

DNB Research programme 2012

Research at DNB focuses on selected themes. Concentration on certain themes may contribute to:

1. enhancing the policy relevance of research efforts
2. improved internal and external visibility of research
3. enhancement of research quality

Selecting policy relevant research themes that act as a framework for the consideration of new research proposals will increase the relevance of research efforts for the policy of DNB. Moreover, the internal visibility of DNB research will increase. This may contribute to increased cooperation and interaction between research and policy staff. External visibility too will benefit. Both *vis-à-vis* the ESCB and *vis-à-vis* the academic world, the research profile of DNB may be further reinforced. That will also advance the possibilities for attracting high-quality new researchers with an interest in one or more of the themes. In addition, concentration on themes will result in more critical mass, enabling the increased cooperation and intensified debates to contribute to further improvements in academic quality.

The DNB Research programme 2012 has four thematic themes: 1. Monetary strategy and price stability; 2. Financial stability and macro-prudential supervision; 3. Micro-prudential supervision and conduct of financial institutions; and 4. Financial literacy and behaviour of households and companies. Compared to the themes of the DNB research programmes of 2010 and 2011, it has been decided to re-allocate research on central bank transparency and communication to the remaining themes in the research programme in view of the limited number of projects.

The thematic themes have been selected on the basis of the following considerations:

- Policy relevance: the themes are to be closely aligned with the responsibilities of DNB;
- Academic relevance: the themes are to offer sufficient scope for publications to appear in high quality academic journals;
- The wish to build on niche positions DNB has acquired in certain areas of research.

The focus on the themes listed below does not mean that *all* research should fit into these thematic themes. A substantial part of research capacity will continue to be directed towards modelling (DELFI – our macro model of the Dutch economy – has already been published in 2011 and a DSGE model is scheduled to be published in the beginning of 2012 as well) and forecasting. That is why a fifth theme has been added to the DNB Research programme: modelling and forecasting.

As follows from the specific projects for 2012 (as listed below), the distribution of research time across the various themes is non-proportional. The research questions phrased in the detailed description of the themes are illustrative only and in no way exhaustive.

1. Monetary strategy and price stability

To what extent should the ECB's monetary strategy be aimed at other objectives besides inflation (such as the prevention of asset bubbles and unbalanced house price rises)? How can (the persistence of) inflation differences within the euro area be explained? What is the relation between inflation expectations and inflation? How can the central bank influence inflation expectations? Do divergent business cycles play a role in monetary policymaking in EMU? What causes these business cycles to diverge? What is the relation between wage developments and inflation? What role is played by commodity prices? Can fiscal policy affect the credibility of monetary policy makers? When do high debt levels lead to inflation? How may central bank communication contribute to the realisation of monetary strategy objectives?

2. Financial stability and macro-prudential supervision

What is meant by the term macro-prudential supervision? What instruments should be used in exercising it? What institutional form should such supervision take? What is the relation between monetary strategy and macro-prudential supervision? What are the interactions between the financial system and the real economy? What role do global imbalances play in the genesis of financial crises? When and how does fiscal policy become a threat for financial stability? How may central bank communications contribute to financial stability? How do supervisors communicate about financial stability and how can the difference be explained? How reliable are payment systems and can they respond adequately to changes in the larger payment system? What role does contagion play in financial crises and how, if at all, is it affected by mutual exposures?

3. Micro-prudential supervision and conduct of financial institutions

By what factors is the conduct of banks, insurance companies and pension funds determined? How do boards of financial institutions reach decisions? What is the influence of micro-prudential supervision and regulation on institutions' risk attitude? How can supervisory authorities contain risks due to conduct and culture of financial organizations? To what extent do institutional factors play a role in financial institutions' behaviour? And what is the role of financial liberalisation? How do supervisors communicate and how can the difference be explained?

4. Financial literacy and behaviour of households and companies

What role does financial literacy play in the financial behaviour of households? What factors determine households' payment behaviour or companies' payment streams? What do households expect from the supervision of financial institutions? How may the communication of supervisors influence households' literacy and behaviour? How does a household's indebtedness influence the way it behaves? How can communications help improve public awareness and what are the effects on the behaviour of the public? Can communication influence public confidence in policy makers?

5. Modelling and forecasting

Is it possible to construct long-term projections with DELFI? Does the model return to equilibrium after a temporary shock? How can indicators like stock market prices, interest rates, volatility measures, industrial production, consumer and producer confidence, and vacancies be used in forecasting GDP growth? How can we improve forecasts of time series that are subject to structural breaks? How can dynamic factor models be used in forecasting?

The research projects for 2012 are listed below. Some fit into more than one theme.

Research projects 2012

1. Monetary strategy and price stability

The optimal tenure length for MPC members

Jan Marc Berk, Beata K. Bierut

We construct a model exploiting trade-offs in a longer tenure and a lower turnover of MPC members: a higher potential for information sharing and learning on the one hand and a higher homogeneity and a lower inflow of new ideas and heuristics on the other hand. The modelling will be done combining macroeconomic elements (inflation and output dynamics in the economy) with committee decision-making elements (such as the MPC size and members' characteristics). The outcomes should allow us to link the optimal tenure on the MPC both with the underlying characteristics of the economy and with the characteristics the MPC and its decision-making processes. The final element will be the empirical verification of the theoretical hypotheses.

Global liquidity as predictor of asset price booms

Beata K. Bierut

Liquidity is one of the factors that have been investigated as a driver of asset price booms and busts. Given globalisation of investment and financial activities, the impact of liquidity has to be analyzed both as a domestic and a global concept. Traditionally, global liquidity has been approximated using G5 aggregates. However, given the rising importance of the emerging market economies, G5 seems increasingly less adequate. In this paper we investigate to what extent truly global measures of global liquidity, comprising data for up to 24 countries/currency areas, improve the predictability of asset price booms when compared with the traditional G5-based measures.

FDI and international business cycle synchronization: a structural analysis

Jos Jansen, Ad Stokman

Jansen and Stokman (2011) found for 12 OECD countries in the period 1995–2010 that more synchronized business cycles are associated with stronger FDI relations (measured in stocks) rather than with stronger trade linkages. These findings suggest that FDI has become a separate channel through which economies may affect each other and that FDI stocks are now an essential aspect of international economic interdependence. But how does the FDI channel work? A key aspect is the interrelationship between international trade and FDI. For example, (vertical) FDI may create cross-border supply chains that increase the scope for business cycle synchronization. We will 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.

Communication about unconventional monetary policy

Jakob de Haan, Jan-Egbert Sturm (ETH, Zürich), David-Jan Jansen

We examine communication by the Federal Reserve and the ECB about unconventional monetary policy measures. We focus on short-term response of financial markets. Following the standard literature on exchange rate interventions, we use event-studies to analyze the response of financial markets participants to communication, rumours and actual purchases.

Experiments with monetary policy rules in a multi country macro model framework (project started in 2011)

Jakob de Haan, Ad Stokman, Peter van Els

Using the multi-country model NiGEM, this project will analyse to what extent redefining the price stability objective of the ECB by taking asset and house prices into account may contribute to maintaining financial stability in the individual countries in the euro area. It will also be analysed how

different the ECB policies would have been in the past and the consequences for output growth if asset and house prices would have been taken into account.

Switching between time and state dependent pricing: consequences for international price level differentials

Marco Hoeberichts, Ad Stokman

Shocks may create adverse effects for price differentials between countries. On the one hand, shocks like oil price rises or increases in exchange rate volatility may affect the distance between countries, thereby stimulating price discriminating practices across the border. As a result prices differentials between countries will rise. On the other hand, shocks might give rise to reconsidering the appropriateness of one's prices relative to competitors. Common shocks may cause price changes to be synchronized by strategic intermediate goods producers that anticipate and respond to their competitors' actions. Under such circumstance, companies switch from time-dependent pricing to state dependent pricing, and price differentials will shrink. In this paper we investigate the impact of three types of common shocks for price level differentials between European countries. The shocks we consider are changes in the business cycle position, changes in the level of exchange rate volatility and oil price shocks. The analysis is based on half a century of absolute price level data for 11 EMU member countries.

