Research News 2020

Research Division at Sveriges Riksbank

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This newsletter describes the research activities and output of the Research Division at Sveriges Riksbank in 2020.

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Karl Walentin, advisor
Andreas Westermark, advisor
Xin Zhang, senior economist

Reflections by the Head of Research

2020 will go to history as the year of the coronavirus pandemic, and it has had a profound impact on all of us, on our working lives as well as at a personal level. As in many places, staff at the Research Division have almost exclusively worked from home since March, and we have been relegated to various online solutions for division meetings, seminars, conferences, and other types of social interaction. Many things have worked out better than expected, and most research collaborations seem to have continued without serious glitches. But of course all types of interactions have changed in nature, and virtual seminars and conferences are certainly not a perfect substitute for the old-fashioned physical type with heated discussions, brainstorming and networking during coffee breaks, lunches and dinners.

Nevertheless, 2020 was another productive year for the Research Division, with several publications in prestigious academic journals. One of these papers, "Curbing shocks to corporate liquidity: The role of trade credit" by Niklas Amberg, Tor Jacobson, Erik von Schedvin and Robert Townsend, is our featured article in this issue. Trade credit is not discussed much in typical policy deliberations, but the evidence suggests that trade credit is at least as important as bank credit for corporate financing. So we are happy to have expertise in this area at the Research Division.

Our research seminar series took a pause during the first months of the pandemic, but was then restarted in virtual form, with some additional focus on covid-related research. During the year we also organized a virtual research conference on "Exchange rates and monetary policy" in October, together with the Central Bank Research Association (CEBRA) and the Centre for Economic Policy Research (CEPR).

Staff at the Division have been more deeply involved than normal in policy issues this year, in particular during the early part of the pandemic. For instance, research staff were involved in preparing monetary policy decisions, doing briefings on epidemiological models, and finding new data sources to better gauge the state of the economy in real time. The pandemic, and the different policy actions that have been taken by authorities around the world, has of course also spawned much interest in the research community, so we definitely have much exciting work to look forward to.

In this year's issue of the Research News you will also find an interview with Jordi Galí, who recently stepped down as an advisor to the Riksbank after eight years. We have very much enjoyed our interactions with Jordi, and we thank him for these years. Jordi has interacted with staff at policy departments and the Research Division, as well as with the Executive Board, and he has been a keynote speaker at several conferences organized at the Riksbank. He was also instrumental in setting up an annual research conference on small open economies, which we are organizing together with Norges Bank, the Bank of Canada, the Swiss National Bank, and the Reserve Banks of Australia and New Zealand. A first conference was held at the Riksbank in 2019, and we were looking forward to the 2020 conference in Sydney. But like so many things this conference was postponed until 2021. In our interview Jordi is sharing his views on the challenges for monetary policy, the state of research on small open economies, and some impressions from his time as an advisor. Don't miss it!

With this, I wish you a good read of our Research News, happy holidays and a happy and productive 2021! Stay safe and take care!

Ulf Söderström

Interview with Jordi Galí

Professor of Economics, CREI, Universitat Pompeu Fabra and Barcelona GSE

You have been advising the Riksbank for several years now, amidst rather turbulent times. What kind of interaction with Riksbank staff or the Executive Board did you find most fruitful? Any advice for future advisers?

I have been visiting the Riksbank as an advisor since 2012. Even though I have worked as an academic consultant for many central banks I have to admit my experience with the Riksbank has been one of the most enjoyable. There may be several reasons for this, but one of them must have to do with the relatively informal, non-hierarchical atmosphere that one senses there. It may have to do with the fact that it is a relatively small central bank, where everyone knows each other, and is aware of the work others are doing. Despite this relative informality I have to say all my visits were extremely well organized! I particularly enjoyed the meetings with some of the working groups on specific projects, where you face well-trained economists trying to cope with a problem that worries the bank but, in doing so, trying to make the most of frontier research from the academic literature. I encourage future advisors to engage as much as possible in these working groups, that's where our contribution can be more useful in my opinion. Of course, all the meetings with Governor Ingves and other board members have also been very pleasant and enlightening. Despite the extreme turbulence of the times I have always felt they were on top of things, but at the same time always willing to listen and to find ways to improve.

During your tenure, the Riksbank has implemented quantitative easing, negative interest rates, and started buying corporate debt. In short, we have done many things which some 10 years ago would have seemed almost impossible. What is your sense of how effective these tools are, which of them do you see becoming a part of the standard monetary policy toolbox?

I am convinced that the Great Recession did not become a Great Depression thanks to the widespread adoption and aggressive use of that arsenal of unconventional tools. But many of these tools have "natural" limits. How negative can interest rates go? How much can you reduce term or risk premia through large scale asset purchases? On the other hand forward guidance on future policy rates has a long way to go in stimulating the economy, at least as long as long rates remain in positive territory. Its main constraint is given by the central bank's credibility. I think forward guidance is here to stay. Of course the Riksbank was already practicing a form of forward guidance well before the financial crisis.

