time-varying local features, including income inequality, and consistent with self-fulfilling responses of the more educated to perceived opportunities, without evidence of imitation or learning from those at the top.

(New project)

House Prices, Home Equity, and Personal Debt Composition

Jieying Li and Xin Zhang

Using a monthly panel dataset of Swedish individuals' debt composition including mortgage and non-mortgage consumer credit, we show that house price changes can explain a significant fraction of personal debt composition dynamics. We exploit the variation in local house price growth as shocks to homeowners' housing wealth to study the consequential adjustment of personal debt composition. To account for local demand shocks and disentangle the housing collateral channel from the wealth effect, we use renters and non-equity-withdrawal homeowners in the same region as control groups. We present direct evidence that homeowners reoptimize their debt structure by using withdrawn home equity to pay down comparatively expensive short-term non-mortgage debt during a housing boom, unsecured consumer loans in particular. We also find that homeowners withdraw home equity to finance their entrepreneurial activities. Our study sheds new light on the dynamics of personal debt composition in response to changes in house prices.

(Continuing project)

LABOR MARKETS

Dynamic Macroeconomic Implications of Migration

Conny Olovsson, Karl Walentin and Andreas Westermarck

International migration flows are large, volatile and have increased in the recent period. As one of the first papers, we study the dynamic effects of immigration shocks on the economy within a search and matching framework. Since many of the macroeconomic effects of immigration are largest in the short run, a steady state analysis would be insufficient. To construct a quantitatively relevant general equilibrium framework, extensive Swedish microdata is used. We then study the effect of a large migration shock on various

macroeconomic aggregates. The effect on GDP per capita and the employment rate is substantial on impact, and then decreases over time.

(Continuing project)

Skill Loss, Job Mismatch and Slow Recovery from Large Recessions

Karl Walentin and Andreas Westermark

In this paper we ask to what degree i) human capital dynamics induced by skill loss during unemployment and ii) decrease in match quality contributed to the slow recovery from large recessions, in particular the low post-2009 growth in GDP, employment, labor productivity and real wages following the Great Recession. Match quality has decreased because of the sullyng effect of the recession that follows from reduced hiring activity and the resulting collapse of the job ladder. We find that the increase in unemployment during the initial phase of the Great Recession had long-lasting effects through the skill loss it induced, mainly in terms of increased unemployment and reduced GDP. We also find that persistence is important for the results. An equally sized shock that is less persistent has substantially smaller effects on GDP and employment.

(Continuing project)

MACROECONOMICS

The Costs of Inflation: Evidence from Microdata along the Supply Chain

Mikael Carlsson, Mathias Klein and Andreas Westermark

Using US consumer price microdata, Nakamura & Steinsson (2018) QJE finds that there is no relation between the inflation rate and the size of price changes at the micro level. This contrasts to the New Keynesian framework, which is used for analyzing monetary policy and indicates that the level of the inflation target is unimportant for the welfare and real variables in the economy. However, as indicated by e.g., Carvalho (2006), in response to a monetary policy shock, sectors with lower frequencies of price adjustment have a disproportionate effect on the aggregate price level. This project uses Swedish microdata from the PRISMA project for both consumer and producer prices, to see whether the Nakamura & Steinsson (2018) results for consumer prices are valid, or if sectoral effects lead to a substantially different and larger effects of shocks. Specifically, since previous studies on producer prices indicates support for the New Keynesian framework, the result in Nakamura & Steinsson (2018) could be overturned by the presence of intermediate goods sectors.

(Continuing project)

The Costs of Macroprudential Deleveraging in a Liquidity Trap

Jiaqian Chen, Daria Finocchiaro, Jesper Lindé and Karl Walentin

What are the effects of different borrower-based macroprudential tools when both real and nominal interest rates are low? We study this question in a New Keynesian model featuring long-term debt, housing transaction costs and a zero lower bound constraint on policy rates. We find that the long-term costs, in terms of output losses, of all the macroprudential tools we consider are moderate. However, the short-term costs differ substantially between tools. Moreover, the costs vary depending on the current state of economy and monetary policy. Specifically, a loan-to-value tightening is more than three times as contractionary compared to a loan-to-income tightening when debt is high and monetary policy cannot accommodate.

