Autumn 2018

Financial Stability Report

DeNederlandscheBank

EUROSYSTEEM

De Nederlandsche Bank Financial Stability Report

Autumn 2018

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Westeinde 1, 1017 ZN Amsterdam – PO Box 98, 1000 AB Amsterdam, the Netherlands

Telephone +31 20 524 91 11 – Email: info@dnb.nl

www.dnb.nl

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Foreword

DNB is responsible for overseeing financial stability in the Netherlands, a task embedded in the Bank Act. DNB expressly considers the interaction between financial institutions and their environment: other institutions, the macroeconomy, financial markets and financial infrastructure. Early detection of systemic risks comprises an important part of DNB's financial stability task.

Every six months DNB publishes its Financial Stability Report (FSR). The FSR outlines systemic risks that may affect groups of institutions or entire sectors as well as the Dutch financial system, and which may eventually disrupt the real economy. DNB issues the FSR to raise awareness among stakeholders - financial institutions, policy makers and the general public - of systemic risks and the potential impact of shocks to the financial system. Where possible, DNB uses macroprudential instruments and issues policy recommendations to prevent or mitigate these systemic risks.

The FSR does not include projections, but analyses scenarios. Chapter 1 lists the main current risks to financial stability and includes a risk map that summarises the main risks to financial stability discussed in this and previous issues of the FSR. The next three chapters address a number of themes in more detail. They are: (i) risks in the commercial real estate market; (ii) vulnerabilities in the insurance sector, and (iii) financial stability risks deriving from a disruptive energy transition.

1 Overview of Financial Stability

Key points and recommendations

The current main international risks to financial stability include the difficult Brexit negotiations, escalating trade conflicts, a faster than expected tightening of the Fed's monetary policy and political tensions across the globe. In addition, the currently still accommodative financial conditions are feeding the build-up of financial vulnerabilities. This is dampening the incentive to reduce debt and is stimulating risk-seeking behaviour in the financial markets. If financial conditions are suddenly sharply tightened, as happened in Turkey and some other emerging countries, imbalances often manifest themselves in a painful manner. If the economic crisis in Turkey were to spread to other emerging countries, the Dutch financial sector may also be affected.

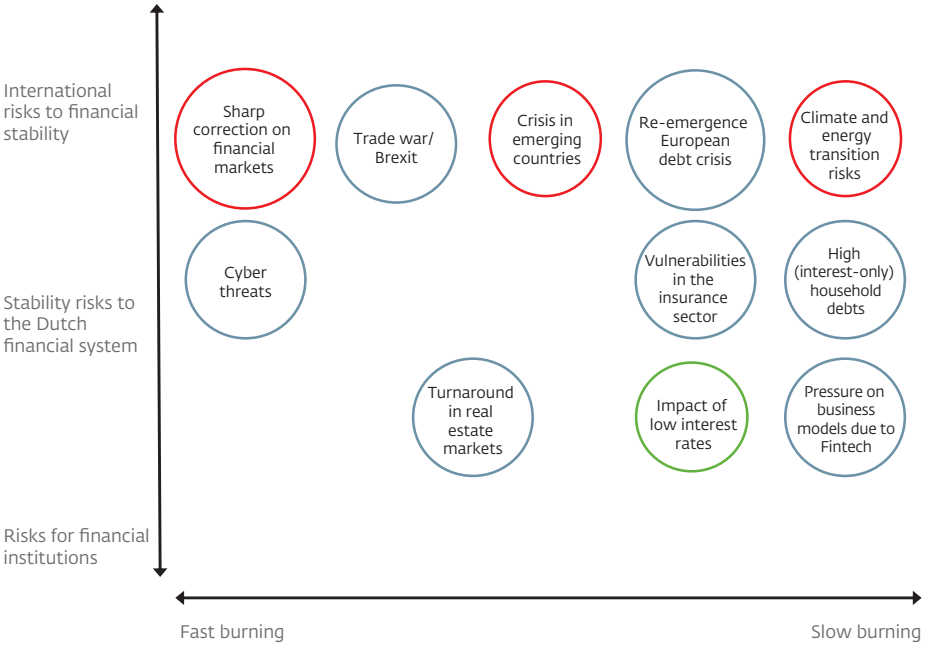
In the Netherlands, the booming real estate prices demand attention. Not only have tensions risen sharply in the residential market, the commercial real estate market is also showing substantial price rises at prime locations. The current scarcity on the housing market must be remedied by increasing the housing supply, especially in the middle segment of the rental market.[1] Easing of the borrowing capacity to the borrower's income is undesirable as this would only fuel overheating of the market. Where the commercial real estate market is concerned, Dutch financial institutions seem to be well able to cushion the consequences of a turnaround. However, especially during periods of economic boom, vulnerabilities may build up, in particular if loans are extended against less stringent financing terms and conditions. It is therefore important for financial institutions to monitor the risks of commercial real estate extra closely in the period ahead. More and better data and improved real estate appraisals by defining legal standards may contribute towards a better functioning real estate market.

The Dutch banking sector is in a good shape as far as capitalisation is concerned, but the insurance sector is facing several challenges. Since the crisis, insurers have made progress in developing a future-proof sector: fewer and less high return guarantees are being issued, consolidation has taken place and retrenchments were made. The life insurance sector nevertheless remains vulnerable, also due to low interest rates and declining premium income. Insurers, supervisors, and policymakers are therefore required to make extra efforts. Important points for attention in this respect are adequate valuation of liabilities and further sobering of return guarantees on new contracts. The successful implementation of a recovery and resolution framework is crucial, as this improves the resolvability of insurers in crisis situations.

1 DNB Financial Stability Report, Spring 2018.

As part of the Paris Climate Agreement, approximately 200 countries committed themselves to limiting global warming to well below 2°C. These commitments require a transition to an energy supply in which emissions of greenhouse gases are sharply reduced. If this energy transition is accompanied by abrupt shocks, this may affect financial stability. We performed a stress test in order to quantify the consequences of a disruptive energy transition.
Our stress test revealed that a disruptive energy transition may lead to substantial losses for the Dutch financial sector. Governments can prevent unnecessary costs by implementing timely and effective climate policies. Financial institutions can curb energy transition-related risks by integrating them in their risk management.

Risk map



The risk map presents a schematic overview of the main risks to financial stability as discussed in the current and previous issues of the FSR. The size of the circles reflects the magnitude of risk. The colour of the circles reflects whether viewed over the medium term, a risk increases (red), decreases (green) or remains unchanged (grey).

International developments

Growth of the world economy is subsiding somewhat in the years ahead, but is still firm. The global economy is continuing to grow steadily on the back of accommodative monetary and financial conditions. The International Monetary Fund (IMF) expects firm global economic growth this year and next, which is set to weaken gradually thereafter. Economic conditions in the euro area are comparable: The European Central Bank (ECB) estimates GDP growth in the euro area at 2.0% for 2018, slowing to 1.7% in 2020. The Dutch economy will also continue growing at a gradually declining pace, posting growth figures slightly above the euro area average.