Literature survey: changes in the inflation process and asset price dynamics, and their relationship

William Melick (Kenyon College), Marco Hoeberichts

This paper describes the literature on broad trends in inflation and output growth over the past few decades and their determinants. This period is characterized by a low and stable rate of inflation and stable output growth and is known as the Great Moderation. Parallel to the dynamics of inflation and output, we describe the literature on the trends in the global financial system, which has evolved rapidly since the 1970s. Comparing the broad trends on the real and the financial side allows us to investigate to what extent the evolution on the financial side contributed to the remarkable decline in the volatility of output growth and inflation.

Competitive devaluation and relative prices in Europe

Ad Stokman, Marco Hoeberichts

Some peripheral countries in EMU have difficulties in competing in international markets. Before EMU, these countries sometimes devalued their currencies to restore competitiveness. In the longer run, a devaluation of the home currency also leads to higher inflation through a higher price of imports. Our dataset covering 50 years of absolute price-level data for eleven EMU countries enables us to analyze the effect of devaluations on relative prices in the short and in the long run. We aim to shed light on the question for how long currency devaluations help competitiveness and whether in the long run, devaluations maybe harm competitiveness instead of improving it.

Exchange rate regimes, determinacy, and learnability in a two-block world economy

Eric Schaling (Wits Business School, Johannesburg), Marco Hoeberichts

We study how determinacy and learnability of global rational expectations equilibrium may be affected by monetary policy in a simple, two country, New Keynesian framework. The two blocks may be viewed as the U.S. and Europe, or as regions within the euro zone. We study cases in which optimal policies are being pursued country by country - where exchange rates are floating - as well as types of managed exchange rate regimes, including monetary union. This case is of strong practical relevance for monetary policy analysis in the euro area. We find that new concerns can arise in the analysis of classic topics such as the desirability of exchange rate targeting and monetary conditions indices (MCIs), the so-called 'corner solutions' debate, and monetary union.

2. Financial stability and macro-prudential supervision

Can infrastructure-related systemic risk be eliminated or mitigated? (project started in 2010)

Ron Berndsen

Infrastructure-related systemic risk is the part of systemic risk that may arise from a malfunctioning in the financial infrastructure or where the infrastructure acts as a propagation channel for shocks coming from (potential) insolvencies of systemically important financial institutions (SIFI). The aim of this research is to investigate whether it is possible to eliminate the occurrence of infrastructure-related systemic risk or – if not – to what extent and costs is it possible to mitigate that risk. We follow a two-step approach. Firstly, we further develop a functional model for representing and eliminating settlement risk exposures in the financial infrastructure by expanding earlier work (Berndsen, 2010). Secondly, we propose a generalization of that model in order to arrive at infrastructure-related systemic risk and investigate the feasibility of an elimination of that type of systemic risk by considering alternative settlement arrangements in an economy.

Non-linear mean reversion in stock prices: an international comparison

Jaap Bikker (TB-STB/UU), Laura Spierdijk (RUG)

We aim at improving mean reversion models by expanding them with three new elements. First, we allow for non-linear effects in the mean reversion process, that is, assuming stronger mean reversion, the more the stock price level is deviated from its long-term equilibrium level, or ‘mean’. Second, we model the equilibrium stock price. Third, we allow for variation in the mean-reversion behaviour over time, as has been observed by Spierdijk *et al.* (2011), conditional to economic and financial turbulences. Mean reversion may be an important driver for the investment strategy, particularly for institutions with a long-term focus, such as pension funds. Following Lothian and Taylor (2008), we apply an adjusted ESTAR model to explain stock prices. ESTAR allows for nonlinear mean reversion. The ‘adjustment’ refers to an equilibrium model of stock prices which changes with productivity. Finally, we allow for shifts in the variance of the error term to represent variation in the mean reversion behaviour over time. We use a panel data set from Global Financial Data consisting of 15 countries over long periods of around 1930-2010.

Housing Markets and Heterogenous Agent Models

Wilko Bolt, Maria Demertzis, Cees Diks (UvA), Marco van der Leij (UvA)

This research project falls within the DNB project on Complexity undertaken in collaboration with CeNDEF, at the University of Amsterdam. This project was set up as a result of the economic crisis and is aiming at looking at new tools that capture better existing non-linearities in the system than our current models do. The housing market is a very appropriate example for these techniques, both because it is subject to abrupt stops as a result of changes in confidence, as well as being crucially important in driving the business cycle. The objective is to help identify bubbles in the market and depending on how rigorous these techniques are, also contribute an early warning mechanism for the policy makers to use. Building on our previous DNB working paper, in the current setup we aim to extend our model by accounting for a number of other variables, including interest rate costs (mortgage costs) as well institutional aspects that dominate the differences between countries (fiscal treatment of home ownership). In this respect we would also like to estimate our model for a number of additional countries, including the UK and Switzerland.

Impact of Innovation on Retail Payments Pricing

Wilko Bolt, Heiko Schmiedel (ECB)

This project aims at analysing consequences of innovation in the retail payment landscape regarding pricing decisions, competition, and adoption of new electronic payments. An important question arises whether conventional balancing mechanism using interchange fees, e.g. card payments, will also apply to the emerging modern (online) and competitive payment space. Important aspects to be considered in such analysis may include: the use of interchange fees and surcharges, the role of public authorities, infrastructures and network effects, incentives, barriers of entry and competition, and effects on

overall social welfare. Building on previous work by Bolt and Schmiedel (2011) and Bolt, Foote and Schmiedel (2011) on competition and efficient pricing in payment card markets, a novelty is that the paper allows for incorporating the impact of innovation and new technologies on payment prices, cost sharing, and distribution of benefits and overall economic welfare.

Modelling the liquidity ratio as macroprudential instrument

Jan-Willem van den End, Mark Kruidhof

The Basel 3 liquidity regulation is a micro prudential tool to strengthen the resilience of banks to adverse liquidity shocks. The Liquidity Coverage Ratio (LCR) enhances the self-insurance capacity of banks to make them less dependent on the central bank as lender of last resort. At the same time the liquidity regulation has wider effects, since the LCR can be a binding constraint for banks' behaviour, thereby affecting financial markets and the economy. From that perspective, the LCR is relevant for macro prudential reasons as well. This paper explores the possibilities to use the LCR as a macroprudential tool. We simulate the effects of various approaches to use the LCR within a liquidity stress-testing framework. We are particularly interested in possible second round effects of bank behaviour in relation to the role of the central bank as lender of last resort.

What determines the size of the fiscal multiplier? A literature review

Niels Gilbert, Jakob de Haan

During the crisis one of the central questions faced by economic policy makers was how much discretionary stimulus would do to boost their economy. Currently, the main question is to what extent fiscal consolidation is likely to hurt growth. The usual way to estimate the effects of fiscal policy on the real economy is through the use of fiscal multipliers. The economic literature however struggles to come up with reliable estimates of the multiplier. In much of the empirical work estimates vary all over the place, in part because most studies ignore the multipliers' state dependency. The crisis however sparked a great deal of new work. The realization came that *the* multiplier does not exist, and that multiplier values are instead highly dependent on for instance the monetary policy regime. In this article we will survey the recent literature, and try to answer the question: what determines the size of the fiscal multiplier?

Trade Dynamics in EMU: Are Deficits and Surpluses related? (project started in 2011)

Jakob de Haan, Peter Wierdsma, Henk van Kerkhoff

In the euro area, diverging current account developments have led to a renewed debate about the 'economic' pillar of Economic and Monetary Union (EMU). Originally the debate concentrated on country-specific adjustment processes in EMU. Recently the debate has broadened in a different direction. With persistent current account differences, and generally slow adjustment in real exchange rates, the question is who should bear the burden of adjustment. We investigate the dynamics of trade patterns of countries that participate in EMU. How have bilateral trade balances developed? How do adjustments occur (wage costs, real exchange rate, trade composition)?