Going forward, what modifications of the policy framework that central banks use are needed for coping with the next time that monetary policy needs to be made more expansionary? Raising the inflation target, modifying the target etc.?

I believe the decline in the natural rate of interest, r*, if perceived to be permanent, calls for a higher inflation target, at least if a conventional flexible inflation targeting framework remains in place. I understand the adoption of a higher target when central banks have not been able to attain its current target raises some eyebrows. The transition may not be easy. It could be very gradual, taking advantage of episodes that raise inflation above the current target to time the adoption of the new target. But eventually it would pay, by making more policy room permanently. If a higher target is rejected, I see no alternative but the adoption of a highly stabilizing rule like price level targeting or average inflation targeting, one that would make the need for more policy space less necessary. But these alternative rules have a risky component since they hinge critically on anticipation effects, and we don't know if they will work as well in the real world as they do in our models, where anticipation effects are very powerful.

Do you see particular adjustments especially relevant for the small open economy framework?

In terms of unconventional tools I believe the challenges are not that different. The one change I would strongly recommend to small open economies like Sweden is to de-emphasize stabilization of price indexes like CPI that have a significant component of import prices that is very sensitive to the exchange rate. That has been one of my small crusades as an advisor to the Riksbank. I am afraid I have not fully succeeded...

What would you say are the key challenges for monetary policy going forward, at the global level?

Many decisions that central banks take even in normal times have redistributive or fiscal consequences. But to the extent that those decisions are not dramatic, the consequences are small and may be altogether ignored by the population as long as the central bank does a good job in stabilizing the economy. Since the financial crisis many of the decisions have been more significant and visible, with larger consequences beyond its stabilizations aims. I am concerned that if central banks keep such a central and visible role their current independence may be questioned by society somewhere down the road. We know this would be dangerous. But it is hard to deny there are legitimate concerns that society may raise.

Obviously, we are in the middle of a global pandemic. What role do you see for monetary policy in the overall policy mix? Should policy be made more expansionary, as in the case of a usual downturn?

To be honest with you, I don't think monetary policy can do much in terms of providing an effective response to the economic fallout from the COVID crisis, other than keeping interest rates low, as it has been doing in recent years. I don't think there is much ammunition left nor there is much need to stimulate aggregate demand in the present circumstances. Fiscal policy should bear the brunt of much of the adjustments needed, both in terms of redistribution towards the sectors most affected as well as in leading the stimulus in case a stronger aggregate demand is called for at some point.

Research-wise, for a small open economy, where do you see key areas that central banks need to work more on?

It is unfortunate that most research in economics is US-centric and focuses on closed economy frameworks and issues. Central banks like the Riksbank should spearhead research on small open economies. There are a number of issues that can be safely ignored if you are trying to model monetary policy in the US or the euro area that cannot be swept under the rug when it comes to a small open economy: the currency of invoicing of imports and exports, the difference between CPI and domestic inflation mentioned earlier, the role of exchange rate fluctuations, the pricing of imported intermediate inputs, the existence of large immigration flows, etc. All of them are highly relevant for the design of monetary policy in a small open economy and should be the subject of more research than the "market" provides in the absence of a deliberate effort by institutions like the Riksbank.

Changes in the research staff

Niklas Amberg joined the Division in January after a period as a visiting researcher at the Division. **Paola Boel** left the Division in August 2020 to take up a position as senior research economist in the Research Department at the Federal Reserve Bank of Cleveland. Our research assistant **Oskar Stigland** also left in August, as his contract expired. And **Anna Rogantini Picco** joined the Division in September 2020, after finishing her PhD at the European University Institute.

Featured article

The paper "**Curbing Shocks to Corporate Liquidity: The Role of Trade Credit**" by Niklas Amberg, Tor Jacobson, Erik von Schedvin, and Robert Townsend has been accepted for publication in the *Journal of Political Economy*. The authors share the main insights of the paper in the following Q&A.

What motivates the research behind your paper?

The ability to handle adverse liquidity shocks is crucial for firms' survival and growth. Traditionally, research on corporate liquidity management has focused on internal cash holdings and bank lines of credit as the key liquidity sources for firms, but we propose that the concept of liquidity should be extended to include the management of trade credit claims with input suppliers and output purchasers. Our paper is an empirical exploration of this idea: that is, we test if, and to what extent, firms use their trade credit positions to curb shocks to liquidity.

What are the key findings of the paper?

Our paper demonstrates that firms do indeed actively manage their trade credit positions to deal with liquidity shortfalls. When faced with sudden liquidity shortages, firms respond not only by drawing down cash reserves, as predicted by traditional theories, but also by drawing more trade credit from their suppliers and issuing less to their customers. The amount of liquidity generated through trade credit adjustments is of roughly the same magnitude as the simultaneous reduction in cash holdings, which suggests that trade credit positions constitute an important source of reserve liquidity for firms. We establish the causality of the relationship between liquidity shocks and trade credit adjustments by exploiting the fraud and failure of a large Swedish cash-in-transit firm as a natural experiment.

