DNB Research Program 2019

DeNederlandscheBank

EUROSYSTEEM

Content

Foreword

The DNB Research Program 2019 is the second one based on the DNB Research Agenda as decided upon in 2018. The Research Agenda outlines the ambitions for DNB research for the upcoming years and offers guidance for the formulation of individual research projects. As a rule, new projects will only be approved if they fit into the longer-term views as outlined in the DNB Research Agenda.

The DNB Research Agenda identifies seven themes: the effects of unconventional monetary policies, the new normal for monetary policy, the dynamics of inflation, credit supply, financial stability and financial regulation, sustainability, and payments and market infrastructure.

As usual, the proposed DNB Research Program has been discussed by the "Regiegroep", consisting of the directors of several policy divisions. Last year, it was impossible to implement the request of the "Regiegroep" for a research project focusing on insurance companies. However, the DNB Research Program 2019 contains two new projects focusing on insurers. On the request of the "Regiegroep", also several new projects focusing on trust in and the integrity of financial institutions have been added to the program.

Jakob de Haan
Head of Research DNB

Monetary policy

The global financial crisis had a profound impact on the practice of monetary policy in a range of countries. The crisis challenged important elements of the pre-existing dominant view that monetary policy should be aimed at price stability and should use just one instrument: a short-term policy interest rate. Being confronted with a massive financial crisis and its repercussions as well as stubbornly low inflation rates, central banks resorted to a large number of unconventional policy tools. When they encountered the effective lower bound (ELB), central banks extended the set of assets they were willing to purchase, these operations being known generically as Quantitative Easing (QE). This changed the composition and vastly increased the size of their balance sheets.

In light of these changes, four sets of important questions arise:

1. Effects of unconventional monetary policies

Although a substantial amount of research suggests that unconventional policies have contributed to increasing output growth and inflation, less is known about their impact on the exchange rate and how this in turn affects the macro economy (changing exchange rate pass-through to inflation). In addition, more research is needed on the (unintended) consequences of unconventional monetary policies on: housing markets, risk taking by financial institutions and markets, zombie-lending (misallocation of capital), and the behaviour of (different types of) consumers (e.g. due to shortfalls in the pension system). With interest rates still at or close to the ELB the effectiveness of unconventional monetary policies going forward increasingly depends on fine-tuning the fiscal-monetary policy mix while controlling sovereign risk.
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2. The new normal for monetary policy

Important changes in the economy, notably the low level of inflation and sluggish economic growth, created new challenges for monetary policy decision-making. A major issue here is that some key variables (like the natural rate and expectations) are non-observable, while they play a key role in theoretical models. Important questions include: how reliable are estimates of the natural real rate of interest and its drivers; can monetary policymakers influence the natural rate, and if so, how? What is the role of expectation formation in relation to wage and price dynamics? To address these issues, a proper theoretical framework is needed, in which the uncertainty about key variables is taken into account. If and when economic conditions turn more favourable, how should monetary policy be normalized (exit from QE; should central banks eventually return to the traditional mode of intervening at the short end of the market; what is the optimal size and composition of the central bank balance sheets) and what operational framework is best suited to effectively and efficiently transmit the desired monetary stance?
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3. Dynamics of inflation

It seems that the dynamics of wage and price inflation has changed. This raises several important questions: do we need new theories to explain (wage) inflation, what is the role of (expected) fiscal policy in this regard, what is the role of technological developments (ICT), globalization and changes in market structures (platforms, contestability), how do changes in labour market composition affect wage growth, is central bank independence enough to deliver price stability? Has the relationship between the output gap, unemployment and (wage) inflation dynamics fundamentally changed?

If so, how should the Phillips curve be modelled? What determines the equilibrium labour income share on the macro and sectoral level? How are (inflation) expectations formed? What is the role of inflation expectations in wage and inflation dynamics? What are the implications of these issues for the ECB's monetary policy – and in particular for the appropriateness of its current strategy?

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4. Credit supply

In the aftermath of the crisis, credit supply by euro area banks dropped. This raises several issues: Why are banks not lending (demand or supply constraints)? What can monetary policy do to stimulate bank lending? What is the relationship between capital and liquidity requirements and bank lending? What are the consequences of lower access to bank credit for small and medium-sized enterprises in the euro area? What impact does a distressed banking sector have on productivity growth? For the last two questions:

what can be learned from the US where banks were recapitalized much faster after the crisis?

In order to address several of these questions, high priority will be given to develop theoretical models for realistically modelled monetary policy in which debt overhang of firms and/or banks is combined with demand shocks. Such models can also be used to analyse asymmetric effects of monetary policy in a heterogeneous monetary union and can give guidance for identification in empirical work on several of the issues raised above.

■ Projects 2019

Theme 1 Effects of unconventional monetary policies

New projects   Continued projects

New projects

1. QE and (international) portfolio rebalancing
Tom Hudepohl and Renske Maas

The portfolio rebalancing channel is often cited in the literature as one of the most important, and perhaps one of the most effective channels through which QE can affect the economy. Most studies that look at portfolio rebalancing consider the euro area as a closed economy. However, QE also comes with important open-economy aspects. In order to address the open character of the euro area, we will look at international portfolio rebalancing. Addressing the question of international portfolio rebalancing will be done in two ways. One particular way investors can resort to portfolio rebalancing is by means of carry trades. By taking a look at the positions of euro area investors, we will investigate the impact of QE on carry trades. This will first be done by looking at whether euro area investors increased their risk-taking via an increase in exposure on liquid instruments in other currencies. Second, we will look at whether euro area investors resorted to international portfolio rebalancing by increasing instrument risk on their balance sheets.

2. Risk management principles for central banks: Towards a better understanding of interest rate risks in the central bank balance sheet
Michael Kurz

The aim of this project is to contribute to the understanding of interest rate risks in central bank balance sheets within a structural model of the economy. Interest rate risk in central bank balance sheets may result from asset-liability mismatches as a consequence of quantitative easing. Since central banks cannot hedge such interest rate risk due to their unique position in financial markets and their mission, it is important to better understand interest rate risks in central bank balance sheets in a broader economic context. This will be achieved by building on and extending structural (DSGE) models from the academic literature that are usually used to model optimal interest rate corridor width.

3. Forward guidance when horizons are finite
Kostas Mavromatis and Joep Lustenhouwer (University of Bamberg)

A well-known puzzle in monetary economics since the wake of the recent crisis relates to forward guidance. Standard DSGE models with agents endowed with infinite horizons deliver explosive dynamics the farther away to the future is the timing of forward guidance announcements. We show that this puzzle no longer exists in a model where agents are boundedly rational and plan over a finite number of periods to the future. We extend the model further by also allowing for heterogeneity in horizons. In this case the fractions of agents associated with different horizons determines the extent to which the economy over- or under-reacts to forward guidance announcements.

4. Asset bubbles in risky assets
Nander de Vette

This paper assesses the relation between asset pricing bubbles in equity and credit markets. Risk premia on equity and credit instruments are closely linked as they both reflect a compensation per unit of default risk. We try to formally identify asset pricing bubbles in equity and credit markets and subsequently gauge the effect of QE on bubble contagion. More specifically, using a reduced form approach and a bubble identification method we shed light on how the portfolio rebalancing channel of QE influenced overvaluation in risky assets (equities and credit), and whether it had a similar impact on risk perceptions.

Continued projects

1. Banks' net interest income in a low interest rate environment

Leo de Haan, Raymond Chaudron and Marco Hoeberichts

Recent research – both for Dutch banks and banks in other countries – has shown that net interest income is not affected much by a flattening of the yield curve. This study investigates for 40 Dutch banks which factors are important in this regard, focusing on characteristics of the Dutch banking sector (e.g., market power, capitalization, credit risk, other sources of income such as fees and commissions).

