

DNB Research programme 2016

1. Monetary strategy, business cycles and price stability

Monetary policy: changes and challenges

Alan Blinder (Princeton University), Jakob de Haan, Michael Ehrmann (Central Bank of Canada), David-Jan Jansen

The financial crisis has had profound impacts on the practice of central banking. Within a matter of years, central banking has been transformed, in many respects. Due to the speed and force of developments in financial markets and the economy more broadly, central banks have often not had the luxury of being able to perform extensive *ex ante* analyses of their expanding tool-kit, broadening mandates, and evolving communications. Necessity has, over the years, often been the mother of invention. At the present juncture, the key question is to what extent these changes have been temporary, and primarily motivated by the financial crisis, or whether we are seeing permanent changes in the practice of central banking. We identify four important directions in which the practice of central banking since 2008 has diverged from the pre-crisis status quo. We discuss these various directions, put them in perspective, and evaluate the extent to which the divergence from pre-crisis practices may be permanent.

Regime-switching fiscal and monetary policy under monetary union

Dennis Bonam, Bart Hobijn (Arizona State University)

Earlier studies on the equilibrium properties of standard dynamic macroeconomic models have shown that an inflation-targeting central bank imposes strict budgetary requirements for fiscal policy needed to obtain a unique and stable equilibrium. When at least one fiscal authority within a monetary union fails to meet these requirements, non-existence of equilibrium is possible. We show that such outcomes can be averted if fiscal authorities can make a credible commitment to switch to more sustainable fiscal regimes in the future. Alternative measures, such as fiscal bailout, sovereign default and debt monetization by the central bank, are discussed as well.

Inflation expectations across the euro area

Dennis Bonam, Eric Bartelsman (Vrije Universiteit, Tinbergen Institute)

When inflation expectations in a monetary union are different across member states, real interest rate differentials might arise which could fuel macroeconomic imbalances. Our aim is to examine the degree of dispersion of inflation expectations across euro area countries and the factors that drive dispersion. We also examine whether this dispersion (if any) is similar across the US.

Fiscal multipliers at the extensive margin (started in 2015)

Andrea Colciago, Vivien Lewis (University of Leuven), Lorenza Rossi (University of Pavia)

We provide VAR evidence concerning the joint effect of a Government Spending and a Dividend income tax shock on unemployment and firms' creation (the extensive margin of investment) in the U.S. We provide a DSGE model consistent with the facts we uncover.

Who creates jobs over the business cycle? (started in 2014)

Andrea Colciago, Antonella Trigari (Bocconi University)

Using U.S. and Dutch data, we study the contribution of different categories of firms to net job creation and job reallocation over the cycle. We then study the contribution of different classes of employers – say small, medium and large employers – to job reallocation, net job creation, job creation and job destruction. We study how much of cyclical job creation is due to expanding employers as opposed to newly-created employers and how much of job destruction is due to contracting employers versus exits. We also consider the role of firms' age and possibly other dimensions. We build a model with search in the labour market consistent with the facts we uncover.

Unintended consequences of unconventional monetary policy
Jakob de Haan, Yimin Xu (intern University of Groningen)

This project will examine whether the unconventional monetary policies of the ECB has led to unintended consequences, such as increased risk taking, higher volatility and delinking of financial and real sector developments.

Measuring asymmetry in the macroeconomic effects of changes in regulatory loan-to-value limits
Jasper de Jong, Emmanuel de Veirman

We propose a methodology for estimating how the introduction of a maximum for loan-to-value ratios on mortgage loans, or changes in that maximum, affect the macro economy. By means of cross-sectional data on household loan-to-value ratios, we translate a desired path for the loan-to-value limit into a succession of shocks to the average loan-to-value ratio. We then track the dynamic response of house prices and consumption to these shocks. In general, the effect of changes in the loan-to-value limit is non-linear since the fraction of households for which the limit binds increases as the limit falls. We illustrate our approach for the Netherlands, where a loan-to-value limit has been in place since 2012.

Lending shocks and macroeconomic stability (started in 2015)
Emmanuel de Veirman

In a theoretical model calibrated to the US economy, I investigate the macroeconomic effects of changes in downpayment requirements on mortgage loans. A tightening in downpayment requirements weakens the collateral effect, and thereby dampens the macroeconomic effects of monetary policy and housing demand shocks. The lending shock itself is amplified to a lesser extent when downpayment requirements are tight, implying that a change in downpayment requirements induces less short-run volatility when downpayment requirements are tight at the outset.

Formation of inflation expectations – new insights from heterogeneity in a high-frequency survey
(started in 2014)
Gabriele Galati, Richhild Moessner (BIS)

We analyse the mechanism through which inflation expectations are formed by evaluating results from a survey conducted from July 2010 through December 2014. Participants in this survey answered a weekly questionnaire about their expectations of euro area HICP inflation at one-, two- and ten-year horizons. Participants received common information sets with data relevant to euro area inflation. We examine alternative expectation formation rules and test for the role of the ECB's definition of price stability as a focal point. We also exploit information on questions on the entire of distribution of inflation expectations to examine whether individual uncertainty differs from cross-sectional dispersion and time series variability of expectations.

Measuring deflation risk in the euro area
Gabriele Galati, Richhild Moessner (BIS), Zion Gorgi, Chen Zhou.