Do your findings have any implications for the management of the COVID-19 recession?

The risk that large numbers of companies could go out of business because of acute liquidity problems has been a central concern for policymakers during the COVID-19 pandemic, and has motivated support programs such as the Riksbank's funding-for-lending program and the Federal Reserve's $600 billion Main Street Lending Program. One criticism that has been levelled against such programs is that the funds risk going only to the largest and most creditworthy firms in the economy, rather than to cash-strapped SMEs that may need them more urgently. Our findings suggest that even if this is true, the programs can have important beneficial *indirect* effects on a broader group of firms, since liquidity is redistributed up and down the supply chain by way of trade credit in response to shifting liquidity needs along the chain. In particular, firms with stronger liquidity positions can offer suppliers and customers with temporary liquidity problems more generous payment terms and thus help alleviate their problems, which creates positive spillover effects that ripple through the supply chain.

Research projects pursued in 2020

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.

(New 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.

(New 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.

(New project)

ECONOMETRICS

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 mis-specified, 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 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 with an unobserved common macro shock as the only link between regions. A crisis in the first region is a wake-up call to investors in the second region. It induces them to reassess the regional fundamental and acquire information about the macro shock. Contagion can occur even after investors learn that regions are unrelated (zero macro shock). Our results rationalize empirical evidence about contagious bank runs and currency crises after wake-up calls. We also derive other testable implications of the model.

(Continuing project)

Optimal Bank Leverage and Recapitalization in Crowded Markets

Christoph Bertsch and Mike Mariathasan

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

Active Fiscal Policy at the Lower Bound

Roberto Billi and Carl Walsh

Government debt sustainability is broadly understood as key for the effectiveness of fiscal and monetary stabilization policies, especially in the presence of the zero lower bound (ZLB) on nominal interest rates. But during ZLB episodes, concerns over the sustainability of government debt may be unwarranted if fiscal policy is active. As we show, in a standard New Keynesian model, a debt-financed fiscal stimulus at the ZLB, not backed 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.

(New project)

Government Spending Multipliers in (Un)certain Times

Jan Philipp Fritsche, Mathias Klein and Malte Rieth

We estimate the dynamic effects of government spending shocks, using time varying volatility in US data modeled through a Markov switching process. We find that the average government spending multiplier is significantly and persistently above one, driven by a crowding-in of private consumption and non-residential investment. We rationalize the results empirically through a contemporaneously countercyclical response of government spending and an efficient weighting of observations inversely to their error variance. We then show that the multiplier is significantly smaller when volatility is high, consistent with theories predicting reduced effectiveness of fiscal interventions in uncertain times.

(Continuing project)

The Effects of Government Spending in the Eurozone

Ricardo Duque Gabriel, Mathias Klein and Ana Sofia Pessoa

Using a novel rich dataset at the regional level, this paper provides new empirical evidence on the fiscal transmission mechanism in the Eurozone. Our baseline estimate reveal a government spending output multiplier of 2.9, an employment multiplier of 1.9, and a cost per job created of €24,000. Moreover, we find that a regional fiscal stimulus leads to a significant increase in private investment, productivity, durable consumption, and real wages together with a significant rise in total hours worked which is driven by changes in the extensive margin (total employment) whereas the intensive margin (hours per worker) barely reacts. We find only small regional fiscal spillovers but detect notable state dependencies. Regional fiscal multipliers are larger in economic recessions, during fiscal consolidations, and in the core countries of the Eurozone.

(New 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)

Fiscal Spending Multipliers over the Household Leverage Cycle

Mathias Klein, Hamza Polattimur and Roland Winkler

This paper investigates household leverage-dependent fiscal policy effects in a two-agent New Keynesian DSGE model with occasionally binding borrowing constraints. Our model successfully replicates empirical evidence showing that fiscal policy’s effectiveness differs significantly across the household leverage cycle. Fiscal multipliers are persistently above unity when government spending rises at the peak of the household leverage cycle. In contrast, increases in government spending at the trough of the household leverage cycle imply fiscal multipliers below unity. We test the model’s predictions on post-WWII U.S. data.

(Continuing project)

The Government Spending Multiplier at the Zero Lower Bound: International Evidence from Historical Data

Mathias Klein and Roland Winkler

Based on a large historical panel dataset, this paper provides robust evidence that the government spending multiplier is significantly higher when interest rates are at, or near, the zero lower bound. We estimate multipliers that are as high as 1.5 during ZLB episodes, but small and statistically indistinguishable from zero during normal times. Our results are robust to different definitions of zero lower bound episodes, alternative ways of identifying government spending shocks, controlling for the exchange rate regime and other potentially important state variables. In particular, we show that the difference in multipliers is not driven by multipliers being higher during periods of economic slack.