Financial crises and macroeconomic performance (project started in 2011)

Gabriele Galati, Chen Zhou

Within the ECB's monetary policy framework, there is a possibility to contribute to avoiding the build-up of massive financial imbalances, which in the longer run may turn out to have disruptive effects on price stability once they burst. The idea is to keep our mandate of price stability unchanged while extending the monetary analysis to encompass monitoring the build-up of financial imbalances and associated potential risks for price stability in the medium- and longer run. There is a need to build analytical underpinnings of this extended monetary analysis, and in particular to improve analytical tools that allow us to make realistic assessments of risks in the financial system and their impact on the macro economy. An important aspect is to investigate empirical relationships between financial crises and macroeconomic performance. This research paper aims at verifying the existence of changes in the distribution of financial variables over time. In the extreme value literature, these changes can be classified into three categories: changes in shift, in scale or in shape. A change in *shift* would reflect

the influence of time-varying factors. A change in *scale* could be interpreted as a change in underlying risk, to the extent that movements in explanatory factors translate into movements in the variance/scale of financial variables, which change the risk propositionally. Such a change may influence both the frequency and the magnitude of a crisis if one fixes the magnitude/frequency in the definition of a crisis. In the case of a change of the third type – in the *shape* parameter – the relation between magnitude and frequency of crises is affected. This research project aims at identifying the relative importance of possible changes of each type, and tries to relate their occurrence to structural changes in the properties of macroeconomic variables.

Industry performance and leverage during the financial crisis (project started in 2011)

Theoharry Grammatikos (Luxembourg School of Finance), Robert Vermeulen

We investigate whether indebted industries have suffered more during the financial crisis in terms of profitability and stock market returns. Special attention is devoted to the role of short-term debt financing. The sample consists of 140 industries from the S&P 1500 index. While most of the literature studies solely manufacturing industries, this paper incorporates the large service sector in the analysis. Basically, Rajan and Zingales (1998) show that financial development increases the growth of capital-intensive industries. We reverse the question and investigate if these capital-intensive industries suffer more when capital is scarce.

Central bank's influence in solving disruptions in RTGS: an experimental approach.

Peter Heemeijer (UvA and ABN AMRO), Ronald Heijmans

This paper builds on the experiment conducted by Abbink, Bosman, Heijmans and Van Winden (2010). Their paper conducts a laboratory experiment based the game theoretical model by Bech and Garrat (2006). Their paper used disruptions to investigate how the dynamics of a game can change from a desired equilibrium to an inefficient one but excludes the influence of an authority like a central bank. This paper builds upon this work but includes the influence of the authority by changing the pay off of the game or the information level within the game. The experiment is conducted in laboratory at CREED (UvA).

Bank credit constraints and automatic stabilizers (project started in 2010)

Willem Heeringa, Job Swank

In this theoretical paper, we consider an economy in which individuals decide on consumption, saving and borrowing over a 2-period lifetime. Individuals are heterogeneous in that they are faced with common as well as idiosyncratic income shocks in both periods. In an attempt to smooth consumption over the lifetime, some of them will save in the first period, whereas others may want to borrow. Financial intermediation is performed by banks that either maximize expected profits or aim at curbing the probability of bank failure over a generation's lifetime. We show that under both strategies, it is optimal for banks to introduce a non-discriminatory credit constraint, as they don't know in advance which borrowers will default on their loans or are most likely to do so. Since individual borrowers have no information edge over banks on their future income prospects, credit rationing in our model is not caused by asymmetric information, as in Stiglitz and Weiss (1981), but results from incomplete information due to borrower heterogeneity. While underestimation of borrower heterogeneity (or tail density) always causes banking profits to be lower than anticipated, we also show that it does not necessarily increase the probability of bank failure under expected profit maximization. This depends crucially on the credit constraint profit maximizing banks would have imposed had the true tail density of idiosyncratic shocks been known. So, contrary to common wisdom, underestimation of tail density is not always a bad thing. We finally analyze within this framework how a public system of proportional income taxes and lump sum benefits can help stabilize consumption over a generation's lifetime and reduce the risk of intergenerational debt transfer due to bank failures.

The empirical relationship between demographics and real house prices: the Netherlands versus the US (project started in 2010)

Willem Heeringa, Job Swank

The aim of this paper is to investigate the empirical relationship between demographics and real house prices. Some people expect that the retirement of the baby boom generation could result into an asset price meltdown. The basic idea behind this is that older generations will sell most of their assets after retirement in order to consume their wealth. Applied to the housing market, this could imply a fall in house prices when the baby boomers start to retire after 2010 (Mankiw and Weil, 1989). Several papers in the literature have investigated this hypothesis for the US, but (except for the UK) no such studies exist for European countries. In this paper, we apply a panel data approach on 76 regions of Netherlands to estimate the relationship between demographics and real house prices, while controlling for income differences. We repeat the analysis for the US at the State-level and compare the empirical results.

Financial sector development and external shocks in small open economies

Steven Poelhekke, Thorsten Beck (Tilburg University)

Sustained and stable real economic growth is most countries' ultimate goal. In theory, financial sector development should be able to smooth fluctuations. In practise, this is not always true. To what extent is the financial sector able to smooth shocks in small open economies, and what are the sector characteristics that constrain this function? What limits pro-cyclical lending by banks and credit booms in general? The paper will combine aggregate data with data on individual banks and firms and examine exogenous external shocks. In addition, the paper will examine the influence of the degree of competition and regulation in the banking sector and the political connectedness of firms.

Credit and liquidity risk pricing in interbank markets (project started in 2011)

Iman van Lelyveld

Banks are inherently fragile institutions making them susceptible to bank runs when liquidity issues emerge, even though the bank might be solvent. Further, banks operate in a network with other banks. The state of this network will influence bank's behaviour and vice versa. Taken together this would mean that market participants would be quite keen to price counterparty risks correctly. We want to study the pricing behaviour of Dutch banks observed in the interbank market. Such pricing information, gleaned from payments streams, would reveal something about banks' view on the riskiness of their counter parties and the risks surrounding scarce liquidity. This can then be compared to both public (credit spreads observed) and private information (collateral banks have available). Understanding market behaviour is crucial for effective supervision and regulation. We would be able to contribute to the literature on risk assessment and price setting. A better understanding in this respect would allow us to develop (early) warning indicators of risks building up in the system. We use data from Heijmans *et al.* (2010). The algorithm developed links payments going out with a return stream consisting of the notional and the associated interest payment. We would then compare the private pricing information with publicly available risk measures and communication signals. Quoted bid-ask spreads (collected from Bloomberg) could, for instance, provide a 'public face' that could be compared with the private information contained in the bilateral prices.

The sensitivity of banks to system shocks (project started in 2011)

Maarten van Oordt, Chen Zhou, Valerie de Bruykere (University of Gent)

In this paper, we plan to use the methodology from 'Systematic Risk under Extremely Adverse Market Conditions' in order to measure which banks are more sensitive to severe shocks in the banking system. Subsequently, we will try to find the bank characteristics that can explain and/or forecast this sensitivity. The analysis may provide a better understanding and forecasting ability on which banks are more sensitive to severe shocks in the banking system.

Net foreign asset (com)position: Does financial development matter?

Robert Vermeulen, Jakob de Haan

This paper empirically investigates the long-run relationship between a country's financial development and its net foreign asset position. We employ a pooled mean group estimator for a large sample of both industrial and developing countries during 1970-2007. The results show that increasing

financial development results in a worsening long run net foreign asset position. When considering the effects of financial development on the asset composition we find that increasing financial development results in 1) an improving net equity position and 2) a worsening in the net debt position. These findings confirm the theoretical predictions of Mendoza et al (2009). The empirical results are robust to using different indicators of financial development. The importance of financial development remains when we include the general level of development of a country in the cointegrating relationship.

Collective strategic defaults: Bailouts and repayment incentives (project started in 2011)

Razvan Vlahu

This paper shows that under a global games approach banks may be subject to risk of failure even when fundamentals are strong due to a coordination problem among debtors. As a result of collective strategic default a financially sound firm may claim inability to repay if it expects a sufficient number of other firms to do so as well, thus reducing bank's enforcement ability. This occurs in particular when financial environment is characterized by a poor quality of corporate sector. The paper provides a model in which participants take simultaneous actions on the basis of imprecise private signals about the ratio of bad loans in bank portfolio. The model has a unique equilibrium in which an attack against the bank occurs when the fundamentals are above a threshold level. The model also helps us understand the role of the Central Bank as a Lender of Last Resort under opportunistic behaviour from borrowers. While an ex-post bailout policy is often believed to reduce bank incentives, in this case it induces commercial banks to affect loan quality, which indirectly reduces incentives for strategic default. Within this framework we argue that the marginal cost of intervention incurred by Central Bank has a double-edge effect. While a higher cost helps to mitigate the moral hazard problem at the bank level by determining it to exert maximum of effort even when fundamentals are strong, it also increase the probability of bank failure by lowering the threshold that triggers collective strategic default. We also find that high bank expected profitability reduces the likelihood of collective strategic default.