2. QE and stock market bubbles

Tom Hudepohl, Ryan van Lamoen and Nander de Vette

This paper assesses the relationship between QE and the search for yield by investors. In a low interest rate environment, investors may increase their risk-taking behaviour, which reduces risk premia and increases asset prices. As a result, the risk of asset bubbles rises. Previous research has been conducted on the relationship between asset bubbles and monetary policy in general. This paper focuses on the specific role of QE by exploring the relationship with asset bubbles, based on the Shiller P/E ratio of the biggest stock indices of ten European countries.

3. QE and portfolio rebalancing in a monetary union

Kostas Mavromatis, Renske Maas and Serdar Kabaca (Bank of Canada)

We use a two country DSGE model for a currency union with portfolio rebalancing to analyse the effects of QE in a monetary union. We first aim to quantify the effects of asymmetric behaviour from the investors' side and, second, from the governments' side following a drop in the supply of long-term assets. Households in each region (Core and Periphery) can hold short- and long-term assets issued by both regions. Importantly, home and foreign assets, but also assets issued within the same region, are imperfect substitutes. Such structure allows for endogenous term premia which depend on the direction of portfolio rebalancing. We account for various asymmetries by allowing home bias coefficients in households' portfolios to differ across the two regions while also the fiscal policy stance differens. Our model accounts for differences in country size and as such can approximate the ECB's capital key. We consider a QE shock which affects each country individually, according to its size.

4. Forward guidance, bounded rationality and expectation formation

Maarten van Rooij, Olivier Coibion (University of Texas, Austin), Dimitris Georgarakos (ECB) and Yuriy Gorodnichenko (University of California, Berkeley)

Recent theoretical research challenges the effectiveness of forward guidance and relates this to k-level thinking (a particular form of bounded rationality) by people and firms. The term k-level thinking refers to which degree individuals take actions of others into account when forming expectations (k refers to the number of iterative steps individuals take in their thoughts when forming expectations). However, there is virtually no evidence that k-level thinking matters for macroeconomic outcomes. In this research, we use the Dutch Household Survey to investigate the links between k-level thinking and expectation formation.

5. Cross-border spillover effects of Quantitative Easing in the euro area

Anna Samarina, Christina Bräuning, Yvo Mudde and Robert Vermeulen

This project aims at quantifying the stock and flow effect of the PSPP on

euro area bond yields since March 2015. Furthermore, it investigates the spillover effects of PSPP-purchases in one country on government bond yields in other countries in the euro area. We distinguish spillovers from countries' purchases, grouped by country's credit rating and bond's maturity segment. For the analysis of stock effects, we will use a panel regression or SUR with country-bond-time dimension, with quarterly bond yields regressed on their own cumulative quarterly purchases, purchases of close substitutes, PSPP announcements leading to different expectations in the size of the program, economic news, foreign factors (VIX as measure of global volatility) and bond characteristics. The analysis of flow effects is based on a similar model specification as the one on stock effects, but the methodological approach would have to account for high frequency data issues – volatility and autocorrelation of error terms.

6. Country-specific risk premium shocks and central bank policies

Emmanuel De Veirman, Dennis Bonam and Gavin Goy

The euro area crisis featured increased heterogeneity in risk premia on sovereign debt. We show that heterogeneous risk premium shocks are amplified in monetary unions. We investigate the effectiveness of lender- and borrower-based macro-prudential policy tools as well as unconventional monetary policy (debt purchases within the SMP) in dealing with country-specific shocks. Our paper (1) focuses on heterogeneity in a monetary union; (2) investigates the effects of credit supply shocks; (3) investigates the influence of macro-prudential policy; (4) investigates the influence of unconventional monetary policy.

Theme 2 The new normal for monetary policy

New projects   Continued projects

New projects

1. Fundamental uncertainty about the natural rate of interest: Info-gap as guide for monetary policy

Yakov Ben-Haim (Israel Institute of Technology, Haifa, Israel) and Jan Willem van den End

This project deals with the fundamental uncertainty in the natural rate of interest. It uses info-gap theory to rank different monetary policy strategies in terms of their robustness against natural rate uncertainty. Applied to the euro area it tests four strategies: a traditional Taylor rule, a less aggressive and a more aggressive response to deviations from price stability and financial stability and an inert or low-for-long strategy. It assumes that the policy strategies are symmetrically applied in a downturn as well as in an upturn. The methodology used is applicable in a wide range of policy analyses under deep uncertainty.

2. Identifying the predictable component in macro-economic forecasting errors

Bas Butler, Dorinth van Dijk and Ad Stokman

In macro-economic forecasting, there is a strong tendency to underestimate the business cycle component in real GDP and spending items: too optimistic when the economy is in a downturn and too pessimistic during upturns. This is a general feature applying to all institutions producing macro-economic outlooks, all countries independent of the openness of the economy and is persistent over time. In a recent empirical examination for the Netherlands, we find that sentiment shocks on financial markets and consumer confidence shocks in a running year may explain (real time) a significant part of forecasting errors in the coming year. We propose to test this preliminary finding for the Netherlands for a range of countries.

3. Term premia under falling stars

Gavin Goy, Claus Brand (ECB) and Wolfgang Lemke (ECB)

Have term premia followed the secular decline in both the natural rate and trend inflation over the last three decades? Using quarterly data for the US and the EA, we show that - different than the conventional wisdom - term premia are in fact stationary once accounting for time-varying macro trends in inflation and the natural rate of interest. Additionally, we find that using term structure information helps to better identity these macro trends in the data. The current natural rate of interest, which in our model is maturity-indifferent, is estimated to be around 1 percentage in the US, while slightly lower in the euro area.

4. Estimating DSGE models with finite horizons

Kostas Mavromatis, Joep Lustenhouwer (Bamberg University), Mike Tsionas (Lancaster University) and Giorgio Motta (Lancaster University)

We augment the Smets-Wouters (2007) model to account for households' and firms' bounded rationality. In particular, we assume that both form decisions up to a finite number of periods to the future. We estimate the model using a novel estimator. Our estimates show that the planning horizon of agents varies from 20 to 25 quarters ahead. Moreover, given the finite horizon in agents' decisions, we show that the responses of output, inflation and investment in the U.S. are more pronounced following fundamental shocks.

5. Behavioural learning equilibria in the New Keynesian model

Kostas Mavromatis, Cars Hommes (University of Amsterdam), Mei Zhu (Shanghai University) and Tolga Ozden (UvA)

We generalize the concept of behavioural learning equilibrium (BLE) to a general high dimensional linear system and apply it to the standard New Keynesian model. For each endogenous variable in the economy, boundedly rational agents learn to use a simple, but optimal AR(1) forecasting rule with parameters consistent with the observed sample mean and autocorrelation of past data. A BLE is therefore parameter free. Agents do not fully recognize the complex structure of the economy, but learn to use an optimal parsimonious AR(1) rule, which satisfies the orthogonality condition for RE. We find that BLE exists, under general stationarity conditions, typically with near unit root autocorrelation parameters. BLE thus exhibits a novel feature: the persistence in inflation and output gap is much higher than the persistence in exogenous fundamental driving factors. In a boundedly rational world, coordination of individual expectations on an aggregate outcome described by our parsimonious BLE seems more likely. We provide a general framework to approximate and estimate a BLE using the notion of iterative E-stability, and show that the standard New Keynesian model fits aggregate U.S. data reasonably well under a BLE. We further analyse optimal monetary policy under BLE for the standard Taylor interest rate rule and, in contrast to the RE benchmark, we find finite optimal Taylor rule coefficients.