(Continuing project)

Fiscal Multipliers: A Tale from the Labor Market

Anna Rogantini Picco

This paper uncovers the role of firms' hiring decisions as a key source of state dependence in the fiscal spending multiplier. When the hiring rate is high, a larger share of workers has to be relocated from production to recruitment and training of the new hires. This diversion of resources lowers firms' productivity and reduces the effect of government spending stimulus on output. I establish this result using local projections and I illustrate this mechanism building a non-linear dynamic general equilibrium model.

(New project)

GROWTH

A Traffic Jam Theory of Growth

Daria Finocchiaro and Philippe Weil

Financial development affects investment, innovation and growth. At the same time, growth prospects impinge on the costly development of finance. To investigate this two-way finance-growth nexus, we build a parsimonious Schumpeterian endogenous growth model with search frictions in the innovation market and in credit markets. In our model, financiers provide funds to entrepreneurs to invest in R&D. All else equal, through this channel finance has a positive effect on growth. Nevertheless, 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

We propose a low risk anomaly (LRA) index with high values indicating high-risk stocks with high-beta, high-volatility, and high-lottery-payoffs. We document a significantly negative cross-sectional relation between the LRA index and future returns on individual stocks trading in the U.S. and international countries. We show that the high-LRA stocks are subject to significant overpricing and primarily held by retail investors, whereas the degree of underpricing of low-LRA stocks is so small that the low risk anomaly is driven by retail investors' demand for high-LRA stocks, leading to temporary overpricing and negative future abnormal returns for these high-beta, high-volatility stocks with large lottery payoffs. To understand how and why individual investors contribute to the low risk anomalies, we use a large-scale individual-level panel dataset from Sweden that allows us to directly observe the stock investments of the entire population at the individual security level. We find that the anomalous negative relation between risk and future abnormal returns is only confined to those stocks held by rich households, whereas there is no evidence of low risk anomaly for stocks held by non-rich households and institutional investors. Further tests also reveal that the skewness preferences of rich households have the potential to explain the demand of wealthy investors for high-risk stocks. In contrast, other potential explanations such as the overconfidence-based preferences, constraints on financial leverage, downside risk, and hedging demand receive little support from the data.

(New project)

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

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

This paper uses an administrative panel dataset to examine Swedish households' socially responsible investing (SRI) in mutual funds. We zoom in on the differences between all and wealthy households because of the wealthy households' importance for the economy. Surprisingly, wealthy households hardly differ from all households in their SRI investment behavior. For wealthy and all households alike, income and financial wealth are positively related to participation in SRI funds. For all households, the likelihood of participating in SRI funds decreases in age, while for wealthy households it increases in age. For both all and wealthy households, income is negatively related to the value of their SRI holdings, while financial wealth is positively related to the SRI value. We also compare households' SRI and conventional fund holdings and find that the background characteristics of SRI and conventional fund participants are fairly similar.

(Continuing project)

The Impact of Social Environment on Entrepreneurial Risk and Its Distributional Effects

Michael Haliassos, Thomas Jansson and Yigitcan Karabulut

Using a rare natural experiment regarding the exogenous spatial allocation of refugee immigrants in Sweden, we focus on the role of social environment in the entrepreneurial process. We analyze whether early interactions with entrepreneurs have any causal effects on the decision to start a new business, and conditional on being a business owner, on the entrepreneurial income. We find they do. Interestingly, only exposure to successful entrepreneurs has a significant effect, while exposure to unsuccessful entrepreneurs displays no effect on the subsequent entrepreneurial activity. We further analyze the potential mechanisms and find strong suggestive evidence that conforms to transfer of tacit knowledge as the operative channel. Finally, we show that the increased exposure to idiosyncratic entrepreneurial risk leads to a higher rank in the wealth distribution.

(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)

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 Westermark

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)

Learning on the Job and the Cost of Business Cycles

Karl Walentin and Andreas Westermark

We show that business cycles reduce welfare through a decrease in the average level of employment in a labor market search model with learning on-the-job and skill loss during unemployment. Empirically, unemployment and the job finding rate are negatively correlated. Since new jobs are the product of these two, business cycles imply that fewer news jobs are created and employment falls. Learning on-the-job implies that the decrease in employment reduces aggregate human capital. This reduces the incentives to post vacancies, further decreasing employment and human capital. We quantify this mechanism and find large output and welfare costs of business cycles.

(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 sullying 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

Narrative Fragmentation and the Business Cycle

Christoph Bertsch, Isaiah Hull and Xin Zhang

According to Shiller (2017), economic and financial narratives often emerge as a consequence of their virality, rather than their veracity, and constitute an important, but understudied driver of aggregate fluctuations. Using a unique dataset of newspaper articles over the 1950-2019 period and state-of-the-art methods from natural language processing, we characterize the properties of business cycle narratives. Our main finding is that narratives tend to consolidate around a dominant explanation during expansions and fragment into competing explanations during contractions. We also show that the existence of past reference events is strongly associated with increased narrative consolidation.