Franchise value and risk capacity

Razvan Vlahu, Lev Ratnovski (IMF)

The recent crisis revealed a surprising amount of risk taking in financial institutions with large and stable franchises (e.g. AIG, UBS, and Washington Mutual). The risk was extreme and its realization destroyed the shareholder value and often the mere viability of such institutions. This contradicts the traditional corporate finance and banking view that institutions with high charter value should be averse to taking excess risk. This paper aims to reconcile the puzzle by studying specifically the risk taking of institutions with a large and stable charter value. While being leveraged, these institutions cannot perform traditional asset substitution, since the shareholders internalize its consequences. In contrast, we show that such institutions can make their limited liability binding by taking extreme forms of risk, namely tail risk: investments that generate stable returns in normal times but with a low probability have a catastrophically bad realization. Moreover, to shift the risk to their creditors, the institutions have to take a large amount of such risk, which - under leverage constraints - is only possible under high charter value. Thus, the presence of a valuable franchise both enables and creates incentives for tail risk taking.

Currency crises linkage: weak or strong? (project started in 2011)

Chen Zhou

Exchange rates are driven by the relative ratio of macroeconomic fundamentals such as money supply, real income, nominal interest rates and price level between the two underlying countries. This creates potential dependence of exchange rates with respect to one common reference country. Empirical literature documented the tail dependence among exchange rates, i.e. two exchange rates with respect to one common reference country are likely to have extreme co-movements. This could be caused by the either shocks on the macroeconomic fundamentals of the reference country on the linkages between macroeconomic fundamentals of the two considered currency. However, such extreme co-

movements are more observed between industrial countries compared to emerging economies. This study intends to provide a theoretical model explaining such phenomenon. Since the macroeconomic fundamentals of emerging economies exhibit heavier tails, i.e. a large shock is more likely, the individual tail events dominate the extreme movements of exchange rates. In that case, an extreme residual dependence is still possible between exchange rates of emerging economies. We define it as the hidden linkages of exchange crises, and show that low level of tail dependence between emerging currencies does not always imply weak currency crises linkage. Empirical analysis verifies the theoretical model.

Identifying systemically important financial institutions: size and other determinants

Chen Zhou, Kyle Moore (Erasmus University Rotterdam)

The failure of a single financial institution can lead to a meltdown of the entire system due to its systemic linkage with other institutions in the system. A firm with a high systemic linkage is thus considered a systemically important financial institution (SIFI). For a macro-prudential regulation framework, it is necessary to identify SIFIs for two reasons: identifying SIFIs help impose regulations on SIFIs to mitigate potential systemic risk; when a financial crisis unfolds, identifying SIFIs help justify bailout actions which stops the potential contagion of systemic failure. For that purpose, we analyze the conditions under which a financial institution is systemically important. One obvious candidate is size of institutions. Beyond size, we intend to identify other determinants of systemic importance, and further analyze the time variation of the scope of the determinants. We follow the approach in Zhou (2010) in measuring systemic importance of financial institutions, and extend it to consider the economic impact given the failure of a particular institution. Here the economic impact refers to the expected total capital shortfall or the expected total loss in insured deposit of the system. Then we run a panel regression to identify bank level characteristics that are associated with systemic importance.

3. Micro-prudential supervision and conduct of financial institutions

Identifying loans in the Euro interbank money market.

Luca Aciero (BdI), Ronald Heijmans, Richard Heuver, Chrisina Picillo (BdI), Francesco Vacirca (BdI)

The algorithm developed by Heijmans et al. (2010), which is based on Furfine (1999), to identify unsecured interbank loans contains three types of errors. Type 1 errors are transactions which are mistakenly identified as loan. Type 2 errors are loans which are not identified by the algorithm and Type 3 error assigns the loan to the wrong maturity. This paper describes the errors in detail and how they can be limited. The probability of certain errors depends on the plausibility corridor, the central interest rate and the interbank loan value chosen. The purpose is to set up an algorithm to identify unsecured interbank loans using TARGET2 transaction data for the whole euro area. The euro interbank money market will be investigated using this algorithm and a network analysis will be done to see how the interbank money market has evolved since 2008.

Bank hierarchies and risk taking (project started in 2011)

Itai Agur (IMF), Wilko Bolt, Chen Yeh (LSE)

This paper investigates the relationship between the hierarchical framework of a bank and its overall risk taking behaviour. A CEO divides funds among self-interested division managers. To elicit behaviour from them that is as close as possible to wider bank interests, the CEO designs their contracts. However, he has limited information on the type of investment opportunities that division heads have. Intra-bank competition for funds is shown to exacerbate bank risk taking. The paper proceeds to investigate how bank hierarchies affect optimal bank regulation.

Optimal pension fund size

Jaap Bikker, Michel Geurts (Utrecht University)

For decades, the economic literature has focussed on scale economies and optimal size in financial institutions, particularly banking. Recently, scale economies in pension funds have been investigated. The existence of non-used scale economies would imply that the structure of the pension sector is inefficient so that consolidation would be necessary to serve the interest of pension fund participants. The first step is to assess the existence and magnitude of scale economies. Closely related is the question of whether an optimal scale exists. The traditional U-shape average cost function would imply an optimal scale. Large funds might be more difficult to manage, to enjoy more luxury, etc. But the traditional U-shape average cost function, particularly its right-hand upward bound, is not evidently. We use data on administrative and investment costs of Dutch pension funds and, hence, investigate two types of activities. We apply translog-cost functions (including stochastic cost frontier models) and other functional forms as suggested by Shaffer (1998) to investigate the cost structure of pension fund administration and investment in order to find the best suitable model. This will result into an assessment of the existence of an optimal scale. Furthermore, we estimate differences over time and differences across types of pension funds (industry-wide, company and professional group funds).

Regular Equivalence in Interbank Markets

Wilko Bolt, Rod Garratt (UCSB), 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 portioning 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.

Measuring competition across US banks (project started in 2011)

Wilko Bolt, Dave Humphrey (Florida State University)

Adequate banking competition benefits consumers by reducing costs, lowering prices, and improving offered services. While the reverse may occur if competition is too weak, if it is too strong banks may seek greater risks in an effort to replace profits lost by lowering prices more than costs can be reduced. Unfortunately, standard indicators of bank competition may yield conflicting results. We propose an alternative measure that takes different bank activities (spread, non-interest income) into account. Should antitrust authorities or banking regulators be concerned? Our competition measure borrows from the cost/profit efficient frontier literature and is applied to US banks to assess banking competition between larger versus smaller banks, between commercial versus savings banks, and to determine whether competition has changed over time.

Indexation of pension benefits through the economic cycle

Dirk Broeders, Paul Hilbers, David Rijsbergen

Indexation of pension benefits is an important condition for maintaining purchasing power. Not surprisingly, pension contracts around the world increasingly focus on the provision of pension benefits in real terms. In many cases indexation is not guaranteed but contingent on the performance of the pension fund. E.g., in career average defined benefit schemes the indexation of benefits, both during the accrual stage and the payout stage, is contingent on the funding ratio. It is important to study these contingent liabilities as they present significant economic value and uncertainty for the

beneficiaries. An interrelated question is how to enhance incentive-compatible regulation for these type of schemes. This paper empirically examines which variables affect the level of indexation that defined benefit pension funds in the Netherlands are able to provide to their beneficiaries. Relevant variables include the type of pension fund, the age profile of its beneficiaries and the composition of the investment portfolio. For this assessment, we collect the relevant data for 200 pension funds in the Netherlands during the period 2006 to 2010.