(Continuing project)

Risk Sharing and the Adoption of the Euro

Alessandro Ferrari and Anna Rogantini Picco

This paper empirically evaluates whether adopting a common currency has changed the ability of euro area member states to share risk. We construct a counterfactual dataset of macroeconomic variables through the synthetic control method. We then use the output variance decomposition of Asdrubali, Sorensen and Yosha (1996) on both the actual and the synthetic data to study if there has been a change in risk sharing and through which channels. We find that the euro has reduced consumption smoothing. We further show that this reduction is mainly driven by the periphery countries of the euro area who have experienced a decrease in risk sharing through private credit.

(Continuing project)

International Business Cycles: Quantifying the Effects of a World Market for Oil

Johan Gars and Conny Olovsson

To what extent is the international business cycle affected by the fact that an essential input (oil) is traded on the world market? We quantify the contribution of oil by setting up a model with separate shocks to efficiencies of capital/labor and oil, and global shocks to the oil supply. The oil related shocks both contribute to comovements in output and inputs. The wealth effect associated with these shocks is typically smaller than the substitution effect, which induces higher responses in output than in consumption. Overall, the model can resolve both the consumption correlation puzzle and the international comovement puzzle.

(Continuing project)

Finite Resources and the World Economy

John Hassler, Per Krusell and Conny Olovsson

We build and evaluate a global macroeconomic model incorporating natural-resource scarcity. The model features low short-run substitutability between the natural resource and other inputs, while in the longer run endogenous directed technical change—allowing the economy to save on scarce resources—generates much higher substitutability, with rather stable cost shares. A nontrivial feature of the framework is secularly increasing resource use: initially, when the resource is abundant, much less is used of it, and as physical and human capital are accumulated, its use increases. The model is also able to generate highly volatile prices at higher frequencies.

(New project)

On the Effectiveness of Climate Policies

John Hassler, Per Krusell, Conny Olovsson and Michael Reiter

We present a quantitative integrated assessment model (IAM) designed as a dynamic, multi-region general-equilibrium model coupled with climate and carbon-cycle modules. The energy input into production comes from an array of different sources, including those not based on fossil fuel. The IAM setup is aimed toward policy evaluation, with a focus on policies that are (i) not necessarily optimal and (ii) potentially different quantitatively and qualitatively across regions. We conduct three key exercises. We first compare policies that have the right design—global carbon taxes—but the wrong magnitude: a tax that is set based on worries about climate change that ex post turn out to be overly pessimistic to one based on the reverse mistake (an optimistic view that turns out to vastly understate the climate challenge ex post). We find a sharp asymmetry: the former is not very costly at all to human welfare whereas the latter is very costly. Second, we examine taxes that differ significantly by region and discuss the cost of implementing them instead of an optimal—uniform—scheme; here we record welfare costs that potentially are very high. Third, we look at efforts to promote green energy—a suboptimal policy in isolation—and argue that reliance on such efforts is highly hazardous. In addition to addressing these policy issues, we show that the model, which is rather tractable, can be extended in interesting directions.

(Continuing project)

The Impact of Foreign Shocks on the Swedish Economy

Jesper Lindé, Henrik Lundvall, Conny Olovsson and Spyridon Sichelmiris

We aim to explain the positive cross-country comovement observed in the data among the main macroeconomic variables both nominal and real ones. We address the comovement problem by introducing international trade in durables. Durables trade in OECD represents roughly 2/3 of the total imports and the total exports. Based on the work of Engel & Wang (2011), incorporating durables trade into a standard international business cycle model improves substantially the volatility of imports and exports and induces positive correlation of these variables with respect to GDP. However, the issue of comovement has not been addressed because prices are flexible. We intend to build a two country New-Keynesian model with price and wage stickiness. Given the price stickiness, there has to be a strong adjustment through quantities that can potentially induce positive comovement among the main macroeconomic variables across the two countries.

(Continuing project)

Fiscal Policy, International Spillovers, and Endogenous Productivity

Klein Mathias and Ludger Linnemann

The paper presents empirical evidence on the international effects of US fiscal policy from structural vector autoregressions identified through external instruments in a panel setting for the G7 countries. An exogenous

increase in US government spending is estimated to produce sizeable positive responses of output and consumption in the rest of the G7 countries, both about half as large as their domestic US counterparts, while strongly depreciating the US terms of trade and lowering short-run real interest rates. Moreover, fiscal shocks are estimated to have a strongly positive impact on hourly labor productivity in the private sector. We solve a two-country New Keynesian model in closed form and show that a low cost elasticity of varying technology utilization can simultaneously explain the positive productivity, consumption and international spillover effects as well as the real depreciation resulting from expansionary US government spending shocks.