(New project)

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.

(New project)

The Costs of Macroprudential Deleveraging in a Liquidity Trap

Jiaqian Chen, Daria Finocchiaro, Jesper Lindé and Karl Walentin

We examine the effects of various borrower-based macroprudential tools in a New Keynesian environment where both real and nominal interest rates are low. Our model features 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 forgone consumption, of all the macroprudential tools we consider are moderate. Even so, the short-term costs differ dramatically between alternative tools. Specifically, a loan-to-value tightening is more than twice 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.

(New 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)

Directed Technical Change as a Response to Natural Resource Scarcity

John Hassler, Per Krusell and Conny Olovsson

How do markets economize on scarce natural resources? In this paper we emphasize technological change aimed at saving on the scarce resource. We develop a neoclassical macroeconomic theory that is quantitatively oriented and that views technical change as directed: it can be used to save on different inputs. At a point in time, the elasticity between inputs - in our application a capital-labor composite and fossil energy - is given by a production function with fixed parameters, but because the future values of these parameters can be changed with R&D efforts today, the long-run elasticity between the inputs is higher than it is in the short run. We demonstrate how the theory can be used to robustly derive predictions for the long-run cost share accruing to the scarce resource as well as for its rate of depletion. In an application, we look at postwar U.S. data, estimate the short-run elasticity between inputs using an aggregate CES production function, and also estimate the implied input-saving technology series. From these technology series, we can gauge what the historical tradeoff has been in the choice between allocating R&D to save on one or the other input. The implied parameter estimates are then used in our aggregate model to make long-run predictions, which indicate a marked increase in the share of costs going to fossil energy.

(Continuing 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)

Manufacturing Decline and House Price Volatility

Isaiah Hull, Conny Olovsson, Karl Walentin and Andreas Westermark

Using a unique dataset of all Swedish housing transactions over the 2009-2017 period, we find that an increase in manufacturing’s share of employment is positively associated with house price growth volatility and negatively associated with risk-adjusted housing returns. Both effects appear to be related to manufacturing's impact on firm concentration, employment growth volatility, and economic uncertainty. Moreover, as we demonstrate in an application, our results have implications for portfolio choice. They also suggest that the manufacturing decline since 1970 could account for a 32% reduction in house price volatility in Sweden, and similar reductions in the U.S., U.K., and Japan.

(Continuing project)

The Impact of Foreign Shocks on the Swedish Economy

Jesper Lindé, Henrik Lundvall, Conny Olovsson and Spyridon Sichlimiris

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)

Real Exchange Rate and International Spillover Effects of US Technology Shocks

Klein Mathias and Ludger Linnemann

The paper presents new empirical evidence on the international effects of surprise and anticipated technology shocks in the US. We employ the proxy-instrumental variable approach to identify structural vector autoregressions in a panel setting and empirically study the transmission of US technology innovations to the G7 countries. Both unanticipated and anticipated exogenous technology improvements lead to a strong and persistent real appreciation (from the point of view of the US), along with an expansionary effect on US macroeconomic aggregates, except for hours worked which initially decline. Internationally, there is a strong and precisely estimated positive spillover on foreign output, consumption, and hours worked in the case of surprise shocks, and a weaker but still mostly non-negative effect in the case of technology news shocks. We show that the empirical evidence is qualitatively compatible with the predictions of a New Keynesian international business cycle model with imperfect financial markets, traded and non-traded goods and imported intermediate inputs in production.

(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.

(New project)

MONETARY POLICY AND THEORY

The Heterogeneous Effects of Monetary Policy Shocks: Microeconometric Evidence

Niklas Amberg, Thomas Jansson and Mathias Klein

This project will provide empirical evidence on the heterogeneous income and consumption effects of monetary policy shocks using administrative micro data covering the entire Swedish population. More specifically, the main purpose of the project is to document how the individual-level income and consumption effects of monetary policy shocks depend on an individual's position in the income distribution. Hence, the findings of the project will have implications for macroeconomic modelling as well as for policy-related issues regarding the distributional effects of monetary policy.

(New project)

How Much Information Do Monetary Policy Committees Disclose? Evidence from the FOMC's Minutes and Transcripts

Mikael Apel, Marianna Blix Grimaldi and Isaiah Hull

The purpose of central bank minutes is to give an account of monetary policy meeting discussions to outside observers, thereby enabling them to draw informed conclusions about future policy. However, minutes are by necessity a shortened and edited representation of a broader discussion. Consequently, they may omit information that is predictive of future policy decisions. To investigate this, we compare the information content of the FOMC's minutes and transcripts, focusing on three dimensions which are likely to be excluded from the minutes: 1) the committee's degree of hawkishness; 2) the chairperson's degree of hawkishness; and 3) the level of agreement between committee members. We measure committee and chairperson hawkishness with a novel dictionary that is constructed using the FOMC's minutes and transcripts. We measure agreement by performing deep transfer learning, a technique that involves training a deep learning model on one set of documents – U.S. congressional debates – and then making predictions on another: FOMC transcripts. Our findings suggest that transcripts are more informative than minutes and heightened committee agreement typically precedes policy rate increases.