At the same time, there are significant risks for global economic growth and financial stability. Trade tensions between the United States and other economies, China in particular, have been rising in the past months. The implementation of trade-restricting measures and the ongoing threat of further protectionist measures may in the longer term eat into economic growth and be accompanied by increasing financial uncertainty.[2] The revoking of previously implemented regulatory reforms poses a further risk to financial stability.[3] The uncertainty surrounding Brexit is also continuing. A definitive exit agreement must be in place before 29 March 2019. As long as there is no agreement in place, the risk of a hard Brexit cannot be excluded. It is important for the Dutch financial sector to continue preparing itself for different Brexit scenarios (Box 1). And last but not least, international political tensions in different parts of the world are still high. Mounting threats or a sudden escalation of tensions may lead to uncertainty among investors, rapidly rising risk premiums, or sharp exchange rate corrections. The increasing political tensions between the United States and Turkey in August, for instance, contributed to a further exacerbation of the economic crisis in Turkey.

A faster than expected monetary tightening in the United States may also cause a sudden correction in the financial markets. The Fed started phasing out its accommodative monetary policy some time ago. US policy rates were raised in eight steps to a bandwidth of between 2 - 2¼%, and the Fed is reducing its swollen balance sheet. Although the financial markets are expecting the Fed to continue its policy of tightening for the time being, investors' perception of the pace at which monetary tightening will take place, lags behind that of the Fed itself. This constitutes a risk. When investors begin to realise that the Fed may well tighten its policy at a faster pace than foreseen earlier, this may induce a sudden decline in risk appetite and sharp corrections on financial markets.

Financial conditions will remain accommodative in most developed countries. Despite monetary tightening in the United States, financial conditions are still very accommodative in this country, which is partly explained by the sharp rise in equity prices and the flattening

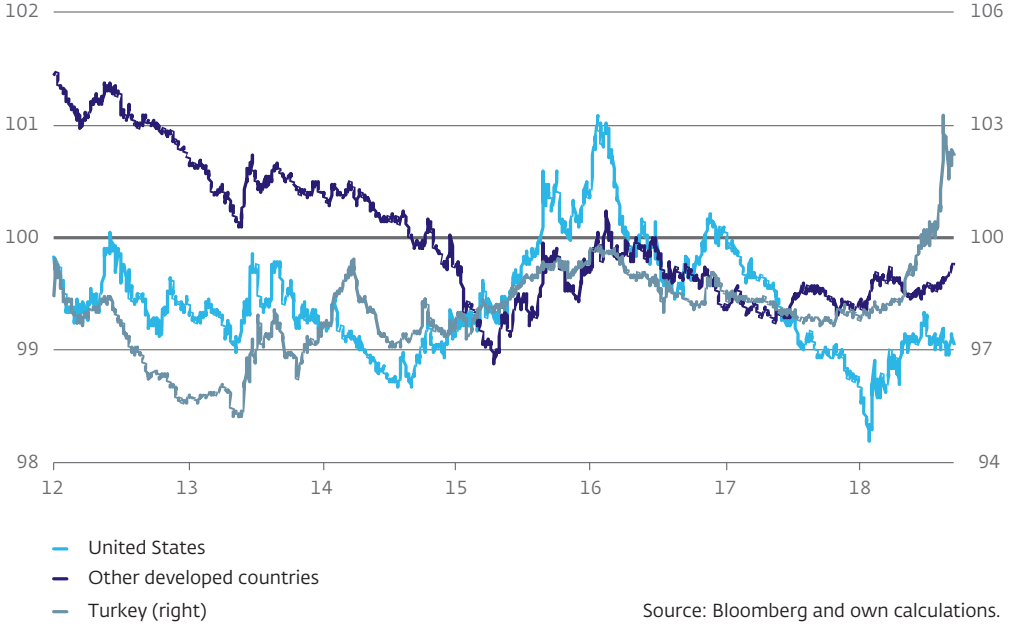
2 For more information on the effects of increasing protectionism on the Dutch economy, we refer you to DNB (2018), *Economic Developments and Outlook*, June.

3 A recent example of this is the Crapo Bill in the United States, which rolls back parts of the Dodd-Frank Act.

US yield curve. Financial conditions in other developed countries also remain relatively accommodative historically speaking (Figure 1). The very accommodative monetary policy pursued in these countries is contributing to this. The Eurosystem is still making net purchases of bonds in the euro area; these net purchases to a monthly amount of EUR 15 billion will be continued until the end of 2018, when they are expected to come to an end. After the purchasing programme has ended, the Eurosystem, however, plans to re-invest the expiring bonds for the time being, which means that the purchases will have lasting effects well into the future. The ECB has also announced that it expects its policy rate to remain unchanged at 0%, at least through the summer of 2019. The Japanese central bank also continues to pursue a very accommodative monetary policy, indicating that it is set to keep its short and long-term interest rates at extremely low levels for an extended period of time. The ongoing accommodative financial conditions in the developed countries are accompanied by mounting financial stability risks.

Figure 1 Financial conditions in developed countries and Turkey

Average between 1990 (or after) and 13 September 2018 = 100



Source: Bloomberg and own calculations.

Note: Goldman Sachs' Financial Conditions Index (FCI) is a weighted average of short-term market interest rates, long-term sovereign bond yields, risk premiums on corporate bonds, equity valuations and effective exchange rates. The average value over the entire period is normalised at 100. A value lower (higher) than 100 means that financial conditions are more accommodative (tighter) than the historical average. The group of "Other developed countries" constitutes a weighted average based on the GDP of the FCIs of the euro area, Japan, Norway, Sweden, Australia, Canada and the United Kingdom.

Box 1 Brexit

The United Kingdom (UK) is set to leave the European Union (EU) on 29 March 2019. The uncertainties about the terms and conditions of the country's departure remain significant, however. A definitive exit agreement has not yet been concluded and the negotiations on the UK's future relationship with the EU are progressing with difficulty. An abrupt exit without an agreement in place and without a transitional period (a hard Brexit) may still be on the cards. This may have severe implications for financial institutions, financial markets, and financial stability. Banks and insurers are for instance running the risk that they will no longer - or no longer under the same conditions – have access to the UK-based infrastructure, or that they no longer have the necessary authorities for specific cross-border activities. In addition, a hard Brexit may induce volatility on the European equity and bond markets, which may lead to financial losses for institutions with substantial investments in the UK. In the longer term, indirect risks may also materialise, e.g. because banks have extended loans to corporations dependent on trade with the UK.

The Netherlands has strong trade and financial ties with the UK, owing to our country's open economy and its relatively large financial sector. This is why the different aspects of Brexit and their effects on Dutch financial institutions and financial stability have our full attention. A major part of the efforts take place at European level. The European Commission has for instance examined which consequences the UK's departure has for European financial legislation.[4] The European supervisory authorities, like the European Banking Authority (EBA), have also issued various Opinions on Brexit, which explain to financial institutions and supervisory authorities the tangible risks of a hard Brexit and the necessity to take adequate preparations in case this happens.[5]