We investigate how deflation risk in the euro area has evolved over time, and what this risk implies for the credibility of the ECB. The paper investigates how market participants and professional forecasters assess the risk of deflation in the euro area, using data on options of forward inflation swaps and surveys of professional forecasters. Our econometric analysis suggests that the anchoring properties of inflation expectations have weakened, albeit in a still subtle way.

Wage dynamics after the crisis (started in 2015)
Marco Hoeberichts

Using the results from the third wave of the Wage Dynamics Questionnaire, we will address a selection of issues regarding wage dynamics, possibly relating frictions in the labour market to financial frictions.

Communicating dissent on monetary policy
David-Jan Jansen, Richhild Moessner (BIS)

We study whether differences in views of monetary policymakers affect central bank communications. We use various readability statistics to analyse the minutes of the monetary policy committees of four central banks. We discuss implications for central bank accountability and transparency.

Household inflation expectations in a context of low inflation (started in 2015)
David-Jan Jansen, Matthias Neuenkirch (University of Trier), Edith Neuenkirch (University of Marburg)

We use the DNB Household Survey to further understand household inflation expectations. In particular, we will address the role of inflation perceptions and media usage in a context of low inflation.

FDI and international business cycle synchronization: a structural analysis (started in 2012)
Jos Jansen, Ad Stokman

Building on our earlier work, our paper aims to increase our understanding how deeper FDI relations may enhance business cycle co-movement, directly and indirectly. To this end, we plan to carry out an empirical analysis along the lines of Imbs (2004), exploring the structural relationships between FDI, international trade, financial integration, specialization and the similarity of economic structures and policies. The results of this project may serve as stepping-stones to the ultimate goal of including FDI into current macroeconomic structural models as a separate channel of international transmission (next to international trade and financial linkages).

Anticipation and materialization of credit default risk (started in 2015; previously: *Loan default risk in the banking sector and macroeconomic stability*)
Sebastiaan Pool

This paper examines the strength of financial frictions amplifying and prolonging business cycle fluctuations. I build upon the mainstream macroeconomic paradigm by estimating a canonical DSGE model for the Euro Area including a banking sector and financial frictions to analyse real-financial interaction. The model is a hybrid model of the financial accelerator model of Bernanke et al. (1999) and the banking DSGE model of Gerali et al. (2010). The (preliminary) results suggest that financial frictions cause strong amplification and prolonging of business cycle fluctuations. Not accounting for these frictions in canonical DSGE models results in a severe underestimation of business cycle fluctuations.

How does the public respond to helicopter money?
Maarten van Rooij, Jakob de Haan

Monetary policy has entered unconventional territory. However, the effectiveness of unconventional monetary policies like quantitative easing is disputed. In this paper, we conduct a consumer survey in the CentERpanel to investigate the effectiveness of giving money to consumers ('helicopter money') as to raise consumption and inflation expectations.

2. Financial stability and macro-prudential supervision

Newton meets Van Leeuwenhoek: Identifying international investors' common currency preferences
Martijn Boermans, Robert Vermeulen

In this research project we aim to isolate investor preferences for euro-denominated debt securities from investor preferences for debt securities issued by euro area residents. In our empirical strategy we estimate a gravity model using a novel security-by-security dataset. In this dataset we observe the holders of a particular security at an aggregate level, the currency denomination of the security and

other security specific characteristics. Results from this study will provide insights on the investor base for debt issued in euros and other currencies by euro area residents.

Investor heterogeneity and international portfolio holdings: Estimating a gravity model with security-by-security data

Martijn Boermans, Robert Vermeulen

The objective of this research project is to empirically investigate the domestic and international portfolio holdings and changes in these holdings for a heterogeneous group of investor classes from seventeen euro area countries using a gravity model. In particular, the analysis focuses on changes in home bias since the outbreak of the sovereign debt crisis late 2009 up to the peak of the sovereign debt crisis mid-2012 and the two years following ECB chairman Draghi's famous 'Whatever it takes' speech for different investor types. We analyse security-by-security holdings at the holding sector level to allow for heterogeneity among investor types in home bias and other determinants.

The liquidity of financial instruments (started in 2015)

Clemens Bonner, Iman van Lelyveld

Liquidity has come to fore, receiving attention from both academics and regulators alike. The latter have implemented both a Liquidity Coverage Ratio (LCR) and a Net Stable Funding Ratio (NSFR) to reduce liquidity risks. The key underlying notion is that to cover (potential) outflows, a firm should have sufficient liquid assets. The aim of this paper is to investigate how banks' funding profiles have evolved in recent years in response to an almost complete collapse of unsecured funding markets and the transition to the new regulatory framework. One primary data source of this paper are the MiFID transaction reports obtained from the Netherlands Authority for the Financial Markets (AFM). As such, the MiFID database is the most comprehensive dataset on market transactions in the EU. Along with many other data fields, each transaction in the dataset includes the international securities identification number (ISIN) of the traded security, the two trading counterparts, volume, time to maturity, the exact time as well as whether the reporting institution acted as a buyer or a seller. The MiFID data will be augmented with other data available at DNB, e.g. covering the unsecured interbank market.