(Continuing project)

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 merit of a money growth target (MGT) relative to a conventional inflation targeting (IT) regime, and to the notion of price level targeting (PLT). Through the lens of a New Keynesian model, and accounting for a zero lower bound (ZLB) constraint on the nominal interest rate, we show, not surprisingly, that PLT performs best in terms of social welfare. However, the ranking between IT and MGT is not a foregone conclusion. In particular, although MGT makes monetary policy vulnerable to money demand shocks, it contributes to achieving price level stability and reduces the incidence and severity of the ZLB relative to both IT and PLT. We also show that MGT lessens the need for the fiscal authority to engage alongside the central bank in fighting recessions. To illustrate this fiscal benefit of MGT, we introduce a simple rule for the fiscal authority to raise government purchases when GDP falls below potential. If the government fails to make up for a substantial share of the shortfalls in GDP, then IT performs worse than MGT from the perspective of society.

(Continuing project)

Liquidity, Capital Pledgeability and Inflation Redistribution

Paola Boel, Julian Diaz and Daria Finocchiaro

We investigate the redistributive effects of expected inflation using a microfounded monetary model where agents differ in their degree of patience. Agents can insure against consumption risk with money and a partially-liquid capital. Borrowing and lending is also possible, but only in specific markets in which capital can be used both as a mean of production and as collateral. We find that, as long as inflation is not too high and capital is sufficiently illiquid, agents hold both money and capital in equilibrium though in different quantities according to their type. We demonstrate that in a world without collateral constraints borrowing and lending are not affected by inflation in steady state since bonds' prices adjust perfectly for inflation. When collateral constraints are introduced, instead, inflation generates income redistribution via borrowing and lending since capital increases with inflation.

(Continuing project)

Optimal Monetary Policy and Uncertainty Shocks

Daeha Cho, Yoonshin Han, Joonseok Oh, Anna Rogantini Picco

We study optimal monetary policy in response to uncertainty shocks in standard New Keynesian models under Calvo and Rotemberg pricing schemes. We find that optimal monetary policy achieves joint stabilization of inflation and the output gap in both pricing schemes. We show that a simple Taylor rule that puts high weight on inflation stability approximates optimal monetary policy well. This rule mutes firms' precautionary pricing incentive, the key channel that makes responses under Calvo and Rotemberg pricing schemes differ under the empirically calibrated Taylor rule.

(New 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)

Monetary Policy and Household Net Worth

Martin Harding and Klein Mathias

This paper investigates the interrelation between household balance sheets, collateral constraints, and monetary policy. Using data on the U.S. economy, we estimate a monetary DSGE model with financial frictions and occasionally binding borrowing constraints. The model implies stronger effects of monetary policy interventions when the borrowing constraint is binding compared to situations when it turns slack. In a prediction analysis we find that, out of a set of alternative plausible endogenous model variables, the level of household net worth is the single best predictor of the tightness of the borrowing constraint, which implies that monetary policy is more effective when household net worth is low. We test this model prediction in the data and provide robust empirical evidence on asymmetric effects of monetary policy across the household net worth cycle that validates the model predictions. A contractionary monetary policy shock leads to a large and significant fall in economic activity during periods of low household net worth. In contrast, monetary policy shocks have only small and mostly insignificant effects when net worth is high.

(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)

The Long-Run Forward Guidance Problem

David Vestin

This paper distinguishes between two distinct forward-guidance puzzles in the standard NK model. The first is the standard one, that expectations about low future interest rates results in large current increases in inflation and output. The second is that pre-announced monetary policy can generate unbounded real effects far in the future, the “long-run forward guidance puzzle”. The paper shows that the proposed solutions to the short-run puzzle based on discounting in the Euler-equation does not solve the long-run puzzle. I show that replacing the Calvo assumption with sticky information, which Kiley (2016) has been discussing as a possible solution to the short-run puzzle, resolves the long-run puzzle. The intuition is straight-forward: sticky information is analytically equivalent to Calvo with price-plans. That is, at the time a firm is “allowed” to adjust its price, it sets a non-state contingent plan for future prices that may not be adjusted until the next time the Calvo signal “allows” a price change. With this assumption, all firms that have been “allowed” to adjust their price plans can coordinate on a nominal adjustment that offsets the real effects of a monetary policy shock. The paper goes on to show that a combination of Euler-equation discounting and sticky information results in a satisfactory solution of both puzzles. In terms of policy implications for central banks, the paper argues that extending forward guidance too far can be counterproductive.

(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 author 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.

(New project)

Balance-Sheet Risk and Financial Independence

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 the funding model for many central banks to be reconsidered.