Continued projects

1. Fear of secular stagnation and the natural interest rate
Paolo Bonomolo and Valentina Gavazza (Stockholm University)

What is the role of expectations and pessimism in explaining the low and persistent pattern of interest rates after the financial crisis? Potential output is not directly observable: when a recession occurs, it is not clear if the effects are permanent (like in a secular stagnation) or transitory. The more the agents are pessimistic, the higher the probability they attribute to the first scenario, leading to a lower natural interest rate. We quantify the contribution of pessimism on the natural rate in Europe and the U.S., estimating a DSGE model under the assumption that agents cannot observe whether shocks to technology are permanent or transitory. We model pessimism as ambiguity aversion in the sense of Klibanoff Marinacci and Mukerji (2005).

2. Detecting liquidity traps
Paolo Bonomolo, Yildiz Akkaya (Konjunkturinstitutet) and Ingvar Strid (Sveriges Riksbank)

Major economies experienced a period of low interest rates and low inflation. A possible explanation is that they fell in a liquidity trap. This is an equilibrium situation in which the policy rate is at the effective lower bound and inflation fluctuates around a negative or very low value. Ending in a liquidity trap is a big risk for the policy maker and we develop an econometric strategy to quantify this risk. We show that the methodology is able to recognize when the probability of converging to a liquidity trap is high before the interest rate approaches the lower bound.

3. Re-assessing monetary policy shocks
Paolo Bonomolo, Björn van Roye (ECB) and Alistair Dieppe (ECB)

We develop a framework to quantify the effects of monetary policy taking into account the possibility of a structural decrease in the growth rate of GDP. When such a situation occurs, we have two consequences: i) the natural interest rate is lower: ii) part of the variation in GDP growth is attributed to structural factors that are independent of monetary policy. Both these effects downplay the estimated effects of monetary policy.

4. Now-casting under structural change
Maurice Bun, Jos Jansen (Ministry of Finance) and Jasper de Winter

Policy makers and economic agents have to make decisions based on incomplete and inaccurate information about current economic conditions. For this reason, the now-casting of key economic aggregates, i.e. forecasting their current state, is of great importance. The recent now-casting literature has developed an extensive toolkit to summarize large amounts of statistical information observed at different frequencies and with non-synchronous release dates. In this project we analyse the robustness of several now-casting models to structural change. We furthermore correct for structural change by including intercept corrections and evaluate the predictive ability of the resulting models.

5. Look for the stars: Estimating the natural rate of interest
Irma Hindrayanto, Mengheng Li and Siem Jan Koopman (Free University Amsterdam (VU))

The natural rate of interest (r*) and the growth rate of potential output are important policy benchmarks widely used by central banks to determine the stance of an economy. It is well recognized that r* is subject to low-frequency fluctuations as shown in the seminal paper of Laubach and Williams (2003). To track its evolution over time

in a parsimonious manner, we propose a 2-stage multivariate unobserved components (MUC) model with similar cycles. In the first stage, we pin down the time-varying trend growth rate of real output using Okun's law. In the second stage, we model the necessary gap variables using similar cycles and insert the calculated trend growth rate in the full MUC model to estimate r*. We apply our model to US, UK and EA data.

6. Estimating behavioural learning equilibria
Kostas Mavromatis, Cars Hommes (UvA) and Ozden Tolga (UvA)

We estimate NKE models under a simple misspecification learning equilibrium that arises from expectational frictions. The representative agent does not know the true underlying mechanism of the economy, but acts as an econometrician and uses a simple univariate sample autocorrelation learning rule to form her expectations about the future state of the economy. Over time, she learns the best univariate rule and her expectations become self-fulfilling, giving rise to Behavioural Learning Equilibria (BLE).

Under fairly general conditions, we show that NKE models can be estimated under a BLE using standard Bayesian estimation methods without using projection facilities. We apply our estimation approach to two models that are commonly used in the literature: the baseline 3-equation NKPC à la Woodford (2003), and the workhorse Smets-Wouters (2007) model. Our results show that the empirical fit and forecasting performance of both models under BLE improve compared to the Rational Expectations models, while we observe important differences in our parameter estimates and the propagation mechanism of the model.

7. Forecasting with large panel data sets
Andreas Pick

This research project investigates methods for forecasting with large panel data sets. An application is that of Bernoth and Pick (2011, JBF), who investigate forecasts of banking and insurance vulnerabilities. The current project aims to further the understanding of forecasting in such data sets, to develop new forecasts, and compare those forecasts to existing forecasting methods.

Theme 3 Dynamics of inflation

New projects   Continued projects

New projects

1. Inflation fluctuations and liquidity constraints

Jakob de Haan, Emmanuel de Veirman and Irina Stanga

This project is motivated by two factors. First, in the eurozone as well as in the Netherlands, core inflation has declined relatively little during the Great Financial Crisis and its aftermath and is increasing relatively little during the current recovery. Second, it is likely that liquidity constraints were more pronounced during the Great Financial Crisis and its aftermath than at other times. We link these two factors by investigating how liquidity constraints affected firms' pricing actions in the Netherlands, not unlike what Gilchrist et al. (AER 2017) do for the United States. We use a micro data set on prices and liquidity of Dutch firms, which we construct for this purpose.

Continued projects

1. Private beliefs formation and macroeconomic risk

Paolo Bonomolo, Guido Ascari (University of Oxford and University of Pavia) and Leonardo Melosi (Federal Reserve Bank of Chicago)

We study how the time variation in the expectation formation process affects the dynamics of inflation. The goal is to understand the determinants of inflation expectations, and quantify the risk that a shift in expectations can lead to high inflation. First, we identify the empirical determinants of the expectation formation process and its time variation through a time-varying parameter VAR. Then, we build a model with time-varying expectations to study the relation between expectations and macroeconomic instability.

2. Non-linearity in the long-run Phillips curve

Paolo Bonomolo and Guido Ascari (University of Oxford and University of Pavia)

In a situation with low inflation and the nominal interest rate at the lower bound, the Central Bank may affect inflation expectations by increasing the inflation target. We focus on a particular risk of such a policy: a negative impact on potential output. The presence of staggered prices and wages may imply a suboptimal level of production: if firms do not set their price optimally, they end up adjusting the quantity produced. We estimate how this inefficiency depends on the level of long-run inflation (the inflation target) using both time series and structural models.

3. On the sources of business cycle fluctuations in small open economies

Paolo Bonomolo, Vesna Corbo (Sveriges Riksbank) and Jesper Lindé (Sveriges Riksbank)

We study how much small open economies are dependent on global factors. We use Swedish data (and in a later phase, possibly Dutch data) to quantify the big role of financial linkages in explaining the dynamics of GDP and inflation after the financial crisis. In particular, when global financial stress increases, the effects are similar to a supply shock: inflation and GDP move in opposite direction. This can account for the so called "twin puzzle": the missing disinflation during the financial crisis, and the low inflation during the financial recovery.

4. Heterogeneity in inflation forecasts

Kostas Mavromatis, Jakob de Haan, Cars Hommes (UvA), Domenico Massaro (Catholic University of Milan) and Adriana Cornea Madeira (University of York)

We use a unique dataset on Consensus Forecast data to analyse inflation expectations dynamics accounting for heterogeneity in expectations. Specifically, respondents in our dataset are called upon forming expectations about inflation, in the US, one and two years ahead. Our dataset contains monthly forecasts of individuals and spans from 1989 to 2017. We develop and estimate a behavioural model of inflation dynamics with heterogeneous agents. Heterogeneity in agents refers to their forecasting rules. Each agent has her own forecasting rule but we allow agents to switch among those rules over time, depending on the forecasting performance of each rule in the past. We experiment with both forward-looking and backward-looking forecasting rules.

5. Does it matter how you target? Performance of point, band, and range targets for inflation

Anna Samarina and Nikola Mirkov (Swiss National Bank)

We construct a new database of inflation targets for 55 countries over the period 1990-2017. We distinguish three types of inflation targets used by central banks: point target, point target with a tolerance band, and range target.