Effective macroprudential policy: Cross-sector substitution from price and quantity measures

Janko Cizel, Jon Frost, Aerd Houben, Peter Wierts

Macroprudential policy is increasingly being implemented worldwide. Key questions are its effectiveness in influencing bank credit and substitution effects beyond banking. Our results confirm the expected effects of macroprudential policies on bank credit, both for advanced economies and emerging market economies. But results also confirm substitution effects towards non-bank credit, especially in advanced economies, reducing the policies' effect on total credit. Quantity restrictions are particularly potent in constraining bank credit but also cause the strongest substitution effects. Policy implications indicate a need to extend macroprudential policy beyond banking, especially in advanced economies.

Measuring systemic risk in OTC-derivatives markets (started in 2015)

Anouk Levels

The OTC-derivatives reforms aim to reduce systemic risk by increasing transparency and mandating central clearing for some types of derivatives. However, while central clearing of derivatives reduces counterparty credit risk amongst market participants, new risk will emerge. These include liquidity risk as a result of increased collateral demand and concentration of risk exposures with the central clearing houses (CCPs) and general clearing members. The aim of the research project is to develop a formal framework that can be used to analyse risks in the derivatives market for Dutch financial institutions. A first goal is to obtain the network for Dutch financial institutions and to analyse how shocks in the underlying of derivatives spread through the system. The basis framework can later be extended to study questions such as: (i) Do alternative CCP requirements (policy measures) alter

contagion in the network? (ii) Do pension funds need access to central bank liquidity in the light of central clearing? (iii) Do alternative network structures alter contagion in the network?

Bank relationships after foreign takeover

Steven Poelhekke, Razvan Vlahu, 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? The latter may have become more likely now that firms have reduced their international scope by closing or selling foreign offices (notably ABN AMRO). 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.

Shadow banking and macroeconomic stability (started in 2015; previously: *Inherent instability in the financial sector*)

Sebastiaan Pool

In this paper I build a model placing the financial sector at the heart of the economic framework, i.e. the model is built around the concept of credit. The critical component of the model is the endogenous build-up of systematic risk as proclaimed by Minsky (1986). While the increase in leverage dwindles down margins in the financial sector, credit for mortgages rather than productive capital increases the dependence of the financial sector on a low inflation rate, low policy rates, and steady growth rate. In the model I will show that an episode of tranquility results in an unstable financial sector, which collapses when the realized state deviates (slightly) from past expectations.

Identifying the determinants of competitiveness: A value added trade share perspective (started in 2013)

Robert Vermeulen, Martin Schmitz (ECB)

This project investigates the country level determinants of the gains from trade. Countries have different positions in the global value chain. What ultimately determines the gains from trade is the value added a country adds to a product and not necessarily its export growth per se. Because the value added content of exports is not a reported number we calculate it from the OECD-WTO Trade in Value Added database to estimate the value added a country gains by trading for around 40 countries during 1995-2009. We empirically explain the change in the value added trade share by different (socio-) economic variables. These variables are based on previous literature explaining export growth. The outcomes can identify the important variables explaining value added trade growth. These can potentially provide policy makers with variables to target when aiming to improve the country's position in the value added chain. We also investigate the effect of FDI on value added trade growth. Do firms offshore the low or high value added part of the production chain? We explicitly document the policy implications that the results imply for the Netherlands.

3. Micro-prudential supervision and conduct of financial institutions

Crowded trades, shared portfolios and price instability

Assaf Almog (Lorentz Leiden), Diego Garlaschelli (Lorentz Leiden), Iman van Lelyveld (TB-BKB, VU)

Crowded trades by identically trading peers might influence asset prices dynamics in the aggregate, possibly fostering systemic risks. However, due to limited data such effects have not yet been investigated. We will examine the effects of market clustering – segregating stock markets in secluded submarkets – on price stability applying complex network methods to compute a measure

of market clustering. We will develop a method to empirically investigate market microstructure patterns using large-scale granular trading data (80 million individual transactions collected under MiFID), which can be applied to a wide range of trading patterns. We will then investigate the relation between market clustering and price stability.

X-efficiency of Dutch pension providers

Gosse Alserda (EUR), Jaap Bikker, Fieke van der Lecq (EUR)

Similar to unused scale economies, and on top of that, X-inefficiency is an avoidable loss and detrimental to future pension benefits. This study explores the extent of X-inefficiency and explains which pension fund characteristics aggravate inefficiency. This leads to recommendations on how to improve the efficiency of the pension sector. X-efficiency will be measured using Data Envelopment Analysis and the Stochastic Cost Function Approach, and will be based on quarterly data from supervisory reports to DNB.

Dynamic adjustment of stock prices to the fundamental value: An error correction approach (started in 2014)

Jaap Bikker, Laura Spierdijk (University of Groningen)

In the public discussion on the future of the Dutch pension system, people suggest that the current funding shortages will disappear as stock prices are expected to recover. Pension funds' investment policies in the Netherlands (including rebalancing strategies) are explicitly based on (long-run) mean reversion of stock prices. The existence or absence of mean reversion has great implications for the FTK continuity test and, the required buffers of pension funds. Theoretically, one may expect a strong link between the financial stock price and real-economic developments. Employing such kind of a long-run relationship is expected to result in a more informative mean reversion model. We will collect data series for several countries over very long periods. Furthermore, we will use bootstrap and simulation methods to determine reliable standard errors in models that employ overlapping samples. Finally, we will investigate the consequences of our results for the FTK continuity test.