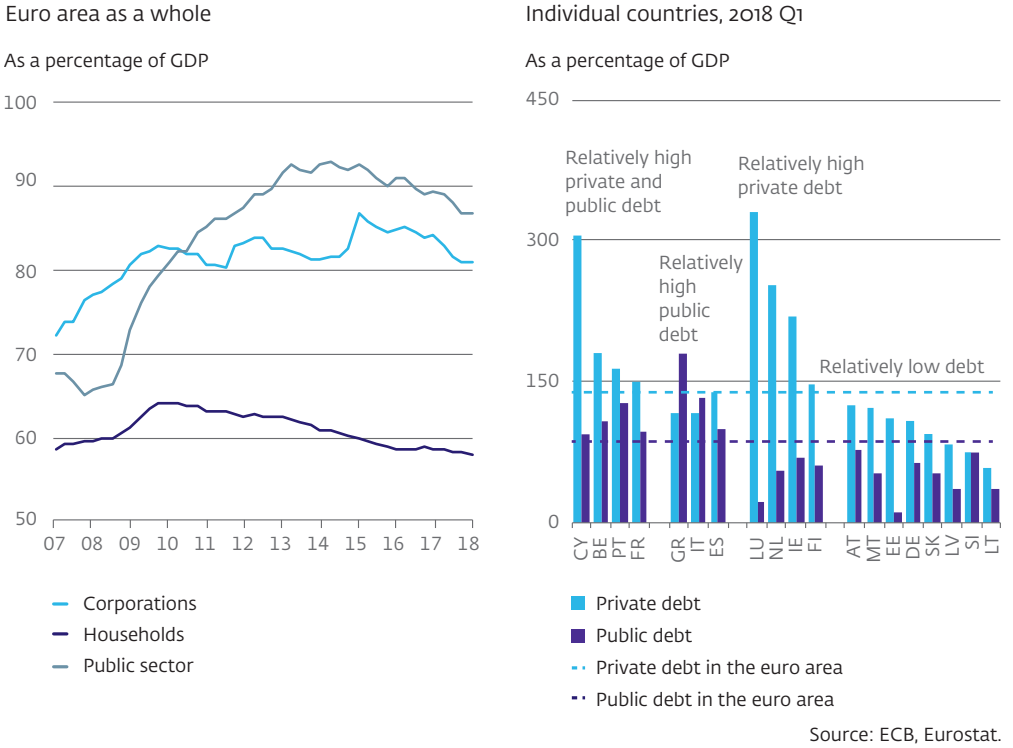
Although financial institutions are primarily responsible for an adequate and effective preparation for all possible scenarios, DNB together with the Dutch Authority for the Financial Markets (AFM) and its European supervisory partners, monitors whether Dutch financial institutions are assessing the impact of Brexit in all possible scenarios and are taking prompt mitigating measures if required. When necessary, we are also conducting surveys among the financial institutions under our supervision to form an opinion on how they are preparing for a hard Brexit scenario and the extent to which they are taking mitigating measures. We will also continue discussing the implications of Brexit for the financial sector in our consultations with the various sectoral associations in the Netherlands, including the Dutch Banking Association, the Dutch Association of Insurers and the Federation of the Dutch Pension Funds.

4 European Commission (2018), *Withdrawal of the United Kingdom and EU rules in the field of banking and finance*, 8 February.

5 See for instance: *EBA Opinion on Brexit issues*, 12 October 2017 and *EBA Opinion on Brexit preparations*, 25 June 2018.

Corporations and governments in the euro area are still facing high debt levels. As financial conditions remain accommodative for a prolonged period of time, households, corporations and governments lose the incentive to reduce their debts. This makes them vulnerable in case financial conditions are tightened again, or when growth prospects deteriorate. At the start of this year, the average government debt in the euro area amounted to almost 87% of gross domestic product (GDP), while household and corporate debt came to 58% and 81% of GDP respectively. Although the level of debt in the euro area is declining, the pace at which debts are being reduced is relatively slow (Figure 2, left). Households have been reducing their debts since the end of 2009, while balance sheet repair in the corporate sector was not started until 2015. Government debt reduction was not started until 2015 either. While average household debt has declined to pre-crisis levels, corporate and government debt in the euro area have by no means returned to these levels.

Figure 2 Euro-area debt levels



Source: ECB, Eurostat.

Note: The government debt shown follows the definition used in the Maastricht Treaty and refers to consolidated gross debt at nominal value. Household and corporate debt have been valued at market value; for corporations this also refers to consolidated debt.

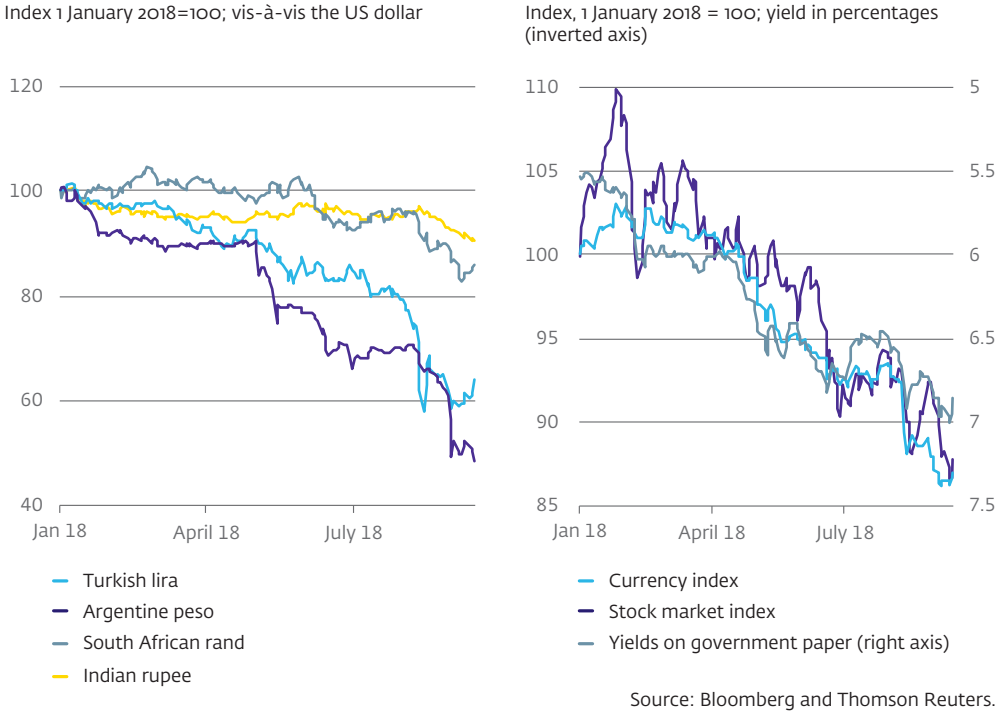
Debt positions differ widely between euro countries. Some euro area countries have high levels of both private (households and corporations) and public debt, e.g. Cyprus, Belgium, France and Portugal (Figure 2, right). In countries like Greece and Italy, government debt dynamics remain particularly vulnerable, while others, including the Netherlands, are facing high private debt levels. If the private or public debt dynamics of a country deteriorates, this may have repercussions for the banking sector through rising credit losses on outstanding loans or losses incurred on investment portfolios.

Prolonged accommodative financial conditions are also inciting risk-seeking behaviour. Amid prolonged accommodative financial conditions, financial markets may face disruptive effects. Low interest rates for instance induce investors to take more risks in order to keep yields at acceptable levels. Fuelled by the search for yield and the favourable economic conditions, prices of some securities have risen sharply in the past few years. Particularly in the United States, equity prices have soared in recent years, and price/earnings ratios of US equities are now way above their long-term average. The fact that investors are increasingly prepared to take risks is also reflected in the booming markets for high-risk products, such as high-yield corporate bonds. In 2017 for instance, a record amount of EUR 87 billion was issued in euro-denominated high-yield corporate bonds, while in the first eight months of 2018 the issues amounted to EUR 47 billion. In addition, the investment-grade corporate bond market is showing indications of deteriorating credit quality. The proportion of bonds with lower ratings is increasing for instance: almost 50% of euro-denominated investment grade corporate bonds is now BBB-rated, as compared with 20% in 2008.