(New project)

The Composition of Public Spending and the Inflationary Effects of Fiscal Policy Shocks

Klein Mathias and Ludger Linnemann

We use structural proxy-vector autoregressions to separately identify US government investment and consumption shocks. Positive public investment shocks raise inflation and have an insignificant impact on productivity. In contrast, positive public consumption shocks induce a significant fall in inflation together with a strong increase in productivity. The empirical findings are consistent with a model where demand shocks have an endogenous effect on productivity. Increases in government investment induce a relatively low endogenous increase in productivity and goods supply in the short run and thus are inflationary, whereas government consumption shocks can lead to a temporary productivity increase and inflation decrease.

(New project)

Macro Uncertainty and Unemployment Risk

Joonseok Oh and Anna Rogantini Picco

This paper shows how uninsurable unemployment risk is crucial to qualitatively and quantitatively match macro responses to uncertainty shocks. Empirically, uncertainty shocks i) generate deflationary pressure; ii) have considerably negative consequences on economic activity; iii) produce a drop in aggregate consumption, which is mainly driven by the response of the households in the bottom 60% of the income distribution. Standard representative-agent New Keynesian models have difficulty to deliver these effects. A heterogeneous-agent framework with search and matching frictions and Calvo pricing allows us to jointly attain these results. Uncertainty shocks induce households' precautionary saving and firms' precautionary pricing behaviors, triggering a fall in aggregate demand and supply. These precautionary behaviors increase the unemployment risk of the imperfectly insured households, who strengthen precautionary saving. When the feedback loop between unemployment risk and precautionary saving is strong enough, a rise in uncertainty leads to i) a drop in inflation; ii) amplified negative responses of macro variables; iii) heterogeneous consumption responses of households, which are consistent with the empirical evidence.

(Continuing project)

MONETARY POLICY AND THEORY

The Role of Money in Monetary Policy at the Lower Bound

Roberto Billi, Ulf Söderström and Carl Walsh

In light of the current low-interest-rate environment, we reconsider the merits of strict money growth targeting (MGT) relative to conventional inflation targeting (IT) and to price level targeting (PLT). We evaluate these policies in terms of social welfare through the lens of a New Keynesian model and accounting for a zero lower bound (ZLB) constraint on the nominal interest rate. Although MGT makes monetary policy vulnerable to money demand shocks, MGT contributes to achieving price level stationarity and significantly reduces the incidence and severity of the ZLB relative to both IT and PLT. Furthermore, MGT lessens the need for fiscal expansions to supplement monetary policy in fighting recessions.

(Continuing project)

Liquidity, Capital Pledgeability and Inflation Redistribution

Paola Boel, Julian Diaz and Daria Finocchiaro

We study the redistributive effects of expected inflation in a microfounded monetary model with heterogeneous discount factors and collateral constraints. In equilibrium, this heterogeneity leads to borrowing and lending. Model assumptions also guarantee a tractable distribution of money and capital holdings. Several results emerge from our analysis. First, in this framework expected inflation is detrimental to capital accumulation. Second, expected inflation affects borrowing and lending when collateral constraints are present, thus also inducing redistributive effects through credit. Third, we find this channel to be regressive when we calibrate

our model using US data. This is because the drop in borrowers' capital caused by inflation is larger when capital is used as collateral.