Bank profitability in a low interest rates environment

Jaap Bikker, Laura Spierdijk (University of Groningen), Tobias Vervliet (intern, University of Groningen)

This paper investigates profitability of banks, its relationship with the interest rate levels, and possible risky behaviour of banks when interest rates and profits are low, against the actual background of falling interest rates. The basic model is a dynamic panel model for bank profitability, applied to a worldwide sample of banks, as well as a sample of more detailed and reliable data from the US. We apply this approach to three different bank business models.

Competition in the non-life insurance industry: a cross-country comparison (started in 2014)

Jaap Bikker, Thomas Maas (University of Utrecht)

Competition in the non-life insurance markets is beneficial as long as the markets remain in equilibrium and the solvency of insurers is not impaired. Where many papers address insurer (in)efficiency, this paper contributes to the limited non-life insurance competition literature. Both the SCP paradigm and ES hypothesis use market concentration as a proxy for competition. This paper assesses competitive conduct in many countries by applying the Panzar-Rosse (P-R) model, adjusted for insurance markets. This approach is rare in the insurer industry and the P-R model is in most cases wrongly specified. Where existing papers on non-life insurance competition investigate a single country, we apply the ISIS data set of insurers' balance sheets across 36 countries. The sample covers around 35 thousand insurance-year observations on 3,500 individual insurers during the 1992-2012 period, allowing for a large cross country comparison.

Early warning and forecasting performance of HAMs in housing markets (started in 2015)

Wilko Bolt, Maria Demertzis, (DNB/European Commission), Cees Diks (CeNDEF, UvA Amsterdam), Cars Hommes (CeNDEF, UvA Amsterdam), Marco van der Leij (CeNDEF, UvA Amsterdam)

Based on DNB WP 2014 2014-450, we apply a nonlinear endogenous switching model of heterogeneous expectations to housing price data, where agents switch between a mean-reverting fundamental view and a trend-extrapolating forecasting rule, based upon their relative profitability. We would like to evaluate this so-called HAM (i.e. heterogeneous agent model) in terms of forecasting performance (HAMs versus linear models) and, based on these results and robustness, assess how the model can be used for early warning purposes. In addition, we would like to extend the model accounting for a number of other variables, including interest rate costs (mortgage costs) as well institutional aspects that dominate the differences between countries.

Regular equivalence in interbank markets (started in 2012)

Wilko Bolt, Rod Garratt (University of California Santa Barbara), Iman van Lelyveld

Identifying classes of institutions that respond in a similar way to shocks or policy changes is of key interest. Two institutions that perform a very similar function in a financial system, and hence should be regarded as similar by a regulator, may not be connected at all. In fact, it is precisely this functional similarity that might preclude their interaction with each other. In a strong notion of equivalence, nodes in a network need to be connected to the same neighbouring nodes. We consider a less restrictive notion of equivalence called regular equivalence. Regularly equivalent nodes do not necessarily have the same neighbours, but their neighbours must be regularly equivalent. So, institutions are grouped together if they interact with other institutions that perform the same function. They do not have to interact with the same institutions. We intend to apply the notion of regular equivalence to the unsecured interbank money market using TARGET data. Our first task will be to compare the partitioning of banks generated by regular equivalence to that obtained a connectionist approach. We will then examine whether our structural classification can be used to predict responses to shocks or policy changes. The classification could be useful for justifying differential regulation of subsets of banks.

Liquidity regulation and monetary policy operations in normal times

Clemens Bonner, Iman van Lelyveld

In response to the 2007-08 financial crisis, the Basel Committee on Banking Supervision (BCBS) has updated the regulatory framework. Besides new rules for capital, the framework also introduces a short-term and a long-term liquidity requirement (LCR, NSFR). Pointing to the reduced risk of fire sales and bank runs, several studies have provided a rationale for such liquidity regulation. Some have pointed to potential harmful side effects related to the specific design of the LCR or liquidity regulation in general. Especially the impact on the functioning of interbank money markets and monetary policy implementation has been subject to discussions. This paper empirically analyses the impact of liquidity regulation on interbank money markets and monetary policy implementation. This analysis is based on unique data on the Dutch quantitative liquidity requirement 8028 in combination with data on banks' lending and borrowing behaviour in the Dutch unsecured interbank money market and banks' lending to non-financial institutions.

Behaviour of the Secured Euro Interbank Repo Market

Svetlana Borovkova (VU/DNB), Tim Wolterink (VU), Ronald Heijmans

We investigate the behaviour of the EUR General Collateral Pooling (GCP) repo market and its participants. We analyse what happens to GC Pooling in times of financial duress, in terms of volume, and compare it to other repo markets. We build the network of repo transaction and analyse the network characteristics and structure turn out to be random. We find that banks with a higher centrality (big banks) pay higher than average interest rates when borrowing and therefore do not get an additional incentive to become larger. This is in contrast to the unsecured Eonia money market and the Italian e-MID, where bigger banks enjoy more favourable funding conditions than smaller banks.