Financial conditions in various emerging countries have recently tightened, which may become problematic in view of their high debt levels. The currencies of several emerging countries have plunged in the past months, e.g. in Turkey, Argentina, and South Africa (Figure 3, left). Combined with rising long-term interest rates and substantial losses in the equity markets (Figure 3, right), this has led to a tightening in financial conditions in several emerging countries. At the same time, private debt in many emerging economies has risen sharply, including debt denominated in foreign currencies. BIS calculations reveal that since 2009, US dollar-denominated non-bank debt in emerging countries has more than doubled to over USD 3,600 billion at end 2017. This makes these countries vulnerable to both refinancing and currency risk.

Turkey in particular has been in the limelight in the past few months. Since the Turkish elections, investor confidence in the country has been under increasing pressure, and the country is undergoing a severe economic crisis. Declining investor faith in the Turkish economy is largely due to the prolonged build-up of imbalances, including a large current account deficit, a large external financing requirement, excessive credit growth, low international reserves, and high inflation in recent months. Following a diplomatic feud between the United States and Turkey in early August, Turkey's external position and currency exchange rate deteriorated sharply. Since the start of this year, the Turkish lira has lost around 40% against the US dollar (Figure 3, left). Other financial indicators have also sharply deteriorated this year: 10-year yields on lira-denominated government bonds for instance almost doubled between the start of the year and mid-August, and the Turkish equity market fell by almost one-fifth in the same period, whereby Turkish bank shares were particularly hard hit. This has caused a substantial tightening of financial conditions in Turkey (Figure 1).

Figure 3 Exchange rates, interest rates and equities in emerging countries



Source: Bloomberg and Thomson Reuters.

Note: The currency index refers to the JPMorgan emerging markets currency index, the equity index refers to the MSCI stock index, while the yields on government paper refer to effective yield according to JPMorgan's emerging markets bond index (EMBI).

Tightened financial conditions in Turkey may pose a problem for the country's corporate and banking sectors. Between 2008 and 2017, debt of non-financial corporations in Turkey as a percentage of GDP virtually doubled to almost 70% of GDP at end 2017. In addition, the increasing corporate sector debt in Turkey has been accompanied by a growing exposure to the US dollar. If financing conditions deteriorate, highly indebted corporations may be confronted with substantially higher funding costs. This may then translate into growing credit losses for banks, if tightening financial conditions put the repayment capacity of these corporations under pressure. There are indications that the quality of Turkish banking sector assets has recently deteriorated further.

DNB has policies in place to curb the risks of exposure to emerging economies. The total direct exposure of Dutch financial institutions to Turkey is relatively limited at around EUR 26.5 billion, but it is not spread evenly across the various institutions. In the Netherlands, a number of small banks operating with a Dutch banking licence are wholly or partly in Turkish ownership. In relative terms, these banks have substantial direct exposures to Turkey. Banks with exposure to Turkey are potentially vulnerable to deteriorating asset quality if the economic crisis were to escalate further. DNB applies several policy rules in order to curb the risks of exposure to emerging economies like Turkey. In case of a material concentration of exposures to a country of this type, banks are required to hold additional capital.[6] DNB also applies a maximum to exposures to countries that are not part of the European Economic Area (EEA) relative to the deposits guaranteed in the Netherlands.[7] Supervisors can also impose additional requirements on individual banks, for instance in case of elevated risk profiles.

Contagion to other emerging countries may affect the Dutch financial sector.
The developments in Turkey and Argentina are accompanied by pressure on the currencies of a number of emerging countries experiencing major financial and macroeconomic imbalances. If investor sentiment deteriorates further, the pressure on currencies may rise further and other emerging countries may also be faced with capital outflows and depreciating currencies. This risk is more pronounced if investors differentiate less clearly between vulnerable and less vulnerable countries. This risk is illustrated by the fact that the correlation between exchange rates and government bond yields of emerging countries increased substantially during turbulent periods in the spring and in August. Contagion of this kind may also hit the Dutch financial sector. The exposure of the Dutch financial sector to emerging countries totals some EUR 200 billion. Almost two thirds of this exposure is concentrated in Poland, China, Turkey, Brazil and Russia.

6 See the Policy Rule on the treatment of concentration risk in emerging countries, Government Gazette 2010, no. 11135.

7 See the Policy Rule Maximising the Deposits and Exposures Ratio under the Financial Supervision Act, Government Gazette 2014, no. 4888.

Financial stability in the Netherlands

Tension in the Dutch housing market has risen sharply. The housing market in the Netherlands is booming. Housing demand is high, partly owing to low mortgage interest rates, high economic growth and low unemployment, while the supply of homes for sale falls short. On average, nominal house prices are now above their 2008 peak. There are big regional differences, however. Prices in the major cities have shown the fastest recovery: nominal prices in Amsterdam are now well over 35% above their 2008 peak, while those in the province of Drenthe are still around 8% below their 2008 peak. The sharp acceleration of house prices has reduced the problem of underwater mortgages. Whereas in 2013 over 35% of home owners were under water on their mortgages, in the second quarter of 2018 this had been reduced to barely 6%. In addition to the house price rises, voluntary repayments are helping to reduce the problem of underwater mortgages. Since 2013, a little over EUR 75 billion has been voluntarily repaid on mortgage debt.

Increasing market tightness is starting to have a bearing on the number of transactions. The tightness on the Dutch housing market is increasing further. This is reflected in the fact that homes are for sale for shorter periods of time and are increasingly often sold above the asking price. In the cities of Amsterdam and Utrecht some 70% of homes is sold above the asking price for instance. The increasing tightness is dampening the number of housing market transactions. In 2017, 242,000 homes changed owners – the highest number seen since 1995. In the first half of this year, the number of transactions fell off again, however. There is a remarkable rise in the number of purchases made by private investors. In the four major cities, private investors accounted for 21% of all house purchases in 2017, whereas this was 9% for the rest of the country.

Prices of commercial real estate on prime locations are rising rapidly, which is accompanied by risks. Driven by the search for yield of foreign investors in particular, prices of commercial real estate in prime locations are accelerating fast. At less attractive locations prices rise more moderately. As vulnerabilities can build up in times of economic boom especially, financial institutions must pay extra attention to monitoring and managing the risks associated with commercial real estate (see Chapter 2).

The Dutch banking sector is in good shape as far as capitalisation is concerned, but the financial position of the pensions and insurance sector is facing several challenges. The capital position of the Dutch banking sector has improved considerably over the past years. The risk-weighted capital ratio in the second quarter of 2018 came to 16.7%, compared with 13.6% in 2014. Over the same period, the leverage ratio also improved steadily, from 3.4% in 2014 to 4.8% presently The Dutch insurance sector is, however, facing several challenges (Chapter 3). Life insurance companies are being hit by declining demand for life insurance products and historically low interest rates, while non-life insurers are having to deal with severe competition. The pensions sector is also under pressure. Despite the good returns seen in 2017, the financial position of pension funds is still not back at pre-crisis levels.