Interbank lending behaviour under stress and the role of the central bank

Leo de Haan, Ronald Heijmans, Richard Heuver, Jan Willem van den End

Heijmans and Heuver (2011) show how daily TARGET2 transaction and collateral data can be used to generate graphic representations of individual banks' behavioural patterns in the Dutch part of the (unsecured) interbank money market. Lending to and borrowing from other banks, borrowing from and depositing at the central bank, the use and build-up of collateral, and payment delays may indicate that a particular bank is in distress. These signals in turn may affect other banks' behaviour with respect to that bank, in terms of volumes and prices for interbank lending to that bank. As a follow-up to that exploratory paper, we proceed by subjecting these and other behavioural patterns and relations to a number of econometric tests. We examine how a change in behaviour of one stressed bank prompts other banks to change their behaviour towards that bank as well, thereby taking into account both the role of the central bank in the money market and individual bank characteristics. We pay attention to possible interactions with the Basle III framework for bank liquidity. We first undertake this research for the Dutch part of TARGET2, with the aim to extend the analysis to the European banking sector.

Bank liquidity risk management under supervision

Leo de Haan, Jan Willem van den End

The recent banking crisis highlights the importance of liquidity risk for banks. In the Basel III liquidity supervisory framework, a minimum liquidity ratio is required (liquidity coverage ratio). Yet, little is known on how banks will manage their funding liquidity in such a framework. This paper contributes by investigating banks' actual liquidity behaviour under a framework which resembles the Basel III proposal: the quantitative liquidity requirement as it is in operation in the Netherlands since 2003. In the Dutch supervisory liquidity system a bank's actual liquidity must exceed required liquidity, at horizons of both one week and one month. Actual liquidity is defined as the stock of liquid assets minus haircuts plus recognised cash inflows weighted by degree of liquidity. Required liquidity is defined as the assumed calls on contingent liquidity lines, assumed withdrawals of deposits, assumed drying up of wholesale funding and derivative funding. The Dutch liquidity requirement resembles the Liquidity Coverage Ratio. Our sample consists of about one hundred Dutch individual banks over the period January 2004 through April 2010. The sample period thus includes the banking crisis episode, which allows an analysis of bank liquidity behaviour under stress and the effect of central bank liquidity injections. We perform panel regression analysis, relating individual banks' stock liquidity holdings to the maturity ladder of expected future net cash flows. We examine how banks adapt their liquidity holdings to the liquidity requirements. We control for other potentially explanatory factors, notably risk factors, central bank operations and bank characteristics.

Volatility analysis of Dutch EONIA

Ronald Heijmans, Lola Hernandez, Richard Heuver

This paper investigates the volatility of the unsecured overnight interbank rate in the Dutch market, Dutch EONIA. Seasonal patterns, calendar effects and the effect of changed monetary policy are investigated. The data used for this analysis encompasses the first twelve years of the Euro, ranging from 1999 to 2011. Several events have happened during this period, like the introduction of the euro Large Value Payment System, TARGET in 1999, the financial crisis starting in the summer of 2007 and the changes in the ECB's monetary policy as a result of the latter. Moreover, the sample period captures the country crisis starting in May 2010. The results show that the interest rates of loans increase significantly at the end of the maintenance period, end of the month. The change of monetary

policy by providing unlimited liquidity had a strong negative effect on the rates. This paper presents an EGARCH model of the volatility of the overnight interest rates of the unsecured Dutch money market.

Determinants of bank stability throughout the 2007 – 2011 financial crisis

Mark Mink, Jakob de Haan

Demirgüç-Kunt et al. (2010) show that banks which entered the crisis with higher regulatory capital ratios turned out to be more stable and resilient to shocks, consistent with the objective of capital regulation. These regulatory capital ratios have remained remarkably stable throughout the crisis, and in many cases have even increased. This observation is at odds with market participants' perceptions of bank capital levels, which have worsened substantially as evidenced by the fact that bank stock prices have plummeted. As a result, the question arises to what extent market participants take into account banks' regulatory capital levels when evaluating their stability, and to what extent they attach value to other factors such as expectations of future profitability and the presence of (implicit) government safety nets. Our approach to analyse the determinants of bank stability is inspired by the regression framework by Stiroh (2006). In this framework, we can take into account variables reflecting regulatory capital ratios, the stance of the business cycle, and bank characteristics that are associated with the likelihood of receiving a bailout (such as size). By analysing the difference between the coefficients and the changes in coefficients over time, we can draw conclusions about the (potentially time-varying) importance of the various determinants of bank stability.

Suppliers to multinationals and local and global crises

Steven Poelhekke, Beata Javorcik (University of Oxford)

During the Asian financial crisis of the late 1990s, it was a good thing for a local firm to be (partially) foreign owned or an exporter, since global demand remained strong (especially after devaluation) and these firms were less dependent on the locally failing banking system. Also suppliers to multinationals tend to be less capital constrained. Export status or foreign owned status during a global crisis may, however, be less of a good thing due to weak global demand and (real and financial) contagion effects. How did suppliers to multinationals cope with the recent crisis? To what extent can (parent) MNEs substitute for banks?

Global financial contagion, foreign bank ownership and credit availability (project started in 2011)

Neeltje van Horen, Steven Ongena (Tilburg University), Jose Luis Peydro Alcalde (ECB)

This paper studies the transmission of the current financial crisis through foreign bank ownership. Specifically, we examine the impact of foreign bank ownership on firm credit availability and the implications for the real economy. Matching data from three different data sources, Bankscope, Kompass and Amadeus, we study the differential impact of the crisis on lending by foreign versus domestic banks in twenty Eastern European countries. Our paper differs from previous studies on crisis transmission through foreign bank ownership (e.g. Popov and Udell 2010, Allen et al. 2010, De Haas and Lelyveld 2010) as we can exploit both bank heterogeneity and firm heterogeneity while accounting for differences in type of borrowers serviced by domestic and foreign banks. In addition, our dataset allows us to study the (differential) impact of the credit crunch on the profitability of firms. To our knowledge this is the first paper studying the real effects of the global financial contagion.

Unused observables in loan officer decision-making

Neeltje van Horen, Sumit Agarwal (Chicago Fed)

This paper studies how loan officers respond to pay incentives building on two recent papers. First, it builds on the work of Agarwal and Ben-David (2011) who show that commission-based compensation leads to more risk taking of loan officers. Second, it builds on Fisman, Paravisini & Vig (2011) who show that cultural proximity increases the intensive and extensive margin of lending, reduces collateral rates and improves repayment performance. Using a controlled experiment where the incentive structure of a subset of small business loan officers was changed from fixed salary to commission-based compensation we test whether increased risk taking resulting from commission-

based compensation was caused by a move away from easy to screen borrowers. Matching loan officers' characteristics (like age, gender and race) with borrower characteristics we test whether cultural proximity is more likely to drive a loan decision when loan officers are less likely to take risks.

Geographic diversification in banking

Iman van Lelyveld

Internationally active banks claim that the diversification in income streams in their business model partly cushion them from country-specific shocks. Income streams could differ because of either the business line or the geographic location. The recent crisis has shown that in some areas the diversification effect has not played out. Although the concept of diversification remains valid, it is open to debate to what extent diversification is an operational concept in a crisis. If it is not, then supervisors should be less keen in accepting it in their supervisory assessment. I will apply a Value-at-Risk approach for determining the magnitude of international credit risk diversification effects in large internationally active banking groups. I intend to use a universally applicable correlation matrix approach to calculate international diversification effects, in which bank subsidiaries are treated as individual assets of the portfolio 'holding' of the banking group, but other approaches might also be valid (*cf.* Embrechts *et al.*, 2002). The dataset covers 43 of the largest banking groups in the world, operating significant country business units in at least two of 49 countries in total, over the period 1992-2009. I will focus my attention on the most important risk in banking, *i.e.* credit risk.