Time evolution and properties of the Dutch multi-layer LVPS payment network

Svetlana Borovkova (VU/DNB), Monika Furdyna (VU), Richard Heuver

We perform a dynamic network analysis of the multi-layer Dutch LVPS payment network using the dataset of TARGET2-NL transactions. We distinguish 14 layers of payments each representing its own network. Network properties of Interbank, Customer, Urgent Customer, Liquidity, Ancillary System: ESES layers and sum of all 14 layers are examined over time. The network properties differ between the layers and over time, but we are still able to distil some typical properties of a LVPS payment network based on two biggest layers: Interbank and Customer Payments and the sum of all layers. We investigate such networks properties as assortativity (which turns out to be negative, meaning that big banks have tendency to transact with small banks and vice versa), clustering coefficient, reciprocity, density (which is very low for payment networks), page rank and others. We find that a typical payment network has a core-periphery-like structure. We also find that the size and importance of the core in the Interbank, Customer and all layers decreases over time.

Network models of derivatives markets and the consequences of central clearing

Svetlana Borovkova (VU/DNB), Robert Jan van Leijden, Anouk Levels

We will continue with the network-based investigation of the stylized derivatives market and examine the consequences of the central clearing on liquidity, contagion, asset fire sales, as well as on different types of financial institutions, focusing in particular on pension funds, insurance companies and other non-core financial institutions. Furthermore, we will separately examine the liquidity situation and risk measures associated with clearing houses, such as the structure of the default waterfall and models for initial margins.

Strategic defaults: An empirical identification (started in 2015)

Margherita Bottero (BoI), Steven Poelhekke, Razvan Vlahu

This empirical study shed light on the borrowers incentives for strategic default. Using detailed information on borrowers outstanding debt and historical repayment behaviour, we find that uncertainty about lenders fundamentals is an important driver for borrowers' repayment incentives. We focus on our study on solvent borrowers which maintain multiple-bank relationships. (A borrower is considered as being solvent if it has multiple-bank relationships and it repays all the loans but one.)

Pension funds and variations in the illiquidity premium

Dirk Broeders, Kristy Jansen (Netspar, TiU), Theo Nijman (Netspar, TiU), Bas Werker (Netspar, TiU)

Pension funds are long horizon investors and are among the most qualified investors to profit from variations in liquidity premiums over time. The main contribution of this paper is to analyse if pension funds are able to benefit from the illiquidity premium in down markets. We use different liquidity measures and proxies for market liquidity (*e.g.*, a measure of down markets). We also look at potential constraints that can restrict pension funds' investment behaviour. The potential outcome of this paper is to better understand a pension funds' trading strategy towards alternative and illiquid investments during a period of financial market stress.

A return analysis of pension fund investment portfolios

Dirk Broeders, Arco van Oord, David Rijsbergen

The investment performance of pension funds influences general welfare, as they are responsible for maintaining the standard-of-living of beneficiaries after retirement. Poor investment returns can significantly impact the wealth and consumption of beneficiaries. From the academic literature, several points of interest regarding pension fund performance stand out. For one, there appears to be a strong focus on equity investments. This can largely be attributed to the absence of sufficient data on investment performance for other asset classes. A second point of interest is that the academic

literature tends to focus on the performance of U.S. pension funds. Again, this appears related to the availability of data. As a result, remarkably little is known about the investment performance of European pension funds. The main contribution of this paper is to employ an exclusive pension fund database to provide a comprehensive overview of the investment performance of Dutch pension funds for 2012 and 2013. Using a unique dataset, we provide a comprehensive and detailed examination of the investment performance of Dutch pension funds. Our dataset is free from self-reporting biases, and contains detailed information on pension fund-specific returns and benchmarks for a distinct set of asset classes. The database covers unique data for approximately 200 pension funds and is highly detailed. For one, the database provides the returns per pension fund for 6 different asset classes (i.e. equity, fixed income, real estate, commodities, private equity and hedge funds).

The role of foreign banks in trade (started in 2015)

Stijn Claessens (IMF), Omar Hassib (Maastricht University), Neeltje van Horen

Financially developed countries tend to export relatively more in financially vulnerable sectors, suggesting access to finance to be important for promoting trade. Combining detailed data on bilateral, sectoral trade with bilateral data on foreign bank presence for 95 exporting countries, we show that exports are even higher with greater foreign bank presence. Results are robust to including various control variables and controlling for possible reverse causality. Studying the role of foreign banks by exporters' level of financial development and contracting and information environments suggests that foreign banks, especially those from the importing country, besides providing additional external financing, help overcome information problems.

Spoilt for choice? Firm-bank matching in local credit markets (started in 2015)

Ralph de Haas (EBRD), Neeltje van Horen

For a large group of countries, we combine data on firm-bank relationships with data on the local banking landscape. From each firm we know its geographical location as well as the bank branches present in the same locality. We also know the bank the firm borrows from. This allows us to analyse how firms choose a bank from a set of potential creditors. First, we analyse whether firms tend to borrow from banks in their own locality. Second, we analyse how the composition and competition in the local credit market determines whether a firm borrows or self-selects out of the credit market. Finally, conditional on borrowing, we examine which type of firms match with which type of banks. The paper provides insights in whether more diverse banking systems are more inclusive or not.

SME access to finance during a financial crisis: Are bank credit and trade credit substitutes or complements?