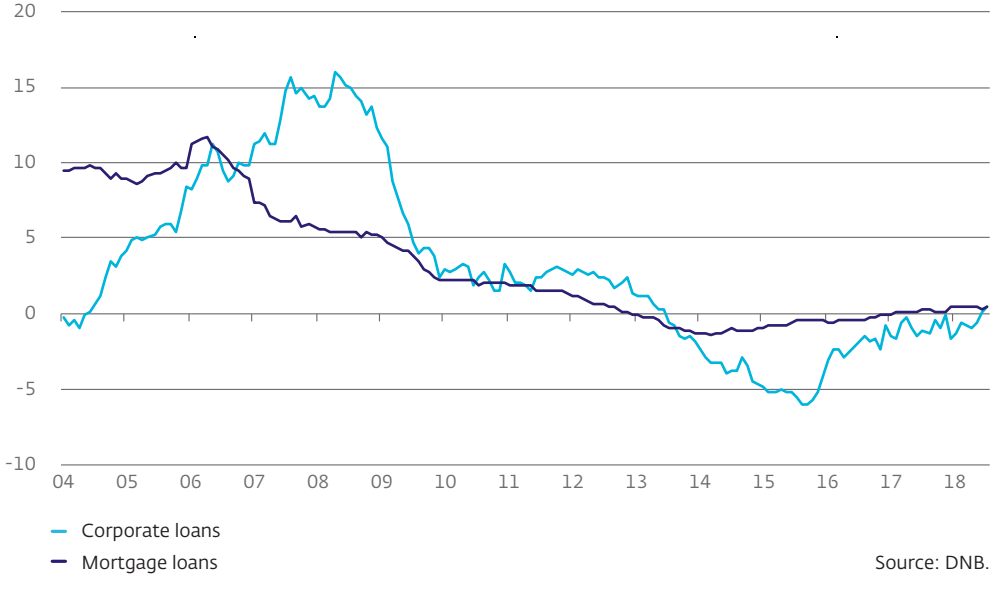
Climate change and the energy transition may have a significant impact on the financial sector. Climate change has a multifarious impact on the financial sector.[8] There are for instance physical risks caused by climate-related damage. The financial sector may also be affected by the transition to a carbon-neutral economy. The exact repercussions of climate change and energy transition for the financial sector are uncertain. This issue of our Financial Stability Report includes a stress test that we performed in order to shed light on the vulnerability of the financial sector to a disruptive energy transition (see Chapter 4).

Macroprudential policy in the Netherlands

The countercyclical capital buffer (CCyB) is maintained at 0%. The credit gap, the difference between the actual total level of lending to corporations and households and its long-term trend, is an important indicator for determining the CCyB. The credit gap is still clearly negative, which indicates a modest development of net credit growth. Against the background of the vigorous economic recovery, credit growth to households and corporations is remarkably modest.[9]

Figure 4 Bank lending to corporations and households

Year-on-year percentage change



Source: DNB.

8 DNB (2017), *Waterproof? An exploration of climate-related risks for the Dutch financial sector*.

9 Economic research shows that periods of "creditless" recovery are in fact not uncommon. Jorda, Schularik and Taylor (2013) for instance show that creditless recovery is more likely if recovery follows a period of exuberant credit growth and deep recession, particularly if this coincides with a banking crisis.

Lagging mortgage lending growth is partly attributable to temporary factors, repayments in particular. Despite the tight housing market, total mortgage lending growth is very modest and almost entirely accounted for by non-banks. Net bank lending to households is hardly increasing (Figure 4). Voluntary repayments on existing mortgages partly explain why mortgage lending is modest. In addition to this, mortgage lending growth was held back by the fact that in many residential transactions the level of debt paid back by the seller exceeded the level of new debt taken out by the buyer. The dampening effect of voluntary repayments is expected to ebb off as there is an end to the assets that home owners can use to make voluntary repayments. In addition, ongoing price rises will push up net debt accumulation in residential transactions as sellers no longer find themselves under water on their mortgages.

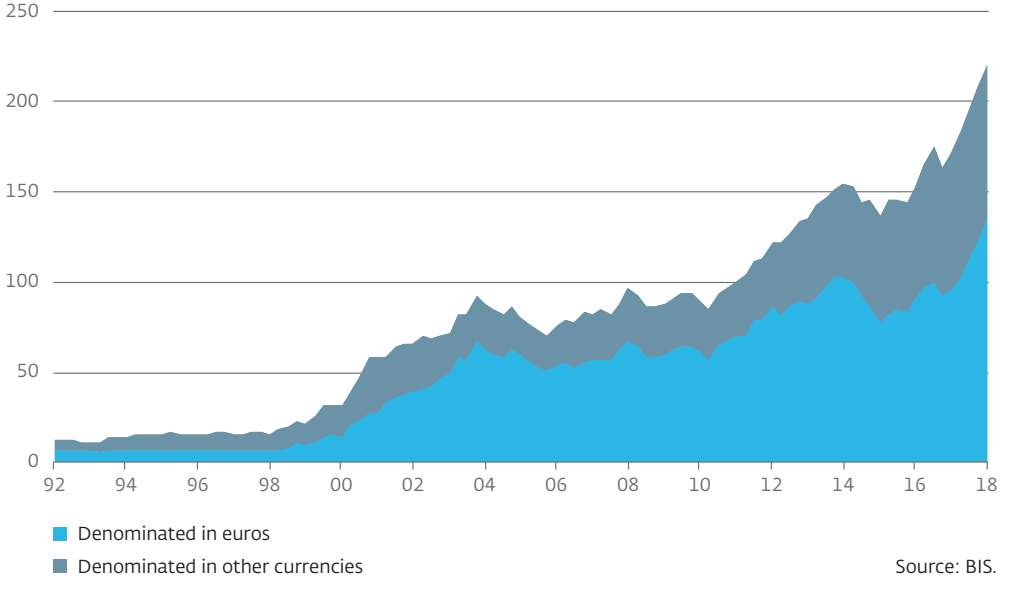
Easing of the borrowing limit is undesirable. First-time buyers in particular often borrow large amounts of money to buy their first home. Some 40% of them opt to take out loans at the maximum loan-to-value (LTV) ratio, while almost half of first-time buyers take out loans with very high loan-to-income ratios (more than 90% of the limit). With this in mind, easing of the borrowing capacity to the borrower's income as proposed in the 2019 Regulation on mortgage lending (*Regeling Hypothecair Krediet* 2019) is undesirable. If the proposed system is applied in full, the borrowing capacity of households may increase substantially, in some cases by more than 10% in 2021. High debt levels make households vulnerable and exacerbate economic swings. Easing of the borrowing capacity would also contribute towards further overheating of the housing market. Prices of owner-occupied homes would only be driven up further, which would fuel the risk of excessive borrowing. Together with the AFM, we are arguing in favour of reviewing the borrowing limit system, in particular to reduce its procyclicality.[10]

The corporate sector uses bank funding to a lesser extent to finance its investments. Until recently, bank lending to the corporate sector had been negative since 2013 (Figure 4). This means that the amount of newly issued loans to non-financial corporations was lower than the amount repaid on existing loans. Dutch corporations have more options at their disposal to finance their activities than bank loans only. They can for instance use internal resources (retained earnings), and other forms of external funding like issuing corporate bonds or shares. As in other European countries, the issue of corporate bonds by Dutch corporations has also been rising rapidly since 2015 (Figure 5). This is partly due to the fact that issuing bonds is relatively attractive as compared with taking out bank loans. That said, the issuance of corporate bonds and shares is the prerogative of large companies in particular.