Using this database, we examine how effective are different types of targets in achieving price stability. That is, whether the distinction between inflation target types matters for inflation performance, its volatility, and expectations. We analyse how these effects depend on countries' economic, fiscal, financial, and institutional conditions.

6. Expectations formation and anchoring: new evidence from a high frequency survey

Federica Teppa, Gabriele Galati and Richhild Moessner (BIS)

This paper helps understanding whether inflation expectations have contributed to low inflation in the euro area. It uses a new type of survey to investigate the behaviour of expectations about euro area inflation and their anchoring properties, and how it has evolved since the financial crisis. The survey covers 8 years of weekly data on expectations about short-, medium- and long-term inflation, and 4 years of quarterly data on the whole probability

distribution of expectations. The paper extends earlier work on this topic (DNB WPs 283 and 509).

Theme 4 Credit supply

New projects

Continued projects

New projects

1. Corporates' bank dependence: The role of financial structure and central bank corporate sector purchases
Joost Bats

When financing is dominated by banks, borrowers may be dependent on bank lending and have little room to substitute bank credit for market credit during financial downturns. The financial structure thus has implications for the cyclicality of credit supply. To ease market credit supply, central banks have implemented corporate sector purchase programs. This paper uses European firm level data and assesses to what extent corporates' dependence on bank financing is influenced by the financial structure and corporate sector purchases.

2. Bank behaviour and central bank credit operations during the financial crisis
Joost Bats, Jorien Freriks, Aerdt Houben and Jan Kakes

In the past decade, the Eurosystem has extended its credit operations, by easing collateral requirements and providing long-term financing (VLTROs and TLTROs). These measures have facilitated banks' access to funding and credit intermediation. We investigate the impact of long-term credit operations on bank behaviour, particularly their funding profile and lending activities. We will use data on individual banks' balance sheets, lending and deposit interest rates and banks' participation in the Eurosystem's tender operations.

3. Capital Regulations and credit line management during crisis times
Paul Pelzl

Credit line drawdowns by firms reduce a bank's regulatory capital ratio. Using the Austrian Credit Register, we provide novel evidence that during the 2008-09 financial crisis, capital-constrained banks managed this concern by substantially cutting little-used credit lines. Controlling for a bank's capital position, we also find that greater liquidity problems induced banks to considerably cut little-used credit lines over 2008-09. These results suggest that banks actively manage both capital and liquidity risk caused by undrawn credit lines in periods of financial distress, but thereby reduce liquidity provision to firms exactly when they need it most.

4. Proprietary trading, bank lending, and the bank balance sheet
Michael Kurz

This project assesses the relationship between proprietary trading activities, bank lending, and banks' funding choices. An extensive theoretical literature argues that if funds are scarce, banks with greater trading expertise may reduce credit supply during a crisis as they redirect funds from lending to trading as the returns from investing in distressed assets are higher than the returns from lending. Moreover, the allocation of scarce funds to scalable short-term securities trading tends to reduce the availability of credit for non-scalable long-term relationship lending activities. This reallocation leads to insufficient incentives for banks to build and maintain long-term lending relationships. Previous empirical evidence indeed shows that banks with strong proprietary trading activities reduce credit supply relative to their non-trading peers. This paper aims at finding answers the to the following questions: Which type of credit do banks reduce when they engage in proprietary trading (by loan type, borrower type, maturity, etc.)? Do banks also change their balance sheets in other areas such as increasing funding?

Continued projects

1. Bank lending to SMEs in the Netherlands

Jasper de Winter, Mark Mink,
Bahar Öztürk and Jakob de Haan

Using supervisory data, the project will analyse lending to SMEs by the three large banks in the Netherlands with the aim to get a better understanding about potential lending bottlenecks to SMEs. We will start by analysing whether credit supplied and the conditions of the loans provided are related to balance sheet indicators and the profitability of firms, as well as the sector and region in which the firm is operating. We also intend to differentiate between new loans provided and credit supplied under existing credit lines.

Financial stability and financial regulation

The financial crisis has also led to major changes in financial sector supervision. Micro-prudential requirements have become stricter, although there is also a tendency (at least in some countries) towards less regulation. Within the euro area, the SSM has become responsible for banking supervision, but not for supervision of other financial institutions. Nowadays most central banks have become responsible for maintaining financial stability. A wide array of macro-prudential instruments can be applied, but so far, there is only limited experience. Early detection of (systemic) risks is important to successfully use both micro- and macro-prudential instruments. This calls for a further development of quantitative tools (using granular data) that can inform policymakers on (systemic) risk both in the banking and non-banking financial sector, such as early warning indicators, financial or credit cycle models, contagion mechanisms, and stress test models. As residential and commercial properties make up a substantial part of non-financial private sector assets, and relate to a significant share of financial sector lending and investment, developments in these markets have a profound impact on economic and financial stability. It is important to better understand the strong boom-bust pattern in the housing market, the causes of the slow reaction of the supply side of the housing market, and the relationship of the housing market with the business cycle.

In light of this, several important questions arise concerning financial stability and financial regulation including:

Which tools and policies can help to reduce the pro-cyclicality of the housing market? How do macro-prudential policy changes and regulatory reforms affect the transmission mechanism of monetary and macro-prudential policy? What is the impact of a country's financial structure (bank-based vs. market-based financing) on systemic risk? What is the impact of "fintech" and financial innovation (like CoCos) on the sustainability of the (successfulness of) business models of financial institutions and what are the implications for financial services provision, the sustainability of business models of financial institutions, financial markets, financial stability and micro- and macro-prudential supervision? How does financial criminality impact the reputation of financial institutions and prudential risks? Do developments like low interest rates, high levels of debt and leverage, and increasing protectionism threaten financial stability?

■ Projects 2019

Theme 5 Financial stability and financial regulation

New projects

Continued projects

New projects

1. Systemic risk of pension funds
Rob Bauer (University of Maastricht),
Dirk Broeders and Annick van Ool

Since the financial crisis changes in
financial regulation have increased
the safety and resilience of financial
institutions. However, this does not
automatically imply that the financial
sector as a whole becomes safer.
There is evidence of herd behaviour
among pension funds, partly because
of this increased intensity of financial
regulation. Herd behaviour can lead
to more homogeneity among pension
funds which potentially harms financial
stability. A simultaneous funding
shortfall of many pension can have a
significant impact on the real economy
as a result of large-scale pension cuts.
In this paper, we focus on potential
trade-offs between individual and
systemic risk in the pension sector and
investigate how diverse diversification
across pension funds can reduce
systemic risk. We use a stylized model
with several pension funds. Each

pension fund determines its individual
strategic asset allocation and we
simulate the performance of all pension
funds in different economic scenarios.
Subsequently, we investigate whether
more diverse strategic asset allocations
across pension funds lead to a better
performance of the pension sector
as a whole. First, we exclude pricing
effects for the sake of simplicity. Second,
we investigate the impact of price
effects which can occur as a result of
institutional herd behaviour.

2. Foreign bias in equity portfolios
Martijn Boermans, Ian Cooper (London
Business School), Piet Sercu (KU Leuven)
and Rosanne Vanpee (KU Leuven)

The literature on international equity
holdings distinguishes between home
bias (overweighting of home stocks) and
foreign bias (relative underweighting
for more 'distant' countries). The two
biases can be integrated into one
distance-based model. This paper builds

on the work on Cooper et al. (2018) to
measure the foreign bias. We analyse
how benchmarking explains the prior
findings in the literature. We collect
portfolio holdings among households
in stocks. The findings are important to
better explain international investment
patterns and may carry implications for
financial stability.