Jasper de Winter, Neeltje van Horen

Using a unique dataset on corporate income taxes for all SMEs active in the Netherlands over the period 2000-2013 we analyse to what extent trade credit can play a role in compensating for unavailable bank credit. We use the global financial crisis as an exogenous shock and differentiate between firms with high and low vulnerability to the disruption in bank credit caused by the crisis. Our identification relies on the idea that firms with more vulnerable financial positions, as captured by their higher dependency on short-term bank credit, are more likely to be negatively affected by the crisis. As such, if trade credit acts as a substitute form of finance, these firms should be more likely to reduce their supply of credit to customers and increase their use of credit from suppliers. In addition, we examine to what extent market power of the firm (as measured by its market share in the industry) enables the firm to use trade credit as a substitute form of finance. The paper provides insights into whether financial stronger firms support financially weaker once during a crisis.

Internal asset transfers and risk taking in financial conglomerates (started in 2015)

Natalya Martynova

This paper studies the effect of securitization in financial conglomerates on their risk choice, and compares it with the choice of standalone banks. Loan sales in conglomerates avoid information

asymmetry, which enables conglomerate banks to shift worse loan risk to the deposit insurance by selling their best loans to the affiliates. However, such a value transfer induces a better asset monitoring by conglomerates enhancing their asset value. Under low capital requirements, conglomerate banks may be safer than standalone banks due to higher monitoring incentives. The model speaks to Vicker's proposal of the UK structural reform showing that higher bank capital requirements alone may not offset conglomerate banks' risk shifting incentives.

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

Natalya Martynova, Razvan Vlahu

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.

The determinants of the lifecycle investment profile of interest rate risk

Roel Mehlkopf, Servaas van Bilsen (UvA), Ilja Boelaars (University of Chicago), Lans Bovenberg (TiU, Netspar)

In this project we explore the determinants of the optimal lifecycle investment strategy for interest rate risk in the context of Defined Contribution pension plans. We explore the sensitivity of optimal investment strategies with respect to model and parameter assumptions. The sensitivity analysis allows us to explore to what extent differences in investment beliefs are able to explain the differences in observed lifecycle strategies across pension providers.

What drives the markets' view on bank capitalization? (started in 2015)

Mark Mink (DNB), Jakob de Haan (DNB), Eric van Loon (Ministry of Finance)

Inadequate banking system capitalisation is widely considered to be one of the main causes behind the 2007 global financial crisis. While regulatory reforms importantly focused on raising bank capital requirements, the crisis also illustrated regulatory capital ratios' poor performance in measuring bank solvency to begin with. For instance, on September 15th 2008, at a time when its regulatory capital ratio was higher than ever before, Lehman Brothers' financiers lost confidence in the bank's solvency, and through a run on the bank forced it to file for Chapter 11 bankruptcy protection. Inspired by this sudden loss of confidence in the accuracy of regulatory capital ratios, this paper develops a measure of bank capitalisation as perceived by financial market participants. We use this measure to analyse how various bank characteristics and market developments cause the markets' view on bank capitalisation to change over time.

The invisible hand of the government. Moral suasion during the European sovereign debt crisis (started in 2015; previously: To increase or not to increase? The determinants of banks' sovereign debt holdings)

Steven Ongena (University of Zurich), Alexander Popov (ECB), Neeltje van Horen

Using a proprietary data set of banks' monthly securities holdings, we show that during the European sovereign debt crisis of 2010–2012, domestic banks in fiscally stressed countries were considerably more likely than foreign banks to increase their holdings of domestic sovereign bonds in months when the government needed to roll over a large amount of outstanding public debt. The effect is

largest for state-owned or supported banks with low initial holdings of domestic sovereign bonds. We eliminate alternative explanations related to regulatory distortions, risk shifting, carry-trade-like behavior, and shocks to liquidity and to investment opportunities.

Entropy-based implied volatilities and its information content

Xiao Xiao (EUR), Chen Zhou

We investigate the maximum entropy method for estimating the implied volatility, which contributes to understanding the perception of uncertainty in the financial market. Compared to existing methods the maximum entropy method has the main advantage that it is free of model uncertainty. We expect that the maximum entropy method outperforms the existing methods in extracting implied volatility such as the Black-Scholes implied volatility and the model-free implied volatility. We will further examine the information content of the entropy-based implied volatility. We expect that it performs better in forecasting future realized volatility and the entropy-based variance risk premium performs better in predicting future market returns.

4. Financial literacy and behaviour of households and companies

Using point-of-sale payment data for estimating household consumption (started in 2015)

Wilko Bolt, Carin van der Crujssen, Nicole Jonker

Collecting statistical information on consumers' expenditures is expensive and time-consuming. As an alternative, in this study we will examine the usefulness of retail payments data for estimating household consumption patterns and identifying leading indicators for business cycles. Usage of payment data sources seem to be very promising: they provide detailed information with respect to the timing of consumption and the nature of consumption and in case of diary data consumption can be linked to demographic characteristics of respondents. We will use two payment data sources. The first data source that we use is payment diary information. Consumers report detailed information on all individual payments made during the day at all points-of-sale in the Netherlands. DNB and the Dutch Payments Association collect these data from September 2013 onwards among the members of the GfK consumer panel. This dataset includes information on domestic demand for expenditures in 14 different POS sectors. These data may provide preliminary estimates of household consumption on daily needs. The second data source is monthly information on the number and value of debit card payments, distinguishing between 21 sectors and available from January 1995 onwards. We study whether potential leading indicators to forecast swings in overall consumption can be identified.