10 DNB and AFM, *Reactie consultatie wijziging Regeling Hypothecair Krediet 2019*, 27 August 2018.

Figure 5 Outstanding corporate bonds issued by Dutch corporations

USD billion



Source: BIS.

Table 1 Current use of the principal macro-prudential instruments

Instrument	Status	Notes
Systemic buffer	ING Bank: 2.25% Rabobank: 2.25% ABN AMRO: 2.25% Volksbank: 0.75% BNG Bank: 0.75%	These requirements are implemented in phases. In 2019 ING Bank, Rabobank and ABN AMRO will be required to maintain a systemic buffer of 3% of risk-weighted exposures, and Volksbank and BNG Bank of 1%.
Countercyclical capital buffer	Set at 0%, effective 1 January 2016	Not activated thus far
LTV limit	100%	FSC recommends further reduction to 90%
LTI limit	Over four times gross income	Statutory regulation based on gross housing costs relative to annual income

2 Risks in the commercial real estate market

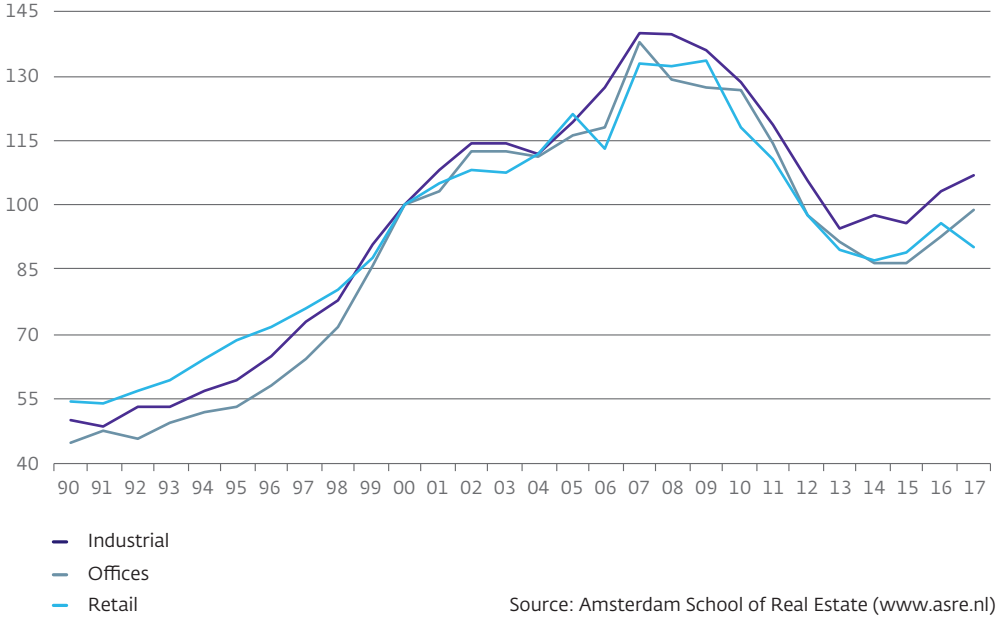
Commercial real estate prices in the Netherlands have been recovering on the back of the economic boom and the search for yield among investors. Prices in prime locations are soaring. At present, Dutch financial institutions seem to be sufficiently resilient to cushion the consequences of a possible turnaround in the real estate market, but they will have to pay extra attention to the possibility of risks building up. Vulnerabilities may build up especially in boom periods, the more so if loans are granted against less stringent conditions. More and better data and improved valuation practices through implementing legal standards may contribute towards a better functioning real estate market.

The commercial real estate market in the Netherlands is picking up again. After the price drops of more than 30% in the aftermath of the financial crisis, commercial real estate prices are picking up again. The price rises seen for office and industrial space have been continuing for several years, while those for retail space seem to be flagging a bit lately (Figure 6).

The Dutch commercial real estate market is recovering, but not without large regional differences. For the market as a whole, prices are still below their pre-crisis peak levels. However, the underlying demand for commercial real estate differs considerably. Prices for quality premises on prime locations have in some cases jumped by more than 20% annually.

Figure 6 Price index of commercial real estate

Index 2000=100



Source: Amsterdam School of Real Estate (www.asre.nl)

The major cities are particularly attractive[11]; Amsterdam and the surrounding areas account for more than half of all real estate transactions. The higher price levels seen in the four major cities are slowly spreading further into the larger Randstad area. Peripheral locations are showing a more moderate trend, and the outlook here is less favourable. The need for locations and square metres is decreasing, due to declining office space per employee and increasing on-line sales.[12] As a result, less attractive locations are suffering structural vacancies. Owners of these premises will have to explore the options for transformation of office space, possibly in consultation with financiers.

The price rises are being driven by the search for yield and the current low interest rates. Investors have ample liquidity and are looking for high-yielding investments, due to the low level of interest rates. This has led to an above-average demand for commercial real estate and record volumes of investment transactions. According to CBRE, a real estate adviser, over EUR 20 billion in Dutch real estate changed hands in 2017; a 40% rise on the year before. In the first half of 2018, transaction volumes had already passed the EUR 10 billion mark. About half of these transactions is accounted for by foreign investors.

A booming commercial real estate market may lead to growing vulnerabilities in the financial system. Commercial real estate market trends are strongly procyclical for various reasons. First of all demand for retail, commercial and office space is strongly related to economic activity. A cyclical turnaround is thus reflected in real estate prices relatively quickly, since the supply of commercial real estate is slow to react to rising demand. Secondly, commercial real estate is an important investment category for national and international investors, which makes it vulnerable to financial market trends such as rising interest rates and increasing volatility. The commercial real estate market is not transparent, which hampers the assessment of value movements based on economic fundamentals. And last but not least, real estate loans have shorter maturities, higher risk profiles, and are more leveraged than standard corporate loans, which means that credit losses are more likely to occur.

Commercial real estate therefore often plays a significant role in financial crises.[13] Financial institutions are directly exposed to real estate risks either through their real estate investment portfolios, or their loan portfolios. There is also indirect exposure in the form of loans with commercial real estate as collateral. Systemic risks manifest themselves in a confluence of events: a cyclical turnaround, a drop in real estate prices, and increasing funding problems. This causes real estate owners and financiers to incur losses, which often culminates into a financial crisis. From the perspective of financial stability, it is therefore essential to keep monitoring the commercial real estate market closely, and to identify new risks promptly.

11 Real capital analytics, *CPPI global cities*.

12 DNB Overview of Financial Stability, autumn 2015.

13 See for instance ESRB (2015), *Report on commercial real estate and financial stability in the EU*.

Risks to financial stability

The higher prices have put yields under pressure. Based on the current rental prices, yields on office and retail space in prime locations in Amsterdam have dropped to historically low levels of 3.5% and 3% respectively.[14] This means that investors increasingly base their investment decisions on price rises, or future higher rental income. In the past year, office and retail rents in the Amsterdam region hardly moved, and those in the Netherlands as a whole only edged up 2%. A survey held among Dutch real estate investors has nevertheless revealed that market sentiment is very upbeat, owing to the ongoing economic uptrend and the anticipated continued demand for high-grade real estate.[15] At the same time virtually all respondents to the survey indicated that they believe the real estate cycle to be nearing its peak.