(New project)

Refereed publications accepted in 2020

Amberg, Niklas, Tor Jacobson, Erik von Schedvin and Robert Townsend, “Curbing Shocks to Corporate Liquidity: The Role of Trade Credit” forthcoming in *Journal of Political Economy*

Amberg, Niklas, Tor Jacobson and Erik von Schedvin, “Trade Credit and Product Pricing: The Role of Implicit Interest Rates” forthcoming in *Journal of the European Economic Association*

Bertsch, Christoph, Isaiah Hull, Yingjie Qi and Xin Zhang, “Bank Misconduct and Online Lending” *Journal of Banking & Finance*, Volume 116, July 2020

Bertsch, Christoph, Isaiah Hull and Xin Zhang, “Monetary Normalizations and Consumer Credit: Evidence from Fed Liftoff and Online Lending” forthcoming in *International Journal of Central Banking*

Billi, Roberto, and Jordi Galí, “Gains from Wage Flexibility and the Zero Lower Bound” forthcoming in *Oxford Bulletin of Economics and Statistics*

Billi, Roberto, “Unemployment Fluctuations and Nominal GDP Targeting” forthcoming in *Economics Letters*

Cao, Jin, Valeriya Dinger, Anna Grodecka-Messi, Ragnar Juelsrud and Xin Zhang, “The Interaction between Macroprudential and Monetary Policies: The Cases of Norway and Sweden” forthcoming in *Review of International Economics*

Carlsson, Mikael and Andreas Westermark, “Endogenous Separations, Wage Rigidities and Employment Volatility” forthcoming in *American Economic Journals: Macroeconomics*

Christiano, Lawrence, Mathias Trabandt and Karl Walentin, “Involuntary Unemployment and the Business Cycle” forthcoming in *Review of Economic Dynamics*

Klein, Mathias, and Ludger Linnemann, “Real Exchange Rate and International Spillover Effects of US Technology Shocks” forthcoming in *Journal of International Economics*

Working papers

No. 399, Diamanti, Eleni, Isaiah Hull, Or Sattath and Göran Wendin, “Quantum Technology for Economists”

No. 398, Schwaab, Bernd, André Lucas and Xin Zhang, “Modeling Extreme Events: Time-varying Extreme Tail Shape”

No. 397, Buncic, Daniel, “Econometric Issues with Laubach and Williams’ Estimates of the Natural Rate of Interest”

No. 396, Laséen, Stefan, “Monetary Policy Surprises, Central Bank Information Shocks, and Economic Activity in a Small Open Economy”

No. 395, Oh, Joonseok and Anna Rogantini Picco, “Macro Uncertainty and Unemployment Risk”

No. 394, Frohm, Erik, “Labor Shortages and Wage Growth”

No. 393, Armelius, Hanna, Carl Andreas Claussen and André Reslow, “Withering Cash: Is Sweden ahead of the Curve or Just Special?”

No. 392, Cao, Jin, Valeriya Dinger, Anna Grodecka-Messi, Ragnar Juelsrud and Xin Zhang, “The Interaction between Macroprudential and Monetary Policies: The Cases of Norway and Sweden”

No. 391, Corbo, Vesna and Ingvar Strid, “MAJA: A Two-Region DSGE Model for Sweden and Its Main Trading Partners”

No. 390, Billi, Roberto, Ulf Söderström and Carl Walsh, “The Role of Money in Monetary Policy at the Lower Bound“

No. 389, Chen, Jiaqian, Daria Finocchiaro, Jesper Lindé and Karl Walentin, “The Costs of Macroprudential Deleveraging in a Liquidity Trap”

No. 388, Di Casola, Paola and Spyridon Sichlimiris, “TFP News, Stock Market Booms and the Business Cycle: Revisiting the Evidence with VEC Models”

No. 387, Corbo, Vesna and Paola Di Casola, “Drivers of Consumer Prices and Exchange Rates in Small Open Economies”

No. 386, Canova, Fabio, “FAQ: How Do I Extract the Output Gap?”

No. 385, Billi, Roberto, “Unemployment Fluctuations and Nominal GDP Targeting”

No. 384, Qi, Yingjie, “Big Broad Banks: How Does Cross-Selling Affect Lending?”

Non-refereed publications

Global Warming from an Economic Perspective

Conny Olovsson

Sveriges Riksbank Economic Review (*Penning- och Valutapolitik*) No. 1, 2020

A global climate policy is necessary to reduce global warming sufficiently. With a smart and cost-efficient climate policy, it would not be expensive to limit increases in temperature to 2 degrees by the year 2100. Economists have important knowledge and tools in this area to evaluate which instruments that can be expected to be effective for this purpose. The most cost-efficient measure would be a carbon tax that is the same in every country. In addition, an ambitious climate policy would be a cheap form of insurance against future high and uncertain expenses, but only if it is cost-efficient. Otherwise, an ambitious policy would risk being very expensive and, in a worst-case scenario, also ineffective. The most important way of reducing warming is to reduce the use of coal. Measures that do not contribute to this will be ineffective.