Mode effects on self-reported household financial data (started in 2015)

Wändi Bruine de Bruin (Leeds University Business School), Wilbert van der Klauw (Federal Reserve Bank of New York), Maarten van Rooij, Federica Teppa, Klaas de Vos (CentERdata)

We conduct an experiment in which participants are randomly assigned to survey modes to examine the effect of internet survey vs. face-to-face interview mode on reported financial information. We aim to measure the accuracy of responses to asset, debt, income and expense questions and the variation across different modes. We investigate the effect of the interview mode on the willingness of individuals to report financial information and on the accuracy of their answers. For the latter, we use objective financial records that respondents have sent in to the survey agency after having participated in the survey.

Trust and economic expectations

Dimitris Christelis (CSEF), Dimitris Georgarakos (Bundesbank), Tullio Jappelli (University of Naples), Maarten van Rooij

We run a series of survey experiments to study trust in the ECB and the relation to economic expectations of consumers. For this investigation we observe the expectations of important economic variables and construct measures for the uncertainty around these expectations. Moreover, we pay attention to anchoring of inflation expectations.

Consumers' bank switching behaviour

Maaïke Diepstraten (Tilburg University), Carin van der Cruïjsen

We map out consumers' product-specific bank switching behaviour over time to get more detailed information about switching behaviour. The switching variables are constructed using twenty years of DNB Household Survey data.

Housing price shocks and trust in financial advice (started in 2014)

Dimitris Georgorakos (Goethe University Frankfurt), Roman Inderst (Goethe University Frankfurt), Maarten van Rooij

In the last decade, housing prices have fluctuated significantly in the Netherlands. In particular, housing prices increased dramatically between the early 2000s and mid 2008, while they have subsequently dropped by 20% on average. At the same time, almost one out of three Dutch households has taken out a mortgage loan in the period 2000-2008, the vast majority of whom after receiving financial advice. Part of the households report that they were advised to take up particular mortgage products (such as interest only mortgages) or to borrow higher than planned amounts. Against this background, our aim is to examine the extent to which the likely losses that households have experienced on a difficult-to-trade asset have influenced the trust they put in advice and in financial institutions and banks more generally.

Frequency of diary survey participation: less is more?

Lola Hernandez

Earlier literature on survey methods point at the risk of panel conditioning and panel attrition which may lead to respondents changing their payment and/or registration behaviour. In order to assess whether this is also true when consumers participate in a payment diary survey several times a year, DNB and the Betaalvereniging Nederland have asked GfK to conduct a pilot survey in November 2013 and in March 2014. The results of this survey will allow us to assess whether the payment behaviour (as registered in the diaries) of respondents who participated in the same survey two or four months before, differs from the registered behaviour of those who participate for the very first time. In the end, this will enable us to make a well-considered decision on how to select and sample the respondents for our annual research measuring cash usage in the Netherlands.

Intraday payment choices: mainstream vs. payments innovations (previously: Cash management and intraday cash balances), (started in 2014)

Lola Hernandez, Nicole Jonker

Payment instruments play a key role in channelling consumers' money into the economic pipeline. Increasing the efficiency of the payment system is then a crucial task of central banks. To better understand what determines the role of payment instruments, it is fundamental to study what determines their use at different moments. This paper aims at better understanding this by shedding light on consumers' cash management as well as their use of new forms of payments as contactless cards. This study uses detailed transaction information using cash, debit cards and new forms of payments as well as cash withdrawals. The focus of this paper will be on cash management and tracking people's payments, using detailed information on their cash balances and transaction characteristics, such as their order and size. In order to do this, it will use shopping diary data collected in an extensive payment survey in 2013 among more than 8,000 Dutch consumers.

How wide is the Dutch border: assessing the effects of increases in excise duties on cross-border trade filling stations (started in 2015)

David-Jan Jansen, Nicole Jonker

Excise duties on petrol were increased in 2014. Petrol stations have incorporated the change in excessive duties in their consumer prices for petrol, leading to an increase in fuel prices for consumers and businesses. According to petrol shops located close to the Belgian and German borders, consumers have chosen to travel across the borders so as not to be affected by the increased

excises. However, others have argued that there is no clear evidence of a change in fuel demand. This study attempts to estimate to what extent demand has shifted in response to recent higher excise duties. In addition, we want to examine whether there are any differences in changes in demand between car owners who live in the border regions and those who don't. The project uses data from the payment diary research. From September 2013 onwards members of the GfK consumer panel were asked to report all their daily payments at all point-of-sale in the Netherlands. As such, this dataset includes information on domestic demand for fuel prior to the change in excessive duties and after the change. In addition, we can distinguish between people living near the border and living further away of it.

Financial literacy and pension expectations

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

We have conducted a survey among employees in het CentERpanel on their level of financial literacy, expected retirement age and replacement rate in 2015. In this paper, we compare these expectations with the outcomes of a similar 2010 survey. Moreover, we analyze whether the updating of pension expectations is related to financial literacy or other personal characteristics.