3. Does search for duration make investment behaviour procyclical?
Stijn Claessens (BIS) and Robert
Vermeulen

We investigate, using security level data
covering all euro area countries, how
various classes of investors adjust their
portfolios in response to changes in
interest rates considering the duration
of investable securities. Investors with
long term liabilities, e.g. insurance
companies and pension funds, face
sharp increases in these liabilities when
discounted with lower interest rate.
This effect can trigger investors to

purchase more long-term bonds with a
high duration, which creates a feedback
loop. The results provide information
on investor behaviour during the ECB's
asset purchasing programs and can
provide guidance on investor responses
when the ECB will decrease its balance
sheet again.

4. Corporate diversification and risk in the insurance industry
Patty Duym and Ilke van Beveren

In general, corporate diversification
is risk-reducing. We investigate the
impact of corporate diversification on
risk for the Dutch insurance industry.
While existing work in this area
focuses on the impact of diversification
on performance (return), theory
suggests a direct relationship between
diversification and risk. Risk can –
for example – be measured by the
volatility in returns. We will separately
consider the effects of product, asset
and geographic diversification by
Dutch insurers on reported risks and

returns using firm-level panel data. We expect to find a negative relationship between diversification and risk, though it is a priori unclear to what extent this pattern holds for all types of diversification.

5. Long-term investors and the yield curve
Kristy Jansen

What determines the yield curve? According to the preferred habitat theory, long-term investors such as pension funds and life insurers have a strong preference for long-term bonds, affecting the yields for these maturities. The cause of this natural preference for long-term bonds may be twofold: economic versus regulatory hedging motives. Using holdings data and a change in the regulatory discount curve, I study the economic and regulatory hedging incentives of long-term investors. The change in the regulatory discount curve implied a positive shock to the funding positions of both life insurers and pension funds. I find that pension funds on average did not respond to the change in the regulatory discount curve, whereas life-insurers decreased their long-term bond holdings, consistent with regulatory hedging motives. Moreover, conditioning on the funding position, I find that underfunded pension funds decreased their holdings after the change in the regulatory discount curve, suggesting that the regulatory hedging motive is stronger for constrained long-term investors.

6. Requirement on the Total Loss Absorbing Capacity for Global Systemically Important Banks
Wayne Passmore (Federal Reserve Board) and Chen Zhou

The Basel Committee on Banking Supervision identifies global systemically important banks (G-SIBs) and requires G-SIBs to hold additional common equity as "G-SIB capital surcharges." An alternative way to increase the Total Loss Absorbing Capacity (TLAC) of G-SIBs is to issue the long-term debt (LTD) that will be written down or converted to equity on failure. The goal of this research are two folds. Firstly, we compare the two policies: G-SIB capital surcharge and TLAC LTD for risk mitigation. The goal is to investigate the optimal policy based on G-SIB capital surcharge or TLAC LTD, or their combination to maintain the expected loss of a G-SIB failure at a low level. Secondly, we evaluate quantitatively the rate of substitution between TLAC LTD requirement and capital surcharge.

7. Trust in financial institutions
Ria Roerink, Caring van der Cruijsen and Jakob de Haan

Trust in financial institutions is crucial for financial stability. However, still little is known about what drives trust in financial institutions. To improve knowledge on this topic we use data from the DNB Trust Survey (DTS) and DNB Household Survey (DHS), two annual consumer surveys among the Dutch CentERpanel. The period covered is 2006-2019. We research trust in three types of financial institutions: banks, pension funds and insurance companies. We gain detailed insights in the influence of sociodemographic factors such as age, gender, income and wealth. Additionally, we examine the role of other factors such as financial knowledge. We also research the stability of trust over time and how this relates to the aforementioned factors.

8. Macro-prudential policy and the transmission of monetary policy: New evidence on the bank-lending channel for the Netherlands
Anna Samarina, David-Jan Jansen and Jakob de Haan

This project studies how the increased usage of macro-prudential policies since the global financial crisis has affected the transmission of euro area monetary policy to bank lending in the Netherlands. We use granular data on lending by Dutch banks to households and non-financial corporations over 2000-2015 and examine a broad range of macro-prudential instruments implemented in the Netherlands during this period.

9. The heat is on: Measuring financial stress during disruptive energy transition paths

Robert Vermeulen, Edo Schets, Melanie Lohuis, Barbara Kölbl, David-Jan Jansen and Willem Heeringa

We develop a four-step methodology for analysing financial stress under extreme scenarios for the transition to a low-carbon economy. Based on a literature survey, we consider uncertainty on two dimensions: climate policy and energy technology. Next, we use a range of models to derive macroeconomic implications as well as sector-specific effects. Third, we measure implications for credit risk and market risk using standard stress-test tools. We illustrate the methodology using granular data for Dutch banks, insurers and pension funds.

10. Estimating spillover intensities in financial networks with spatial state space models

Dieter Wang, Julia Schaumburg and Iman van Lelyveld

In recent work, we have revisited the credit spread puzzle in bank CDS spreads from the perspective of information contagion. The puzzle, first detected in corporate bonds, consists of two stylized facts: Structural determinants of credit risk not only have low explanatory power but also fail to capture a systematic common factor in the residuals (Collin-Dufresne et al., 2001). For the case of banks, we hypothesize that the puzzle exists because of omitted network effects. We therefore extend the structural models to account for information spillovers based on business model similarities. To capture this channel, we propose and construct a new intuitive measure for portfolio overlap using the complete asset holdings of the largest banks in the Eurozone. Incorporating the network information into the structural model for bank credit spreads increases explanatory power and removes the residual common factors. In the current project we will run further simulations to prove the general applicability of the method.

11. The Fed and financial stability

Arina Wischnewsky (University of Trier), David-Jan Jansen, and Matthias Neuenkirch (University of Trier, CESifo)

This paper retraces how financial-stability considerations interacted with U.S. monetary policy in the decades before the Great Recession. We apply text-mining techniques to Fed communications to construct indicators for financial-stability concerns. We analyse these indicators in the context of Taylor-rule models for the Fed funds rate. The overall aim is contributing to the on-going debate on interactions between monetary policy and macroprudential policy.

Continued projects

1. Demand and supply reservation price indices for the housing market

Dorinth van Dijk and Marc Francke (UvA)

We use the Van Dijk, Geltner & Van de Minne (DNB WP 583, 2018) method to estimate reservation price indices for buyers and sellers in the Dutch and U.K. housing market. We relate features of these indices to regional characteristics and mortgage markets. We expect that the seller reservation price index dynamics are different in regions with high mortgage debt, since these sellers might be more loss averse due to negative equity problems. We also look at the differences between commercial and residential reservation price dynamics.

2. Challenges of macro-prudential policy

Gabriele Galati and Richhild Moessner (BIS)

While macroprudential policy has become a primary policy to support financial stability and has become increasingly popular in policymaking, it faces important challenges. We discuss several key challenges in taking the analysis of macroprudential policy forward. The focus is on the challenge of coordination between macroprudential and monetary policy – particularly in the current environment where central banks are exiting or planning to exit from a highly accommodative stance. We also discuss other important analytical challenges: the coordination with fiscal policy, regulatory arbitrage, the regulation of the infrastructure of the financial system and the relationship with green finance.

3. Loan to value ratio, loan guarantees, and mortgage defaults: Evidence from Dutch banks' loan level data

Leo de Haan and Mauro Mastrogiacomo

Using loan level data on mortgage loans of the three largest Dutch banks originating from 1996 to 2015, we analyse the determinants of the incidence of mortgage arrears. We find that the loan-to-value ratio (LTV) and the debt-service-to-income ratio (DSTI) are significantly positively associated with the probability of mortgage arrears. The results also suggest that government loan guarantees reduce credit risk. Moreover, several mortgage loan characteristics, such as interest only loans and the underwater status of the loan, increase credit risk. The age of the loan applicant diminishes credit risk. The purpose of the loan is also a determinant: when purpose is debt consolidation or the financing of a partly commercially used real estate, credit risk is higher.