A sudden turnaround in economic conditions or market sentiment may cause the situation on the real estate market to turn around quickly, which will lead to losses. History has taught that turnarounds in real estate prices are difficult to predict, but when they occur, they often occur quicker than expected and have a severe impact on the financial sector and the real economy. A rise in risk-free interest rates – e.g. due to accelerating economic growth and inflation, and phasing out of the unconventional monetary policy – will make real estate a less attractive investment. In addition to this, risk premiums may also rise as a consequence of economic and political uncertainty, causing real estate investors and financiers to become more cautious. The current low yields will then be insufficient to compensate for the increasing real estate risks, which will further dampen demand for real estate investments. The structural decline of user demand for real estate is putting prices under pressure as well. These factors are causing investors to withdraw from the market, which amplifies the price slides and compounds losses. Foreign investors in particular, who are currently dominating the Dutch real estate market, are inclined to swiftly withdraw their capital in a downturn. Lastly, a downturn of this kind is likely to occur on several European real estate markets at the same time as international capital flows have increasingly synchronised the price trends on these markets.[16]

The Dutch financial sector

Based on their direct exposure to commercial real estate, the large Dutch banks seem less vulnerable than ten years ago. The large Dutch banks have not expanded their real estate portfolios in the past few years. At EUR 75 billion (4% of all assets), the real estate portfolios of the three largest banks together is smaller than before the credit crisis. Since the asset quality reviews performed by DNB and the ECB in 2012, 2013 and 2014, banks have obtained a better overview of their exposures and their risk management has improved. Non-performing loans for the sector as a whole are below 10%, and possible losses are initially covered by collateral

14 Cushman & Wakefield, *Office Market Snapshot respectively Retail Market Snapshot – the Netherlands Q1 2018*, www.cushmanwakefield.nl.

15 Royal Institution of Chartered Surveyors (RICS), *Netherlands commercial property monitor*, www.rics.org.

16 ESRB (2018), *Vulnerabilities in the EU commercial real estate sector*, forthcoming.

and provisions. Banks thus seem sufficiently resilient to cushion shocks and accommodate losses. Still, indirect exposures of Dutch banks to commercial real estate through corporate loans backed by real estate collateral have grown, increasing to EUR 180 billion at the start of 2018, from EUR 150 billion at end 2016. Losses on these types of loans occur if a growing number of corporations default on their loans. There is, however, no adequate historical information available on the possible size of these losses.

A possible shock in the real estate market, e.g. due to rising interest rates and falling prices, will lead to more non-performing loans and higher credit losses for banks. Half of the outstanding bank loans has an interest term of less than three years, meaning that an interest rate hike would pass through to funding costs for investors relatively quickly. This may in turn cause problems if investors have to fulfil their liabilities towards the bank. In addition, data on individual loans in the portfolios of Dutch banks shows that there is a clear connection between the value of the collateral and expected credit losses on commercial real estate. A drop in real estate prices, combined with rising interest rates may lead to credit losses for banks: both the likelihood of default and losses in case of default will increase in such a scenario. A calculation of the effects of such a stress scenario reveals that based on their current real estate exposure, banks would be forced to take between EUR 1 billion and 1.5 billion extra losses on top of their current provisions.[17] At present, banks have sufficient capital buffers to cushion such losses, but they ought to pay extra attention to a possible accumulation of risk.

New real estate financing risks may emerge during the current economic boom. Financing conditions in the real estate sector are being eased at present. The average loan-to-value ratio of new loans is rising. It is now close to 70%, from 62% in mid-2016. Figure 7 shows that the rise is mainly attributable to the higher LTVs on residential and industrial real estate, which two categories are currently very popular among investors. Market participants have also indicated that financing conditions are less stringent and amortisation requirements are lower at present. Interest rates on real estate loans have also been declining gradually to 2.7% at end 2017, from an average of more than 3% in 2015. One third of all real estate loans in the bank portfolio has interest rates of less than 2%. This leaves little room for adequate risk premiums. Our analyses based on granular data show that real estate loans issued during periods of economic boom have a higher likelihood of default and losses. Loans issued at the end of a boom period have a higher risk profile and are more likely to be confronted with insufficient collateral in case of a turnaround in economic activity. A mitigating factor is that non-domestic banks and non-bank parties (insurance companies, hedge funds and real estate funds) have been providing more real estate financing lately. This ensures a diversification of risk among financiers, meaning that possible losses will not have to be borne by Dutch banks only.

17 This scenario assumes a 25% drop in commercial real estate prices, a 3 percentage point rise in interest rates, and a 10% jump in the vacancy rate. Based on this scenario, the average relative increase of the likelihood of default and default-related losses are calculated and multiplied by the banking sector's total exposure to commercial real estate. The total credit losses are then compared with the provisions that banks have already taken.

Although real estate investments of insurers and pension funds have recently grown sharply, they are still relatively small and internationally diversified. In the past five years, insurers and pension funds have expanded their real estate investments to EUR 15 billion and EUR 120 billion, from around EUR 10 billion and EUR 85 billion respectively. This increase is partly attributable to value gains. Relative to their total balance sheet size, these real estate investments are still fairly modest, at 3% for insurers and 9% for pension funds. In addition, insurers and pension funds invest mainly indirectly by means of real estate funds and listed real estate equities. These investments are often internationally diversified and include large and growing proportions of relatively safe rental homes. A drop in real estate prices has only a limited impact on the solvency of insurers and the funding ratio of pension funds, owing to their relatively small exposure and adequate risk spreading in their real estate investment portfolios.

Figure 7 Average loan-to value ratios of new real estate loans issued by Dutch major banks

Source: DNB commercial real estate loan level data.

Structural developments, like the declining office space per employee, increasing on-line sales, and the greenification of office and business space may induce a further shift in demand for real estate and involve additional costs for real estate owners. Sustainability and energy saving are becoming increasingly important in the real estate market, partly as a result of government policies aimed at greenification of the built environment.[18] Demand for non-sustainable real estate will fall, due to more stringent statutory requirements. In 2023, all offices in the Netherlands must have energy label C or better for instance. A survey held among a number of pensions managers shows that Dutch pension funds are actively working on improving the sustainability of their real estate portfolios: over 80% of their Dutch real estate investments, on which data is available, has energy label C or better. Banks are also including sustainability in the management and transformation of their real estate portfolios. Loan level data shows that

18 DNB (2017), *Waterproof? An exploration of climate-related risks for the Dutch financial sector*.

the proportion of real estate collateral with energy label C or better currently stands at around 50%. At the same time Dutch banks, insurers and pension funds have as yet no information available on the energy labels of more than half of their real estate exposures. This will have to improve in the period ahead.

Policy conclusions

Financial institutions must pay extra attention to monitoring and managing commercial real estate risks in the period ahead. The recent price rises and the search for yield have caused record volumes of funding and driven up price levels on prime locations, not only in the Netherlands but also in the rest of Europe. These similar price trends amplify the risk of a simultaneous downturn in the European real estate markets.[19] The availability of attractively priced investments is declining, as rents (the foundation of price determination) have only been rising scantily. In addition, the perspectives for the real estate markets strongly depend on market sentiment and uncertain economic developments. Due to the vulnerable character of commercial real estate, financial institutions must carefully monitor their exposures, and systematically quantify the impact of a possible price fall. They will have to take extra care in issuing highly leveraged loans at less stringent credit terms, as such loans have higher risks on average.