(Continuing project)

Quantum Technology for Economists

Eleni Diamanti, Isaiah Hull, Or Sattath and Göran Wendin

Research on quantum technology spans multiple disciplines: physics, computer science, engineering, and mathematics. The objective of this manuscript is to provide an accessible introduction to this emerging field for economists that is centered around quantum computing and quantum money. We proceed in three steps. First, we discuss basic concepts in quantum computing and quantum communication, assuming knowledge of linear algebra and statistics, but not of computer science or physics. This covers fundamental topics, such as qubits, superposition, entanglement, quantum circuits, oracles, and the no-cloning theorem. Second, we provide an overview of quantum money, an early invention of the quantum communication literature that has recently been partially implemented in an experimental setting. One form of quantum money offers the privacy and anonymity of physical cash, the option to transact without the involvement of a third party, and the efficiency and convenience of a debit card payment. Such features cannot be achieved in combination with any other form of money. Finally, we review all existing quantum speed-ups that have been identified for algorithms used to solve and estimate economic models. This includes function approximation, linear systems analysis, Monte Carlo simulation, matrix inversion, principal component analysis, linear regression, interpolation, numerical differentiation, and true random number generation. We also discuss the difficulty of achieving quantum speed-ups and comment on common misconceptions about what is achievable with quantum computing.

(Continuing project)

Private Bank Money vs Central Bank Money: A Historical Lesson for CBDC Introduction

Anna Grodecka-Messi

In this paper, a unique event is studied: the opening of Bank of Canada in 1935, the central bank note issuance monopoly and its impact on the note issuing chartered banks. Between 1935-1950, Canadian chartered banks had to gradually withdraw their notes from circulation. I show that chartered banks constrained by new issuance limits experienced higher volatility of return-on-equity in the short run and lower Z-scores and return-on-assets in the longer horizon. The effect on lending is either non-significant or ambiguous. This study can offer lessons for the debates on central bank digital currencies and their impacts on commercial banks.

(Continuing project)

Revisiting the Properties of Money

Isaiah Hull and Or Sattath

The properties of money commonly referenced in the economics literature were originally identified by Jevons (1876) and Menger (1892) in the late 1800s and were intended to describe physical currencies, such as commodity money, metallic coins, and paper bills. In the digital era, many non-physical currencies have either entered circulation or are under development, including demand deposits, cryptocurrencies, stablecoins, central bank digital currencies (CBDCs), in-game currencies, and quantum money. These forms of money have novel properties that have not been studied extensively within the economics literature, but may be important determinants of the monetary equilibrium that emerges in the forthcoming era of heightened currency competition. This paper makes the first exhaustive attempt to identify and define the properties of all physical and digital forms of money. It reviews both the economics and computer science literatures and categorizes properties within an expanded version of the original functions-and-properties framework of money that includes societal and regulatory objectives.

(Continuing project)

Monetary Policy Communication and Private Sector Expectations

Oreste Tristani and David Vestin

Central banks that publish the most likely, or intended, future path of their policy rates occasionally observe a decoupling of private sector expectations from the intended path. We demonstrate that such a decoupling can arise because of incomplete and asymmetric information and that it is not necessarily a sign of lack of credibility. Even if the central bank truthfully communicates its future policy intentions, households and firms can reasonably judge that those intentions are based on an incorrect assessment of the state of the economy, and notably an assessment which may be revised in the future. Incomplete and asymmetric information also

paves the way for a theory of policy shocks -- that is, an interpretation of occasional deviations from the normal monetary policy rule as reactions to central bank signals on the state of the economy that are not observed by the private sector. Depending on households' and firms' inference about such deviations, the policy shocks can look like the "central bank information shocks" that have recently received attention in the literature.

(Continuing project)

Open Economy Aspects on Selecting which Inflation Index to Target

Melinda Suveg and David Vestin

Gali and Monacelli (2005) and several follow up contributions finds that a small open economy should target domestic inflation, ignoring low imported inflation from the rest of the world. Other authors finds support for a more CPI-oriented price index, and even targeting an export-based price index. This paper tries to identify the key assumptions that drives these results and use microdata on Swedish firms in order to see in which direction evidence points to.

(Continuing project)

Funding a Central Bank in a Low-Seignorage Environment

David Vestin

This paper builds a framework for thinking about balance-sheet risk in the context of financial independence from the government. The paper quantifies the impact of changes in the natural rate of interest, cash usage and other critical factors and argues that given the uncertainties of the future values of these quantities requires that the funding model for many central banks may need to be reconsidered in order to ensure financial independence.

(New project)

Balance-Sheet Risks

David Kjellberg and David Vestin

We quantify the balance-sheet risks that the Riksbank faces related to the QE portfolio and the currency reserve using a BVAR model with Swedish and foreign interest rates, inflation and exchange rates. We use the model to compute equity buffers needed to keep the probability of a recapitalization at reasonably low levels.