4. Networks of Financial Market Infrastructures: Fire walls or fire lighters?

Ronald Heijmans, Froukelien Wendt (IMF) and Dieter Wang

This paper develops an approach to a network analysis model for authorities to analyse the importance of FMIs and their participants in a network as well as potential contagion channels following defaults, market shocks, or cyber-attacks. The network could also form the basis for stress testing methodologies. Data about exposures between FMIs and market participants, coupled with analytical techniques are expected to improve the understanding of the safety and robustness of FMIs, and their participants, and their role in financial networks at a country, regional and global level, including the tipping point up to which FMIs absorb shocks, beyond which they spread risks rather than contain them.

5. Liquidity Coverage Ratio in a payments network: Uncovering contagion paths

Richard Heuver and Ron Berndsen (Tilburg University (TiU))

Using payment data, we create an approximation of LCR, which creates the possibility to anticipate liquidity coverage statistics at daily level. Moreover, it enables us to place this statistic in a network perspective opening the possibility to look at secondary round effects and locations in the payment network that are most vulnerable. In 2018 a pilot has been started in cooperation with divisions Supervision and Resolution in which we try to implement the model using actual LCR figures of the largest European banks as well as the Dutch banks.

6. Bank run detection using machine learning

Richard Heuver and Ron Triepels (TiU)

We apply machine learning techniques to look for signals of bank runs in the main Euro large value payment system TARGET2. We investigate which source data and granular level deliver most accuracy by testing the results of the algorithms to available data on bank runs in the past. Bank run signalling can be of importance to Payments, Prudential Supervision, Banking Resolution, Financial Markets and Financial Stability.

7. Being in good hands: Deposit insurance and peers' financial sophistication

Mauro Mastrogiacomo, Francesco Caloia (University of Venice) and Giacomo Pasini (University of Venice)

We study the effect on savings of the Deposit Guarantee Scheme (DGS) reform in the Netherlands. We derive optimality conditions for savings allocation in a DGS environment and we empirically investigate how bank accounts allocations of the Dutch households changed as a response to the reform. Moreover, we highlight the indirect effect on consumption and stock market participation and the role of peers in influencing people's financial decisions.

8. Do shocks to financial intermediary capital move financial markets?

Mark Mink, Iman van Lelyveld and Rodney Ramcharan (USC, Price School of Public Policy)

One of the key objectives of financial regulation and supervision is to ensure that financial intermediaries are adequately capitalized. The recent financial crisis has amply illustrated the need for such regulation, as a sudden worsening of financial intermediaries´ capital positions can destabilize financial markets as well as the real economy. In this research, we exploit the Securities Holding Statistics (SHS), a large and granular database on the securities holdings of euro area financial intermediaries to examine how shocks to these intermediaries' capital positions spill over into financial markets. The outcomes of this research can contribute to financial stability and regulation policies, and to our understanding of the link between financial intermediary capitalization and asset price formation in financial markets.

9. Consumer reaction to booms and busts in the housing market

Maarten van Rooij (DNB), Dimitris Christelis (University of Naples), Dimitris Georgarakos (ECB), Tullio Jappelli (University of Naples) and Luigi Pistaferri (Stanford University)

Booms and busts on the housing market lead to vast changes in housing wealth and have strong impact on the business cycle via the effects for consumption. In this research, we use the Dutch Household Survey to investigate the consumer reaction depending on whether shocks are perceived as long-lasting and compare the results across different types of shocks with different degrees of liquidity.

10. Regulation, supranational bank supervision, and the corporate structure of foreign affiliates

Razvan Vlahu and Natalya Martynova (Deutsche Bundesbank)

In the context of cross-border banking, we study how differences

between home and host country regulatory arrangements, as well as the introduction of a supranational supervisor, affect the corporate structure of foreign affiliates. When going abroad, banks can operate as either a subsidiary or as a branch. Subsidiaries are separate legal entities regulated and supervised by host country's authorities, thus protected by limited liability. Branches are an integral part of the parent bank, enjoying no limits on the ability to transfer funds cross-border within the banking group. They are also subject to regulation and supervision on a consolidated basis in the home country. We show that when the host country's regulation allows for both structures, foreign banks may circumvent stricter regulation abroad and prefer to operate through a branch structure. We also show how the presence of a supranational supervisor, who limits the scope of "ring-fencing" arrangements in the host country, may affect the structure of foreign affiliate. By increasing subsidiaries' ability to easily move funds cross-border, while leaving the limited liability of the affiliate unaffected, a centralized supervision may increase the preference for a subsidiary structure

11. Bank relationships after foreign takeover
Razvan Vlahu, Steven Poelhekke and Vadym Volosovych (EUR)

This empirical study will investigate the impact of foreign acquisitions on funding of acquired non-financial companies. Put in different words, we will try to assess whether non-financial companies who rely on funding from banks, change (completely/partially) their borrowing counterparty upon being acquired by a foreign entity. Do such firms rely on (multinational) banks for their funding and other bank services, or do they adopt the bank relationships of their new foreign owners? Do they keep both relationships and split bank services along particular lines? These questions further help to shed light on the importance of a banking system with home country multinational banks, versus a banking system with smaller domestic banks with a national scope and a set of local offices of foreign multinational banks.

Sustainability

The sustainability of economic growth has become a major issue, not only for monetary policy-making but also for financial supervision. Fundamental changes in the environment could affect economic and financial stability and the safety and soundness of financial firms, with clear potential implications for monetary and supervisory policies alike. Changes in public policy to address environmental risks, as well as wider factors, such as technological innovation, may affect the economy and financial system. For instance, in view of the Paris Agreement, a major goal for governments is to reduce the emission of carbon dioxide which implies a transition towards more sustainable energy sources. This may affect the macro-economic environment for monetary policy. Likewise, it may affect the riskiness of portfolios of financial institutions (e.g. there may be a risk that carbon-intensive assets may become 'stranded' as part of a low carbon transition). These portfolios may also be affected by other possible environmental developments, such as climate change and the increasing adoption of sustainable investment practices. How can these risks be measured?

Sustainability also has a socio-economic aspect, reflecting the need for the fruits of sustainable economic growth to be shared among the population. For instance, the wealth and income distribution (between households but also between production factors) is often considered an important dimension of sustainability. Likewise, sustainability may require social security arrangements (such as pensions) to be self-financed so that the risks are not transmitted to future generations.

As to sustainability, DNB research will address issues like: how will the energy transition affect economic sectors? How will (sudden) changes in the energy transition affect exposures of financial institutions and financial stability? How are climate risks priced in at financial markets? How can the energy transition be implemented efficiently and effectively, given its international dimension and sometimes conflicting (short-term) interests of jurisdictions? What role do financial markets and new financial instruments have in financing the transition? How should the energy transition and the transition towards a circular economy be financed?
As pointed out above, sustainability is more than climate risk. From that perspective DNB research will also address issues like: What are the drivers of TFP-growth at the firm or sector level? What is the contribution of access to finance, zombification,

capital misallocation and inter-firm spillovers for TFP-growth at the aggregate level? How do monetary policy and macro-prudential policies affect wealth and income distribution? How does incompleteness of financial markets and the implied heterogeneity in terms of access to liquidity affect macro-economic demand? In view of several changes (like increasing share of temporary workers, reduced bargaining power of trade unions) another important issue is how will the future labour market look like. What is the relationship between income and wealth distribution and robust growth? How can the pension systems be designed (and reformed) in such a way that the risks are shared equally between generations (including future generations)?
■ Projects 2019

Theme 6 Sustainability

New projects

Continued projects

New projects

1. A granular carbon risk stress test for portfolios
Martijn Boermans and Rients Galema (Utrecht University)

In this paper we quantitatively analyse the "carbon risk" associated with investors' stock portfolio holdings using firm-level data. We contribute to the literature by better identifying the expected stock losses associated with different climate stress test scenarios. Prior work has not considered how individual firms interact. Previous climate risk stress tests have typically grouped all firms into industry types, thus not capturing firm heterogeneity in terms of carbon emissions or the firm linkages both within and between industries. We expect that our granular stress tests on stock holdings will yield lower expected losses from climate risks than those based on a more macro-economic approach. For policy purposes it is important to have different climate stress tests results to compare outcomes for the financial system.