Real-time Indicators Provide Information Support during Rapid Cyclical Turnarounds

Jacob Ewertzh, Thomas Falk, Marie Hesselman, Isaiah Hull, Mårten Löf, Oskar Stigland and Markus Tibblin

Sveriges Riksbank Economic Commentaries No. 3, 2020

Sudden and powerful cyclical fluctuations mean that the Riksbank needs information more rapidly and more frequently than many traditional statistical products are capable of providing. To gain a quick oversight of how the coronavirus pandemic is affecting the Swedish economy, the Riksbank has expanded its collection of high-frequency data with real-time indicators. In many cases, these appear to give a fair and clear view of the development of demand, the labour market and prices. There is a lot to suggest that real-time indicators will become a more important source of data for policy analyses in the period ahead.

Money and Monetary Policy in Times of Crisis

Hanna Armelius, Carl Andreas Claussen and David Vestin

Sveriges Riksbank Economic Commentaries No. 4, 2020

Central banks around the world have implemented extensive measures to alleviate the effects of the corona pandemic on the economy. Many of the measures involve creating large volumes of new money. But how is money created and who ends up holding it? In this commentary, we explain how money is created and destroyed in the current financial system, what roles the banks and the Riksbank have and how different course of action by the banks and the Riksbank influence the amount of money. At the end of the commentary, we use examples from the Riksbank's crisis measures to illustrate how monetary policy influences the economy and the amount of money.

Seigniorage through Periodic Recoinage: When the Validity of Money Was Restricted in Time

Roger Svensson and Westermark Andreas

VoxEU.org, 21 January 2020

For almost 200 years, old coins were frequently declared invalid in large part of medieval Europe and had to be exchanged for new ones for an exchange fee. This column shows that frequent recoinage generates incomes for the minting authority when the tax level is low enough and the punishment for using invalid coins is high enough, and when there is a limited coin volume in circulation and also an exchange monopoly. The system is equivalent to the 20th-century idea known as the Gesell tax.

COVID-19 in Real Time: A Collaborative Approach from Central Banks, Academia, and the Private Sector

Isaiah Hull

VoxEU.org, 23 July 2020

The COVID-19 pandemic has placed pressure on central banks and other public institutions to monitor the economy at a higher frequency than usual. However, much of the data and expertise needed to perform such monitoring is concentrated in the private sector and academia. This column describes the effort made by the

Swedish Riksbank to alleviate this bottleneck by opening up a collaborative public channel through which academics and the private sector can directly contribute to the research in real time.

Other research activities

Conferences

Together with CEBRA and CEPR, the Riksbank organized the fourth annual meeting of CEBRA's International Finance and Macroeconomics program on 1-2 October, held online. The theme of the meeting was “Exchange Rates and Monetary Policy”, and keynote speeches were given by Hélène Rey (London Business School) and Philip Lane (ECB). The program and videos are available at: https://www.riksbank.se/en-gb/press-and-published/conferences/2020/cebras-international-finance-and-macroeconomics-program-1-2-october/

Daria Finocchiaro was on the scientific committee for the annual workshop of ESCB Research Cluster 2 (“International Macroeconomics, Fiscal Policy, Labour Economics, Competitiveness, and EMU Governance”), hosted online by the Bank of Italy. Tor Jacobson and Conny Olovsson organized the session “The Challenges Imposed by Climate Change” for the CEBRA annual conference, hosted online by the London School of Economics. Conny was on the scientific committee of the CEBRA workshop for “Commodities and Macroeconomics”, hosted online by the Central Bank of Chile. Andreas Westermark was on the organizing committee of the OeNB-SUERF conference “25 years of EU Northern Enlargement”, held online.

Greater Stockholm Macro Group

Together with Per Krusell (IIES, Stockholm University), the Research Division continued — in the first part of the year — to organize 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” and aims at fostering exchange of ideas and cooperation among macro researchers in the Stockholm area. However, due to Covid-19, the GSMG has been put on hold since the spring, and is planned to restart next year.

Internship Program

The Riksbank PhD internship program was cancelled during 2020, due to the pandemic.

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 the spring, seminars have been virtual events. A complete list of both upcoming and past seminars is available on the homepage of the Research Division: 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. Daria Finocchiaro taught “Applied Macro” (master’s level) and “Macro I” (PhD level) at Uppsala University, and advised students also at the Stockholm School of economics. 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, the Paris School of Economics, and the Royal Institute of Technology.

Miscellanea

Daria Finocchiaro was partially on leave at Uppsala University until August. Karl Walentin visited the Swedish Ministry of Finance in May-July, working on the analysis for economic measures in response to Covid-19. Xin Zhang was on sabbatical at the Federal Reserve Bank of San Francisco in January-May, working on research projects. 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. Xin was also on the organizing committee for the online seminar series “Applied Machine Learning, Economics, and Data Science”.

Upcoming events in 2021

Next year, the Research Division will give 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.

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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/