(New project)

Refereed publications accepted in 2021

Amberg, Niklas, Thomas Jansson, Mathias Klein and Anna Rogantini Picco, "Five Facts about the Distributional Income Effects of Monetary Policy", *American Economic Review Insights*

Apel, Mikael, Marianna Blix Grimaldi and Isaiah Hull, "How Much Information Do Monetary Policy Committees Disclose? Evidence from the FOMC's Minutes and Transcripts", *Journal of Money, Credit and Banking*

Bertsch, Christoph, Isaiah Hull and Xin Zhang, "Narrative Fragmentation and the Business Cycle", *Economics Letters*

Cho, Daeha, Yoonshin Han, Joonseok Jason Oh and Anna Rogantini Picco, "Uncertainty shocks, precautionary pricing, and optimal monetary policy", *Journal of Macroeconomics*

Fritsche, Jan Philipp, Mathias Klein and Malte Rieth, "Government Spending Multipliers in (Un)certain Times", *Journal of Public Economics*

Harding, Martin and Mathias Klein, "Monetary Policy and Household Net Worth", *Review of Economic Dynamics*

Hassler, John, Per Krusell and Conny Olovsson, "Directed technical change as a response to natural-resource scarcity", *Journal of Political Economy*

Hassler, John, Per Krusell and Conny Olovsson, "Suboptimal Climate Policy", *Journal of the European Economic Association*

Hull, Isaiah, Conny Olovsson, Karl Walentin and Andreas Westermark, "Manufacturing Decline and House Price Volatility", *Review of Economic Dynamics*

Klein, Mathias, Hamza Polattimur and Roland Winkler, "Fiscal Spending Multipliers over the Household Leverage Cycle", *European Economic Review*

Klein, Mathias and Stefan Schiman, "What accounts for the German Labor Market Miracle? A Structural VAR Approach", *Macroeconomic Dynamics*

Klein, Mathias and Roland Winkler, "The Government Spending Multiplier at the Zero Lower Bound: International Evidence from Historical Data", *Journal of Applied Econometrics*

Walentin, Karl and Andreas Westermark, "Learning on the Job and the Cost of Business Cycles", *American Economic Journal: Macroeconomics*

Working papers

No. 408, Daniele Bianchi and Mykola Babiak, "On the Performance of Cryptocurrency Funds"

No. 407, Oleksandr Faryna, Magnus Jonsson and Nadiia Shapovalenko, "The Cost of Disinflation in a Small Open Economy vis-à-vis a Closed economy"

No. 406, Isaiah Hull and Or Sattath, "Revisiting the Properties of Money"

No. 405, Conny Olovsson, Karl Walentin and Andreas Westermark, "Dynamic Macroeconomic Implications of Immigration"

No. 404, Paola Di Casola and Pär Stockhammar, "When Domestic and Foreign QE Overlap: Evidence from Sweden"

No. 403, Niklas Amberg, Thomas Jansson, Mathias Klein and Anna Rogantini Picco, "Five Facts about the Distributional Income Effects of Monetary Policy"

No. 402, Marianna Blix Grimaldi, Alberto Crosta and Dong Zhang, "The Liquidity of the Government Bond Market – What Impact Does Quantitative Easing Have? Evidence from Sweden"

No. 401, Christoph Bertsch, Isaiah Hull and Xin Zhang, "Narrative Fragmentation and the Business Cycle"

Non-refereed publications

Marianna Blix Grimaldi, Mats Christoffersson, Yuuki Ikeda and Jonas Niemeyer, "Systemically important banks: is there a TBTF premium?" *Sveriges Riksbank Economic Review* 2021:2

Henrik Erikson and David Vestin, "Pass-through of negative policy rates", *Sveriges Riksbank Economic Commentaries* No. 9, 2021

Hanna Armelius, Carl Andreas Claussen and Isaiah Hull, "On the possibility of a cash-like CBDC", *Sveriges Riksbank Staff Memo*, February 2021

Niklas Amberg, Thomas Jansson, Mathias Klein and Anna Rogantini Picco, "It's in the Tails: The Distributional Income Effects of Monetary Policy", *SUERF Policy Brief*, No 145

Niklas Amberg, Thomas Jansson, Mathias Klein and Anna Rogantini Picco, "The rich, the poor, and the others: How monetary policy affects the distribution of income", *VoxEU.org*, 23 May 2021