2. Zombie firms and productivity growth in the Dutch economy
Maurice Bun and Jasper de Winter

Recent theoretical and empirical research indicates the causal link between highly indebted firms (so-called zombie-firms) and economy-wide productivity growth. The evidence for the Netherlands is limited, and largely neglects feedback loops from the business cycle on the growth of the number of zombie-firms. In this research, we investigate the links between highly indebted firms and the economy-wide productivity growth for the Netherlands using a novel database containing the population of Dutch firms and their balance sheet data.

3. Monitoring the Dutch business cycle using text-mining techniques
Dorinth van Dijk and Jasper de Winter

Traditionally, the business cycle has been modelled using macro-economic time series. Recently, research has indicated the potential use of using text as data. This research aims to explore the possibilities of using Dutch newspaper articles to monitor and forecast the stance of the Dutch business cycle using recently developed text-mining techniques from the machine-learning literature.

4. How value chains and domestic demand shape euro area trade patterns
Duncan van Limbergen and Robert Vermeulen

This paper investigates intra- and extra-euro area (EA) trade flows for the five largest EA countries in order to gauge the importance of intra- and extra-EA value chains. Current analyses on trade flows that identify the role of value chains are generally based on static input-output analyses. We aim to complement these studies by offering a time-series dimension on the importance of value chains in classic import and export demand regressions. In these regressions we explicitly focus on the role of the euro area. In order to fully take cross country heterogeneity into account we conduct the empirical analysis at the individual country level.

Continued projects

1. Carbon footprints and pension funds' portfolio investment trade-off
Martijn Boermans and Rients Galema (Utrecht University)

In this study we empirically test how Dutch pension funds allocate their stocks towards firms with high and low carbon footprints. We analyse the determinants and trade-offs pension funds face when deciding to investment in companies with lower carbon emissions. We build a new harmonized measure of carbon footprints using unique information from portfolio investments. The results have important ramifications for practitioners and supervisors who value the transition to a low carbon economy and aim to promote a more sustainable financial sector.

2. The employment effects of corporate income tax shocks: New evidence and some theory
Andrea Colciago, Vivien Lewis (Bundesbank) and Branka Matyska (Leuven University)

We aim to assess whether cuts to corporate income tax rates can be a useful tool to boost job and business creation. We will provide empirical evidence concerning the effects of corporate tax income shock on firm creation (and destruction) and employment. Then we will estimate reduce forms effects using panel-regressions estimated on US state data. We will then provide a DSGE model with search in the labour market and endogenous firms dynamics along the lines of Colciago and Rossi (2015), augmented with a fiscal side. The model will be aimed at addressing the main facts identified in the empirical analysis.

3. Competition and income and wealth distribution
Andrea Colciago and Rajssa Mechelli (Milano Bicocca)

The aim of this work is to understand how the extent and the form of competition between firms in the market for final goods affects households' income and wealth distribution. We plan to study how the dynamics of technology affects the degree of competition in the market for goods, and how this shapes the distribution of income and wealth. To the best of our knowledge there is no general equilibrium framework available in the literature which studies this issue. Our project aims at providing policy prescriptions, such as dynamic antitrust policies or ad hoc fiscal policies, that could counteract the rise inequality due to an increase in market concentration.

4. Market concentration and the labour share of income
Andrea Colciago and Rajssa Mechelli (Milano Bicocca)

We consider a framework characterized by complete markets and by firms endowed with heterogeneous level of technology. In this setting we will study the classical issue of the division of income between capital and labour. If technological changes advantage the most productive firms in each industry, product market concentration will rise as industries become increasingly dominated by superstar firms with high profits, large market shares and by a low share of labour in firm value-added and sales. This, in turn, negatively affects the share of income distributed to labour.

5. Impact of financial inclusion and financial literacy on financial stability

Anneke Kosse (Bank of Canada) and Nicole Jonker

The objective of this research project is to gain insight into the influence of financial inclusion and financial literacy on financial stability. We will start with conducting interviews with experts and an extensive survey of the literature. Based on the results we will identify, if necessary, topics for future empirical research. Understanding the impact of financial inclusion and financial literacy will help DNB in determining DNB's ambition and activities in the area of financial inclusion and financial education.

6. Asymmetric shocks in EMU: private or public risk sharing?

Patrick Kosterink, Dennis Bonam, Matthijs Zaal and Jakob de Haan

We examine the importance of asymmetric shocks in EMU by replicating and extending some recent work on this issue and discuss the implications for the need to have more private risk sharing (via financial markets) and/or public risk sharing by some form of European risk sharing scheme.

7. Financial literacy and pension expectations

Maarten van Rooij, Rob Alessie (University of Groningen) and Remko Struik

A side-effect of low interest rates is that many pension funds are underfunded, have not been able to index the pensions for a number of years and may have to cut pensions when shortfalls do not recover. We investigate whether employees have updated their expectations regarding retirement age and replacement rate (both in terms of levels and uncertainty), also in view of the major policy changes since 2013 (gradual increase in statutory retirement age and reduced accrual rates). Moreover, we analyse whether the updating of pension expectations is related to financial literacy or other personal characteristics.

8. Does monetary policy affect income inequality in the euro area?

Anna Samarina and Anh D.M. Nguyen (Bank of Lithuania)

This project focuses on distributional effects of monetary policy and examines how it influences income inequality in 10 EMU countries over the period 1999–2014, through wage and asset prices channels. The impact of expansionary monetary policy on income distribution may depend on the channels considered. On the one hand, it can reduce income inequality by boosting economic activity and wage growth. On the other hand, loose monetary policy raises asset prices, which benefits high-income households more, which could result in higher income inequality.

Payments and market infrastructures

Both innovation-driven developments and regulatory measures like PSD2 are transforming the payments ecosystem rapidly. Payment behaviour changes, e.g. there is a downward trend in the use of cash. New players enter the scene. The market structure can change. This will affect the way the central bank can pursue its goal of promoting the smooth functioning of the payment system as well as DNB's supervisory role. Fintech may also have an impact on monetary policy transmission. Moreover, financial market infrastructures may be affected by developments in potential new payment methods or financial instruments, such as crypto-currencies and the underlying technologies. It must remain possible for over-the-counter transactions to be settled in cash as long as consumers still want this.

In the light of the changing landscape, the following research questions on payments and market infrastructures are key:
Research on payment innovations, notably the block chain technology, is important, as well as research on the effects of new regulation. What drives the acceptance of traditional and new payment instruments? Is there a minimum level of cash usage below which commercial parties are not interested anymore in maintaining a good infrastructure for cash? How can we improve the banknote in terms of cost and usage? What is the impact of e-commerce on payment use? What is the influence of new regulation and "fintech" on retail payments? How much trust do people have in new and traditional payment instruments and payment service providers, and does it matter?

Market infrastructures such as TARGET2, TARGET2-Securities and central counterparties produce a lot of granular transaction data on a daily basis. How can we use that data to obtain information on a. the monetary policy implementation of the Eurosystem, b. risk indicators within an FMI and between FMIs, c. potential liquidity problems, and d. detect outliers? Many innovations in this field are technology-driven, notably the distributed ledger technology. It is key to investigate their disruptive consequences (not only in the financial sector) and to gain detailed hands-on experience of such new technologies in order to answer questions that relate to their suitability of a potential implementation by central banks and how they need to be supervised.