Contextual determinants of banks' liquid buffers (project started in 2010)

Iman van Lelyveld, Robert Zymek (University of Edinburgh)

Banks' role in maturity transformation combined with a first-come, first-served constraint imply that banks are susceptible to bank runs and thus can suffer from – temporary – illiquidity. The supervisory community has realised this and is working hard in coming to a joint framework for liquidity regulation and supervision (see WGL (2009) for an overview of the state of play in the literature). Objections to such a common framework have been raised as 'contextual factors' would make it impossible to achieve a level playing field; The depth of the financial market, the quality of regulation and competition have for instance been mentioned as such factors (BCBS, 2008). This paper will examine the economic importance of many of the factors mentioned in the debate. We will provide the first formal analysis of the determinants of banks' liquid asset holdings across countries. Using balance-sheet data for nearly 7,000 banks from 30 OECD countries over a ten-year period, we will assess the relevance of a number of country-specific institutional and policy variables in explaining the size of banks' liquid asset buffers. Our setup will be similar to Aspachs, Nier and Tiesset (2009) but we will use a worldwide dataset. Using several measures of bank's liquidity as dependent, we intend to explain these by firm specific controls, macro economic controls, and variables that measure contextual factors as mentioned in the literature.

Securitization and the dark side of diversification

Maarten van Oordt

Recent theoretical findings emphasize a dark side of diversification by financial institutions. Diversification tends to increase the similarity in portfolio holdings and as such has been blamed for increasing the probability of joint failures or systemic crises. The theoretical discussion on the dark side of diversification by financial institutions is based on classical diversification strategies. That is, financial institutions decide how much of their funds are invested in certain predefined assets. Nevertheless, these models forego the possibility that financial institutions structure the claims on these assets into different seniority classes. In this paper I assess whether the possibility to structure claims into different seniority classes has relevant implications for the discussion.

A tale of two factions: Exploring the relationship between factional faultlines, conflict management and the moderating role of reflexivity in pension fund boards (project started in 2011)

Dennis Veltrop, Niels Hermes (University of Groningen), Theo Postma (University of Groningen), Jakob de Haan

In the present study we examine the relationship between the demographic factional faultline between two naturally occurring stakeholder factions within Dutch pension fund boards on conflict management within boards of directors. Data on 313 Dutch pension fund boards confirm that demographic factional faultlines are positively related to competitive conflict management and negatively related to cooperative conflict management. These relationships are mediated by subgroup formation. A noteworthy finding with clear practical implications is that the adverse effects from demographic factional faultlines are attenuated by board reflexivity. Moderated mediation analyses corroborate these findings.

Regulatory capture: A social identity perspective on supervisors' monitoring financial institutions

Dennis Veltrop, Jakob de Haan, Dave Coenen

Regulatory capture is a topic widely debated in the academic literature. We propose that an important but up to now unaddressed determinant for regulatory capture is that supervisors can identify with the institutions they are monitoring. In this research project we examine the determinants of effective supervision from a social identity perspective. In particular, social identity theory holds that part of an individual's self-concept is derived from his or membership of social groups. In this vein, organizations can be considered as social groups. A great deal of research on organizational identification has demonstrated the pervasive effects of individuals identifying with organizations. Accordingly, we maintain that supervisors identifying with the institutions they are monitoring may affect their effectiveness in monitoring these institutions.

Board functioning: A multilevel perspective on the determinants of effective board behaviour in financial institutions

Dennis Veltrop, Jakob de Haan, Gerben van der Vegt (University of Groningen)

Boards of directors are critical for good governance of financial institutions. Although a great deal of research has been conducted on formal structural board arrangements, like any social entity boards of directors are first and foremost social groups. Governance scholars know very little about the determinants of effective board behaviour, however. This research project teases out the determinants of effective board behaviour at multiple levels of analysis. We study board behaviour at the group level of analysis, at the individual level of analysis, and at the dyadic level of analysis. Thereby, facilitating a fine grained analysis fostering a profound understanding of boards from a behavioural perspective.

Is there a home bias in Dutch insurance companies' asset allocations?

Robert Vermeulen, Melle Bijlsma

Previous research pays little attention to the international diversification of insurers' assets. In general, researchers take home bias as a given for insurance companies. There are, in principle, no barriers to foreign investments for Dutch insurance companies. Moreover, the euro zone provides a large market to hold assets the same currency. Since knowledge about insurance companies' investments is scarce, we first document Dutch insurers' geographical asset mix. We use confidential DNB data at the firm level, which contains the investment positions and transactions for each Dutch insurance company during 2006-2011 at the quarterly frequency. A first glance at the data suggests that most funds are invested in euro denominated assets, mostly bonds. We formally study the extent of home bias in the portfolio with an empirical gravity model. In particular, we study whether gravity matters differently for the type of asset and how it changes from pre-crisis, during the financial crisis and during the current sovereign debt crisis. We aim to document the extent to which insurers decrease their exposure to periphery government debt and where they shift their portfolios to. In particular, whether the sovereign debt crisis creates a flight to domestic assets and increases the home bias.

Contagious bank runs

Razvan Vlahu, Martin Brown (University of St. Gallen), Stefan Trautmann (Tilburg University)

A contagious bank run arises because the occurrence of one bank run alters the beliefs of the depositors at other banks. Depositors' beliefs may be affected because the fundamentals of the banks are interrelated as a result of either common economic shocks or common exposures in their balance sheets. Yet, contagion can arise without such economic links - coordination failure of depositors at one bank may lead to coordination failure at another bank as it basically makes withdrawal a "focal" point for depositors. This paper experimentally studies these two channels for contagion and provides answers to the following questions: (i) can bank runs be contagious in absence of any fundamental linkages?, (ii) which channel can be more damaging for the stability of the banking system?; (iii) do individual characteristics (e.g., risk attitude, past experiences) affect depositors' propensity to run when they observe large withdrawals from another bank?

Goal incompatibility and prioritization of collective goals at the top of financial organisations

Melanie de Waal

Recently a common call for more regulation on the financial sector is heard in an attempt to decrease risk-taking behaviour at the top of financial organisations, as an answer to the events leading to the financial crisis of 2007. Therefore, a behavioural and cultural change starting at the *top* of financial organisations (i.e. at the board-level; Committee 'de Wit') is desired, which concerns a shift from short-term individual goals towards a focus on collective goals that serve financial organisations in the long run. De Nederlandsche Bank - as regulator- is expected to play a key role in supervising this change. Central to this project is the potential problem of perceived goal incompatibility by board members of financial organisations when confronted with a choice-dilemma between lower-order (divisional or departmental goals) goals these board members represent versus the collective goals of the organisation. Hence, the aim of this research project is to unravel the key factors that will reduce the *level of perceived goal incompatibility* within the boards of financial institutions necessary for a prioritization of collective goals. In 2012 the first study of this research project will be designed and executed.

4. Financial literacy and behaviour of households and companies

What do the public and the retailers expect from DNB concerning its role in the retail payment system? Evidence from a survey among Dutch customers and retailers

Hans de Heij, Frank van der Horst, Nicole Jonker, Esther van den Kommer

Due to the financial crisis the media paid a lot of attention towards DNB, in particular to the supervision activities. Recent DNB-research showed that the public often expect more from supervisors than they can realistically achieve. The payment division of DNB was less in the centre of interest. However, the media attention and perceived expectations towards supervision triggered us in wanting to know what stakeholders, i.e. the public and retailers, expect from DNB in the retail payment system. Do the stakeholders think that DNB is responsible for the availability and spread of ATM's. Should DNB take action when there is on a large scale counterfeits? Is DNB the organisation, according to the stakeholders, that should fight skimming?

Compensating insurance agents: commissions versus fees (project started in 2011)

Janko Gorter

Due to both competitive and regulatory concerns, the compensation of insurance agents has come under increasing scrutiny, both from policy makers and from the public at large. Particular concern exists about the effects of commission payments on unethical sales practices. It has been suggested that it would be better if consumers would pay a direct fee for advice about financial products rather than having the agent receive a commission from the insurers if a sale is made. This paper models the insurance market. There are consumers, insurers and agents. Agents have a financial incentive to

exaggerate the benefits of insurance to consumers if compensated by sales commissions. Consequently, the quality of advice is greater when agents are compensated under a fee-based system. However, consumer will not become informed under a fee-for-advice system, unless they first pay the fee. So, whether a fee-based system is actually preferable from a welfare perspective largely depends on the market position of agents and consumers, respectively. Therefore welfare comparisons are made between commission-based and fee-based compensation regimes.