Ricardo Duque Gabriel, Mathias Klein and Ana Sofia Pessoa, "How government spending shapes the Eurozone economy", *LSE EUROPP*, 29 January 2021

Other research activities

Conferences and Events

The fifth annual workshop of the ESCB Research Cluster on "Monetary Economics" was hosted online by the Riksbank. The new cluster coordinators Roberto Billi (Riksbank) and Klodiana Istrefi (Banque de France)

organized the workshop. This year's themes were monetary policy and inequality, inflation expectations of households and firms, and the effectiveness of non-standard monetary policy tools. The policy panel, which included Anna Breman (Deputy Governor of the Riksbank), Ricardo Reis (Professor at London School of Economics) and Frank Smets (ECB), discussed challenges for monetary policy strategies.

Christoph Bertsch, Tor Jacobson and Xin Zhang organized the session "Bank Competition and Financial Stability amid the Rise of FinTech" for the CEBRA annual conference. Conny Olovsson was on the scientific committee of the CEBRA workshop for "Commodities and Macroeconomics". Xin Zhang was on the scientific committees of the ASSA-IBEFAs annual meeting and the fifth annual workshop of ESCB Research Cluster on "Financial Stability, Macroeconomic Regulation and Microprudential Supervision", and on the organizing committee of the online seminar series "Applied Machine Learning, Economics, and Data Science".

Greater Stockholm Macro Group

Together with Per Krusell (IIES, Stockholm University), the Research Division has been organizing a monthly internal seminar series for macro researchers from all major institutions in Stockholm and Uppsala. This series is known as "Greater Stockholm Macro Group" (GSMG) and aims at fostering exchange of ideas and cooperation among macro researchers in the Stockholm area. The GSMG was put on hold this year due to the pandemic, but is planned to restart next year.

Internship Program

The PhD internship program was cancelled this year due to the pandemic, but will restart next year.

Research Seminars

The Research Division organizes weekly research seminars, mainly with international speakers. The seminars usually take place on Tuesdays, and attendance is open to Riksbank employees as well as to academics. Since November, seminars have been virtual and in person events. A complete list of both upcoming and past seminars is available on the homepage of the Research Division at <https://www.riksbank.se/en-gb/about-the-riksbank/the-tasks-of-the-riksbank/research/research-seminars/>

Teaching and Advising

Several staff members taught at an internal Riksbank course on central banking, and taught monetary economics to PhD students from Stockholm University. Anna Grodecka-Messi taught "Intermediate Macroeconomics" (Bachelor's level) at Örebro University. Daria Finocchiaro taught "Macro I" (PhD level) and advised students at Uppsala University. Conny Olovsson taught the course "The Climate and the Economy" at Stockholm University, together with John Hassler and Per Krusell; Conny also gave guest lectures on the same topic at Uppsala University and the Royal Institute of Technology. Ulf Söderström advised a PhD student in Uppsala, while Andreas Westermark advised a master student at the Stockholm School of economics.

Miscellanea

Thomas Jansson participated in the ECB Household Finance and Consumption Network (HFCN) meetings, while Xin Zhang participated in the International Banking Research Network (IBRN) meetings.

Upcoming events in 2022

Next year, the Research Division will co-organize the sixth annual workshop of the ESCB Research Cluster on "Monetary Economics", jointly with the Banque de France. The Research Division will co-organize the annual conference on "Non-traditional Data, Machine Learning, and Natural Language Processing in Macroeconomics", jointly with the Federal Reserve Board and Bank of Italy. Together with the Monetary Policy Department, the Research Division is also planning a research conference on the use of the central bank balance sheet as a policy tool.

The Research Division will teach again a second-year PhD course on monetary economics, in cooperation with faculty from Stockholm University. The purpose of the course is to introduce students to modern New Keynesian models for monetary policy and business-cycle analysis.

Correspondence to the editor:

Roberto Billi
Research Division
Sveriges Riksbank
SE-103 37 Stockholm
Sweden
Email: roberto.billi@riksbank.se

This newsletter, as well as other information about the Research Division at Sveriges Riksbank, is available online at <https://www.riksbank.se/en-gb/about-the-riksbank/the-tasks-of-the-riksbank/research/>