■ Projects 2019

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Theme 7 Payments and market infrastructures

New projects

Continued projects

New projects

1. Cryptos and illegal activities: casting light on the dark side of cryptos

Timothy Aerts, Janko Gorter and Jakob de Haan

A key policy concern at the G20 level is the misuse of cryptos to finance illicit activities. Against this background we apply graph technology to investigate transaction patterns within different crypto networks. Therewith we aim to determine the extent and nature of illegal activity in crypto markets and how this has changed over time. More knowledge on the functioning of crypto markets is needed, also to inform the public surveillance of crypto activities. The latter is becoming a reality, for example in Europe where crypto exchanges and wallet providers have been brought under the scope of anti-money laundering regulations.

2. CBDC: pros and cons

Wilko Bolt, Peter Wierts and Michiel Bijlsma

We provide a preliminary impact analysis of a Central Bank Digital Currency (CBDC), within a conceptual framework that stresses market failures and behavioural incentives in banking and payment systems. The point of departure is that dispersed retail depositors have little incentive for monitoring bank risk-taking, due to asymmetric information and free-riding. The representation hypothesis then calls for private or public representatives of depositors (Dewatripont and Tirole, 1994). The current solution is risk shifting to a Deposit Guarantee Scheme (DGS) and indirect representation through financial supervision, to counter moral hazard. A CBDC option would allow for direct public depositor representation, by pooling deposits on the balance sheet of the central bank and thereby directly providing safe deposits outside DGS. We investigate both pros and cons of such an alternative institutional set from the perspective of payment systems, monetary policy and financial supervision.

3. Contactless payments, the pain of paying, and financial troubles

Carin van der Cruijsen

An increasing number of people are using their debit card or phone to pay contactless at the point-of-sale. This is a quick and user-friendly way of paying. However, given the speed of paying a contactless payment may feel less like a real payment than a cash or standard debit card payment; the pain of paying may be lower. We use consumer survey data to examine the link between payment instrument choice, the pain of paying and financial problems. Thereby, we examine the role of age and other personal characteristics.

4. Financial literacy, trust in banks and adoption of new payment technologies

Carin van der Cruijsen and Nathanael Vellekoop (Goethe University Frankfurt and SAFE)

There is a large literature describing the adoption of new technologies, as well as on the take-up of new products in consumer markets. So far, a systematic study of adoption of new payment technologies by banking clients has been lacking. The past decades have seen many developments in payment technologies. For example, in the Netherlands the use of the debit card to pay in stores has become widespread, and nowadays half of these debit card payments are contactless. Households can do their banking online, and since the late 2010s also with a smartphone. We use twenty-five waves of the DNB Household Survey to document the take-up of new payment technologies over time, at both the extensive and the intensive margin. Second, we describe the speed with which new payment technologies replace older technologies. Finally, we use measures of financial literacy and questions on trust in banks to explain the adoption of new payment technologies.

5. Does banknote authentication need time and touch?
Frank van der Horst and Jelle Miedema

Most of the times, people just accept a banknote in a cash transaction and the authentication process is done implicitly, fast, automatically and non-conscious. The question can be raised if people are equipped for this authentication task during a cash transaction, which is normally performed very rapidly. For central banks around the world it is important to know if it is possible at all to be able to make a judgement on counterfeits in such a short time. As far as known, there are no studies published on how fast a banknote is recognized and whether testing new security features via a computer screen is a good method. This field study measures the authenticating sensitivity of people in the following conditions: presentation of counterfeits and genuines on a computer screen in 0.5, 1 and 10 seconds. This way, we will know if people, without training, are able to recognize in a split second, or if they need longer time. Next, we have two conditions in which we give the banknote short and longer in hand. This way we can see the added value of touch.

6. Pricing the payments infrastructure
Nicole Jonker and Wilko Bolt

The increasing fragmentation of the payment chain due to the entrance of fintechs raises the question of which costs are actually involved and who must foot the bill (paying for payments). The payment infrastructure, which is essential to the payment system, is presently available at a relatively low price. Under PSD2, nonbank parties like account information service providers and payment initiation service providers could be able to gain free access to this infrastructure, enabling them to offer innovative services. We want to study the access and pricing of the payment system more closely, including the question of how the providers of the underlying infrastructure remain willing to keep investing in its robustness.

7. Strengthening cyber resilience – quality factors of red teaming frameworks
Raymond Kleijmeer, Ramon van Ingen and Arne de Boer

Several cyber trends can be recognized that threaten both an institutions' resilience and the collective resilience in the financial industry. We observe both increasing complexity and interdependencies in the financial system, and an increase in the level and sophistication of cyber-attacks by different categories of evolving threat actors such as nation states, criminal organizations, and hacktivists, with a range of motivations to improve for example their information position, financial gain and/or disruption. There is a need to build a stronger base of fundamentals, improve the resilience posture and test the resilience in practice with sophisticated resilience testing. Red teaming is one of the instruments available for testing financial institutions' operational cyber resilience. Several frameworks have been introduced at the international level, such as CBEST-UK, GFMA, TIBER-EU and TIBER-NL. The objective of this research is to contribute to improving the operational cyber resilience of the Financial Industry by explaining the framework for threat intelligence based ethical red teaming (TIBER) and by identifying critical success factors to execute TIBER tests based on our experiences gained with TIBER in the Netherlands.

Continued projects

1. E-commerce: Use, growth and pricing
Wilko Bolt and Bas Butler

E-commerce is rapidly growing. Buying online represents a technology that will fundamentally change the way industries operate. Although E-commerce sales remain a smaller percentage of overall sales than "brick-and-mortar", yet the percentage continues to increase at a (much) faster rate than overall sales. Who are the online users, how do they pay and what preferences do they have? What does it mean for market structure, competition and its effect on product pricing? How do network effects come into play? Using recent Dutch survey results ('two waves') on E-commerce this paper tries to empirically assess above questions by applying multivariate logit/probit regression models, identifying demand and preference characteristics and its potential effect on payment use, production cost, price levels and inflation ("the Amazon effect").

2. Virtual currencies: Dynamics and monetary aspects
Wilko Bolt and Maarten van Oordt (Bank of Canada)

Bitcoin was launched in 2009 and has recently attracted much attention from economists, financial media, and even governments. Its increased attention was fuelled by the sudden "explosion" and volatility in the exchange rate of Bitcoin by the end of 2013. Can economic theory help explaining these extreme price movements and its dynamics, and does virtual currency pose a threat or an opportunity for monetary policy? Building on Bolt and van Oordt (2018), this research project tries to further assess the dynamics and monetary aspects of virtual currency.

3. PSD2, instant payments and integrity supervision: Consumers' trust in a changing retail payment ecosystem
Carin van der Cruijsen, Jakob de Haan and Nicole Jonker

For central banks it is key to understand the consequences of a changing payment ecosystem. Due to PSD2 new payment service providers may enter the retail payments market, offering new kinds of payment services. The introduction of instant payments and the growing supply of mobile payment services may also alter consumers' payment behaviour and influence the functioning of the retail payment market. The purpose of this research is to cast light on consumers' trust in traditional and innovative payment instruments/services and in traditional and new types of payment service providers. We research the drivers of trust, including the role of integrity supervision, and to what extent trust matters for payment instrument usage and the intention to share data with payment service providers.

4. International comparison of liquidity efficiency of LVPS
Ronald Heijmans, Bank of Canada, Danmarks Nationalbank, ECB, Banque de France, Bundesbank, Reserve Bank of India, Central Bank of the Russian Federation, Bank of England, FED Board, Fed New York, University of California, BIS

Using interbank transaction data from large value payment systems world-wide, this study aims to assess the use of liquidity in these payment systems and to study the effect of payment system characteristics (e.g. availability of liquidity saving mechanism and number of participants in the system), as well as macro factors (country GDP, banking concentration) on liquidity efficiency.