Cash versus debit card: the role of budget control

Lola Hernandez, Nicole Jonker, Anneke Kosse

Several studies have shown that the social cost efficiency and safety of a payment system is affected by the way consumers pay for their purchases. In general, a substitution of cash by debit card payments is found to reduce social costs. In order to gain insight into how the safety, efficiency and accessibility of paying in the Netherlands can be further improved, DNB and other stakeholders in the Netherlands, regularly conduct research. However, until now, little attention has been paid to the role of budget control in consumers' payment choice: what value do consumers attach to controlling their budget and spending, to what extent do the different means of payment fulfil these demands, and how does this affect consumers' payment choice at the point-of-sale? The academic literature as well, is unclear about the role of budget control in consumer payment choices. In order to answer these questions, we will use consumer data collected in 2011 by means of an extensive payments survey among more than 7,000 consumers. In addition, an additional survey will be held in 2012 among members of the CentERpanel, in order to be able to make a link with the data gathered via the yearly DNB Household Survey. Using regression analyses, we will investigate to what extent payment habits are influenced by the need for self-control. Due to the rich dataset, we will also be able to assess differences across individuals, types of transactions and transaction amounts. To check our findings, we will assess daily developments in ATM and POS transactions using transaction data supplied by Equens.

Explaining the relative wage of older workers

Jos Jansen, Yike Wang

The steepness of the observed average age-earnings profiles varies greatly across industrialized countries. Research by the OECD and others suggest that a steep age wage profile is associated with a weak labor market position of older workers, in particular a low hiring rate by firms of older workers. This paper aims to explain the observed cross-country variation in the steepness of age-earnings profiles in OECD countries, measured by the relative wage of older workers (compared to the average wage of workers aged 25-29). Explanatory variables are cross-country differences in relative productivity (measured by educational attainment), differences in labor market institutions, such as employment protection legislation and incentives for early retirement, and the quality of industrial relations and trust.

The impact of public campaigns on debit card usage in the Netherlands

Nicole Jonker, Mirjam Plooij

The number of debit card payments has increased steadily since the introduction of the debit card at the end of the 80s. However, in 2007 Currence, the scheme owner of the Dutch debit scheme PIN, launched a long term public campaign stimulating consumers to use their debit card even more, also to settle small transaction amounts at the point-of-sale. The campaign has aimed subsequently at specific branches, starting with supermarkets in the summer of 2007. Sectors that followed include drugstores, DIY, wine & liquor stores, garden centres and the catering industry. In addition, the public campaign also includes regional campaigns and nation wide campaigns 'Week van het Pinnen', 'PIN & Win' which focus on overall card usage. This paper aims at assessing the overall effectiveness of the campaign on card usage, as well as the effectiveness of the different kind of campaigns. In 2012 we will collect monthly/weekly branch specific debit card figures as well as information on the intensity of the different kind of campaigns (measured e.g. as the number of tv-commercials, radio commercials, adds in national or regional papers, promotion material in shops, ec.). We will use time-

series/panel data techniques to analyse whether the campaign has had effect on card usage, while controlling for other factors which influence card usage such as supply side factors (e.g. availability of payment terminals per branch, availability of ATMs), demand side factors (demographics, macro-economic environment) and seasonal effects.

Do newspaper articles on debit card fraud affect debit card usage? (project started in 2010)

Anneke Kosse

Skimming fraud is one of the main forms of payment fraud at points of sale and ATMs in the Netherlands and it has increased materially over the past few years. Although the size of this fraud is relatively small in comparison with total retail payments, these incidents receive a fair amount of attention from the media and might therefore affect consumers' payment behaviour and in the end the overall efficiency of the payment system. Using time series and panel data analyses, I will analyse, after having corrected for calendar and seasonal effects, to what extent daily debit card usage is affected by publications of newspaper articles about skimming. To this end, daily debit card transaction data (split up by region) have been collected from 2005 – 2008, as well as all skimming articles published during this period in national and regional newspapers (also split up by region). This study will provide insight into the extent to which overall consumer payment behaviour is affected by media announcements and into the sensitivity of consumers' confidence with respect to paying.

Distributional aspects of household savings, saving motives and liquidity constraints

Federica Teppa

This project provides a descriptive overview of several aspects of household savings, including saving motives and liquidity constraints, based on the information collected in the first wave of the HFCS. The harmonized nature of the HFCS questionnaire makes this data source particularly suitable for cross-country comparisons and very valuable to analyse household saving behaviour in Europe. The HFCS data offers the opportunity to work out a qualitative self-assessed measure of household saving based on information about whether over the previous year the regular expenses in the household were higher than household income, just about the same, or less than household income. Within each country the data allows to identify the households who are able to save and those who are forced to dissave by household characteristics (e.g. size) and head of household characteristics (e.g. age, level of education, employment status). In addition, the HFCS contains info about (food) consumption. The analysis of the distribution of this component across wealth, income and demographic groups helps understanding wealth effects and complements other information on income and debts. The second topic this study may investigate is attitudes towards saving. The third contribution of this project may be the analysis of liquidity constraints. Ideally both the extensive and the intensive margin of liquidity constraints should be empirically investigated.

Subjective bias in house prices: Empirical evidence from the Netherlands

Federica Teppa, Gabriele Galati

Housing wealth represents typically the largest fraction of household portfolios. The recent financial crisis has caused large fluctuations in house prices and consequently on the ability for households to borrow out of their housing wealth. It has been contended, however, that households tend to misperceive actual prices and systematically overestimate the price of their house, on average. While this contention appears reasonable, it is very difficult to verify empirically given the scarcity of consistent data on subjective and objective house prices. This paper aims at filling this gap by using data from the DNB Household Survey and from the Dutch cadaster to study the subjective bias in house prices. We exploit the longitudinal component of the Dutch panel to track the variation in the discrepancy between self-assessed measures and official statistics over time, and relate it to household-specific characteristics, house characteristics, and the business cycles.

Public trust in banks and their supervisor: why it left on horseback

Carin van der Crujnsen, Jakob de Haan, David-Jan Jansen

Using a Dutch household panel survey, we research the development of public trust in banks and their supervisor. First, we show that trust has declined sharply during the recent crisis. Second, by using the outcomes of a detailed questionnaire, we shed more light why trust left on horseback. We link trust to two factors in particular: (1) personal crisis experiences, and (2) knowledge about supervision. Regarding the first factor, we expect that the decline in trust is relatively strong for those respondents that experienced that their own bank ran into problems, either by going bankrupt or by receiving government support. Regarding the second factor, we expect that poor knowledge about banking supervision and thus unrealistically high expectations of banking supervision go along with relatively large losses of trust. The latter would imply that banking supervisors should try to improve the knowledge of the public at large because large drops in trust threaten financial stability.

Motives for paying with cash or debit card on a conscious or subconscious level

Frank van der Horst, Ester Matthijsen, Marcel van der Woude

From various other studies we learned a number of rational motives for possession or payments with cash. It has not been examined however which conscious or subconscious motives are used - and how these different motives contribute - in the decision of paying with cash or pin. We are of the opinion that this cannot be measured satisfactory by asking people, in stead we have the intention to observe behaviour of people in a laboratory setting.

Non-financial determinants of the individual retirement age

Niels Vermeer (CPB/UvT), Mauro Mastrogiacomo (CPB/VU), Daniel van Vuuren (CPB), Maarten van Rooij

It can be loosely stated that about half of the observed retirement behavior is related to financial incentives and half to non-financial determinants. The impact of financial incentives has been investigated widely. But few scholars have focused on other determinants, while these might be critically important for the effect of the policy changes ahead of us on actual retirement choices. We will set up a special module for the DNB Household Survey to shed light on the impact of non-financial determinants on retirement behavior. In particular, we are interested in social norms with respect to the retirement age, the effect of the presentation of choice options and the role of financial literacy. This research will provide important insights on the retirement behavior of individuals and the impact of a higher pension age on the labor participation rate.