The role of information on the formation and revision of subjective survival expectations

Federica Teppa, Susan Thorp (University of Sidney), Hazel Bateman (UNSW)

The divergence between subjective and objective survival expectations can lead to retirement planning problems and public policy challenges. We test the effect on subjective survival expectations of supplying cohort and/or ancestor survival information to 4000 experimental subjects from two countries. We then evaluate their attitudes to pension age increases and personal savings. Personalized longevity information generally does not induce the expected revisions to subjective expectations. "Live to" and "die by" framing has a much larger effect on reported subjective expectations. Yet subjective expectations are relevant to explaining opinions on pension policy and savings.

Payment data and consumers' privacy

Carin van der Crujisen

The National Forum on the Payment System has commissioned a survey about consumers' attitudes towards the use of payment data by banks. The independent research agency Motivation surveyed Dutch citizens. The main finding is that whereas the use of payment data is well-accepted in several instances, for example to enhance security or improve services, most people don't accept its use for commercial purposes. The goal of this research project is to deepen insights. The first step is to use the outcomes of nine scenarios to construct an overall measure of consumers' attitude towards payment data use. Next, differences in attitudes will be related to personal characteristics and if possible other variables.

Payment behaviour: the role of socio-psychological factors

Carin van der Crujisen, Frank van der Horst

This study examines the effects of socio-psychological factors on payment behavior. Based on the socio-psychological literature we build a conceptual model with factors that may affect payment intentions and actual payment behavior. Next, we conduct two surveys. The first survey measures payment intentions and the psychological factors that may be related to payment intentions and actual behavior, such as habits, social norms and perceived control. The second survey measures actual payment behavior. We use the outcomes of the surveys to test our conceptual model.

Flat or flexible pension? Consumers' expenditures before and after retirement (started in 2015)

Carin van der Crujisen, Nicole Jonker

Some pension funds allow their participants to choose between flat pension profiles and more flexible pension profiles in which monthly pension receipts may vary according to a prearranged

agreement. People may choose to receive relatively much pension income during the first years of their retirement, and less afterwards (high-low construction), but low-high constructions are also feasible. We examine what kind of pension arrangements correspond best with the preferences and needs of (future) pensioners. We use the DNB households survey to collect data on consumers' actual expectations and preferences regarding their pension profile and we use data from consumer payment diaries to estimate realized expenditure profiles after retirement. The DNB/DPA payment survey includes extremely rich and detailed information on consumers' expenditures in 14 different sectors during 2014.

Economic and institutional determinants of mortgage default (started in 2015)

Razvan Vlahu, Irina Stanga (University of Groningen), Jakob de Haan

This paper studies the potential causes of cross-country variation in mortgage defaults. We examine whether in addition to the macroeconomic risks and mortgage market characteristics, the peculiar features of countries' institutional and legal environment matter.

5. Modelling and forecasting

Modelling spending under conditions of low inflation/deflation (started in 2015)

Robert-Paul Berben, Ad Stokman

Many OECD countries have experienced episodes of low inflation or deflation in the recent three decades. In most cases such episodes had been short lived, but in some cases like Japan deflationary pressures had been structural with long lasting downward effects for economic growth. After the outbreak of the recent financial crisis, in many countries (both in Europe and outside) inflation and nominal interest rates dropped sharply. Particularly in Europe, inflation levels tended to remain low in the aftermath of the Great Recession posing problems for the real economy and for policy. In this paper, we investigate the consumer spending consequences of low inflation/deflation.

Modelling the business and financial cycle in a multivariate time series model for the G7 and the euro area (started in 2014)

Irma Hindrayanto, Jasper de Winter, Siem Jan Koopman (VU University)

Azevedo, Koopman and Rua (AKR, 2006, JBES) proposed a multivariate bandpass-filter based on the trend-cycle decomposition model for the Euro-area. The underlying multivariate dynamic factor model with a moderate database (of nine time series) relies on m trend and cycle components and produces smooth business cycle indicators with bandpass filter properties. In this project, we plan to apply the AKR method by including relevant financial variables (financial-macro relation) and distinguish two instead of one business cycle. The goal of this project is to determine a long and short-term business cycle and determine the drivers of these cycles distinguishing real-economic indicators (GDP, industrial production, yield-curve, producer confidence, unemployment) and financial indicators (housing prices, credit variables, stockmarket indices) for the G7 and the euro area. What are the main drivers of the short- and long-term cycles and do we see international transmission between the short-term and long-term cycles?

Forecasting with large panel data sets (started in 2015)

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.

Trade financing practices before, during and after the Great Recession

Ad Stokman

Worldwide 40 to 80% of exports are financed by means of open accounting, which is the most flexible (and risky) form of trade financing; banks finance 10 to 40% of international trade

transactions. In a time series framework from the early 1970s to the early 1990s, Stokman (1995) showed that German, Belgian and Dutch foreign trade financing practices are actively being used to (partly) offset tighter bank credit conditions. Data availability for The Netherlands from 1995 onwards (CBS) and for Germany for a much longer episode (Bundesbank, starting in 1949) puts us in a position to re-investigate inter company trade credit behaviour and establish whether trade financing played a similar or different role during the recent financial crisis. We explicitly take account of the possibility that causality between trade and trade financing may run in both directions.