Remittance payment channel preferences of migrant' in the Netherlands: Evidence from survey data

Robert Vermeulen, Anneke Kosse

Globally migrants send over US\$ 300 billion to their families in their countries of origin and many studies provide results on the positive effect of remittances on the local economy of the recipient countries, both at a micro and macro level. So far, however, little attention has been paid to remittance channel choices made by migrants. Each channel has its own pros and cons for the payer and the payee, e.g. in terms of transparency, costs, accessibility, safety, speed and reliability. This research will contribute to the existing literature by exploring the determinants of migrants' remittance channel choice. We base our research on an extensive consumer survey conducted in 2009 among more than 1,600 Dutch migrants. First, we describe the remittance channels used by migrants in the Netherlands. Next, we dig deeper in the underlying reasons for choosing a specific channel. In particular, we investigate how remittance channel choice is affected by the country of destination, the amount remitted, socio-economic characteristics of the payer, personal stated motivations, cost perceptions, as well as migrants' perceptions and experiences regarding the safety, speed, costs and user friendliness of other payment instruments and payment channels in general, such as internet banking and cash usage. The relevance of this work is to shed light on the role of formal and informal remittance channels, the possible barriers perceived by migrants for particular channels, and to provide policy suggestions on how to increase the usage of formal remittance channels and more generally on how to further stimulate the safety, efficiency and integrity of international remittance transfers.

5. Modelling and forecasting

Macroeconomic Forecasting in the Euro-zone using Seasonal Dynamic Factor Analysis: combination of forecasts and Bayesian model averaging

Andres M. Alonso (UC3M, Spain), Carolina Garia-Martos (UPM, Spain), Irma Hindrayanto

The seasonal dynamic factor analysis methodology developed in this project will be suited for modelling and forecasting Harmonized Index of Consumer Prices (HICP) in the Euro-zone countries, which contains pronounced seasonal pattern. The forecasted HICP numbers are fundamental for monetary policy decisions since they define inflation. By including seasonal component directly into the dynamic factor analysis framework, we allow extraction of both regular and seasonal components, as well as common and specific unobserved dynamic features in the HICP data. We expect that the integral treatment of seasonal component is useful for improving short-term forecasts and enhancing the understanding of price movements.

DELFI's long-run properties

Robert-Paul Berben, Johan Verbruggen

Many of DELFI's behavioural equations are modelled using the co-integration framework, in which the long-run relationships are derived from economic theory. This implies that – in isolation – these variables move back smoothly towards their equilibrium paths. Much less attention has been paid to the stability of the entire model. Is it possible to construct long-term projections with DELFI? Does the model return to equilibrium after a temporary shock? And if so, is the adjustment path smooth or does it feature strong oscillations? Studying the long-run properties of DELFI will hopefully give answers to these questions. Furthermore, we may be able to uncover weaknesses in the model, i.e. equations or coefficients that lead to instability. The impact on the long-run properties of the model can then explicitly be used as a criterion for equation selection.

Reduced rank time-varying Vector Autoregressions (project started in 2011)

Joris de Wind, Luca Gambetti (UAB, RECent)

The time-varying Vector Autoregressions of for example Primiceri (2005) and Cogley and Sargent (2005) seem to be overparameterized. They assume that the vector of time-varying coefficients follows a random walk with full rank covariance matrix. Principal component analysis, however, suggests that only a few factors are important in driving the coefficients. Therefore, we reduce the rank of the covariance matrix of the random walk. We rewrite the reduced rank model using an underlying factor structure which we can estimate much faster than the full rank model. Because the reduced rank model is not subject to overparameterization as much as the full rank model, we can include more variables and/or more lags.

Forecasting macro-economic time series using economic indicators (dynamic factor model approach)

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

In dynamic factor models (DFM), a small number of (unobserved) common dynamic factor drive the observed movements of a large number of economic time series. The technique has been proven a powerful tool for short-run forecasting and policy analysis. The appropriate dimension in DFM specifications is still a topic of ongoing research. Empirical forecast performance of small scale DFM appears quite competitive with larger models. However, large DFMs may still be attractive when there are few theoretical grounds to eliminate possible explanatory variables a priori. As a compromise, we propose to employ a large scale DFM framework with a clearly defined categorical structure. Assuming we have four categories in economy (real, finance, prices, survey indicators), we may choose for instance up to three principal components (PC) from, say 20 time series in each group, resulting in no more than twelve PCs. These PCs are then used as the unobserved common factors in our DFM. After the DFM structure is selected, we apply this model to forecast two key macro-economic variables: output growth and inflation. Empirical details will follow later on. In a next stage, we plan to investigate the forecast performance of our model for different Euro-countries.

Relation between employment and production: Lessons from the credit crisis

Irma Hindrayanto, Johan Verbruggen

Labour market behaviour during the credit crisis was different to normal and also different from forecasts. Although the economy faced an unprecedented sharp fall in production in 2009, the number of unemployed persons increased by far less than DNB and others had predicted. This was primarily because enterprises hoarded substantially more employees than expected. With the benefit of hindsight, this is understandable given that the labour market was rather tight for quite some time when the credit crisis hit. Employers evidently attached great importance to keeping their newly recruited employees on the payroll. Moreover, enterprises were generally in good financial shape during the credit crisis, as a result of which employers could afford hoarding labour. We will analyse whether these mechanisms have worked before in the Dutch economy or elsewhere. If so, we will try to incorporate these findings in the employment equation of DELFI.

Asset price based leading indicators of GDP for US, Europe and Asia

Clovis Hopman, Ad Stokman

We construct a leading indicator of GDP growth for the US, the euro zone and Asia based on asset prices. We are particularly interested in the predictive power of house price dynamics as suggested by Rogoff and Reinhart. Forecasting horizons range from 1 quarter ahead up to 1 year ahead. A preliminary comparison with the official BMPE by the Euro System suggests that the asset price approach is promising.

Predicting quarterly GDP in the short run: A comparison of methodologies

Jos Jansen, Jasper de Winter, Xiaowen Jin (University of Munich)

This project compares statistical approaches to predict quarterly GDP in real time within short horizons for a number of European countries. A reliable assessment of the current state of the economy and a well-founded sense where it is heading in the short run is of great importance to both policy makers and private agents, especially in volatile times. This paper focuses on the information content of indicators that become publicly available more frequently and more timely than the quarterly GDP time series itself, including revisions. Examples of such indicators are stock market prices, interest rates, volatility measures, industrial production, consumer and producer confidence, and vacancies. Teasing out the predictive content of these indicators is complicated by the large number of potentially useful indicators, the noisy nature of many series and the mixed frequencies and time lags of observations. Several statistical approaches have been developed in the literature to deal with these complications in an optimal manner. Among them are bridge models, VAR models and dynamic factor models.

Forecasting macroeconomic and financial time series that are subject to structural breaks

Andreas Pick

This research project considers the issue of forecasting time series that are subject to structural breaks. A recent paper by Pesaran, Pick and Pranovich (2011) has introduced the notion of optimal forecasts when the econometric model is subject to structural breaks, where optimality is in the MSFE sense. These authors introduced weighted regressions where weights are chosen such that the resulting forecast has the minimum MSFE. In their paper, forecast of GDP growth based on the slope of the yield curve are evaluated with the different forecasting methods. In this research project we aim at broadening the empirical evidence on the different forecasting methods. For this we will consider a wide range of international macroeconomic and financial times series.

6. Other projects

Key elements in banknote design: banknote identity (project started in 2011)

Hans de Heij

Commissions to design a new banknote are typically unclear, hiding many implicit aspects. This study aims to make these key subjects more explicit in order to make them more manageable. The study is done with an eye on the design of future euro banknotes (Euro Series 3). The key elements of banknote design fall apart in two separate groups, subjects related to a) the product, i.e. the banknote; b) the process, i.e. the design management. Both product and process are divided into six subjects and each subject is subdivided in several items. The 'fieldwork' of the study covers 3 of the 12 identified key subjects: 1) Value recognition of banknotes (2009 DNB Occasional Studies 2009/2), 2) Security features for retailers and public (2010, DNB Occasional Studies 2010/4) and 3) Designing banknote identity (work done in 2011; Occasional Study planned for 2012). These three studies also cover the methods developed and used by DNB at the time of the successful Dutch guilder banknotes. These three fieldwork studies done are the major input to the thesis which is planned to be ready by the end of 2012. An important part of the thesis is the Annex (*yellow pages*), which will be a template of a complete Programme of Requirements for a new banknote.