Availability of more and better data on prices, investments, financing and sustainability labels is essential to a well-functioning real estate market. To date, information on real estate prices, investments and financing has been fragmented and of poor quality. In 2016, the European Systemic Risk Board (ESRB) made a recommendation to remedy data gaps on the residential and commercial real estate markets in the EU. Central banks and statistics agencies, including the ECB and Eurostat, are following up on this recommendation. Together with Statistics Netherlands, DNB launched the initiative to establish a national price index for commercial real estate. In addition to this, DNB has been collecting granular data on the real estate portfolios of Dutch banks for several years. We have also conducted several examinations in the past years with the purpose of improving data quality at financial institutions.

A statutory quality framework for reliable appraisals will ensure better guarantees for adequate real estate valuations and risk assessments. Reliable appraisals are essential to making adequate investment and financing decisions and assessing risks. Commercial real estate appraisals are a complex matter. The lack of quality requirements to ensure high-grade and consistent appraisals may induce excessively generous borrowing conditions and overvaluation of properties. Valuations must be based on a robust set of standards for the appraiser. This is especially important when assessing credit losses and adjusting borrowing conditions.

19 ESRB (2018), *Vulnerabilities in the EU commercial real estate sector*, forthcoming.

26

Appraisers must operate independently. DNB and the AFM have therefore urged real estate appraisers to agree on a code of professional conduct and practice and independent disciplinary proceedings. Although the Dutch Register of Real Estate Appraisers was established to this purpose, the self-regulation promoted by the Register is slow in getting off the ground. This is why DNB and the AFM in their annual legislative letter to the Ministry of Finance voiced their objective to develop statutory standards for real estate surveyors in cooperation with the Ministry of the Interior and Kingdom Relations.

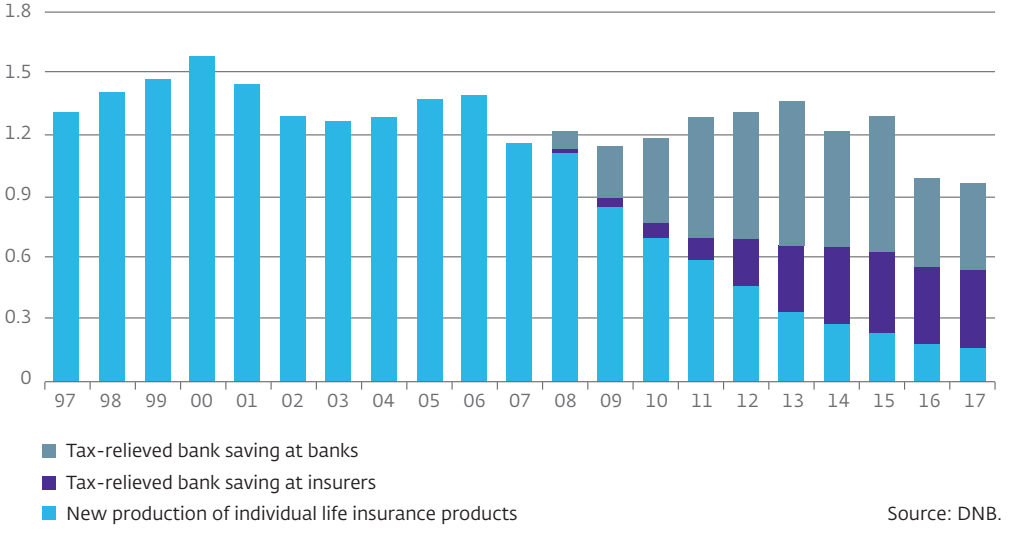
3 Vulnerabilities in the insurance sector

Since the financial crisis, the Dutch insurance sector has made progress in future-proofing the sector by cutting costs, consolidation and scaling down return guarantees. The insurance sector nevertheless remains vulnerable, also due to low interest rates and declining premium income. Insurers, supervisors, and policymakers are therefore required to make extra efforts. Moreover, the crisis has shown that problems at individual insurance companies may have severe implications for the financial system as a whole. In order to better protect financial stability and the interests of policy holders, the introduction of a statutory recovery and resolution framework for insurers is being prepared. This will better prepare DNB and the insurance sector for crisis situations and it will improve the resolvability of insurers.

The earnings capacity of the insurance sector is under pressure. While non-life insurers are having to deal with severe competition, which is depressing margins in this subsector, the earnings capacity of life insurers is under pressure from declining demand for individual life insurance products (Figure 8). This declining demand is partly explained by multiple changes in the tax treatment of financial products, putting the brakes on fiscal facilitation of wealth accumulation by means of life insurance products. The premium volume of life insurance products has taken a plunge since 2008, when tax-relieved bank saving was introduced as an alternative for wealth accumulation. In addition, the savings-based mortgage loan ceased to exist as mortgage interest tax relief on new loans is now allowed only if the loan is fully and at least repaid in annual equal instalments during its life. The declining public confidence in the insurance sector, due to unit-linked insurance policies sold in the past, has also contributed to

Figure 8 Life insurance premiums and tax-relieved bank saving

As a percentage of GDP



Source: DNB.

this. The market for individual life insurance is expected to shrink further in the years ahead. A considerable proportion of the existing policies is due to mature in the next few years and sales of new policies are modest.[20]

Life insurance companies are also suffering the negative effects of low interest rates. This is affecting these insurers in two ways. First, low interest rates lead to higher values of liabilities, as future liabilities are discounted at low interest rates. In addition, low interest rates put investment returns of insurance companies under pressure. This is a problem for insurers as 67% of their long-term liabilities consist of guaranteed return policies. These policies guarantee a minimum return to the holder. Low interest rates are making it more difficult for insurers to achieve sufficient returns on their investments to finance these guaranteed returns. Due to their relatively long-term liabilities and by issuing guaranteed returns, Dutch insurers are very vulnerable to prolonged low interest rates, which the 2016 EIOPA stress test confirmed.[21] EIOPA will perform a new stress test among 42 European insurance groups this year in order to identify vulnerabilities.[22]

Since the financial crisis, insurers have taken measures to future-proof the sector. The emphasis has been on cost cuts and consolidation. The number of employees working in the Dutch insurance sector was for instance reduced by 20% to 46,000 in 2015, from 57,000 in 2010.[23] Numerous mergers and acquisitions have taken place in the past few years, recently also among larger market players.[24] Partly owing to this consolidation wave, the number of life insurance companies has been reduced to a little over 30, from 80 in 2005. Over the same years, the number of non-life insurers was halved to 120. These mergers and acquisitions have prepared the sector better for ongoing market shrinkage. The other side of the consolidation coin is that the market is increasingly concentrated with a small number of large players. The five largest insurance groups currently account for a market share of 87% (Table 2). This is accompanied by systemic risks, as it is hampering the substitutability of specific insurers and possibly complicating the resolvability of insurance groups. In addition to using consolidation opportunities, a number of insurance companies have changed the focus of their activities, e.g. by aiming more at pension products, banking activities (tax-relieved bank saving and mortgage lending) or wealth management for third parties.

20 DNB (2016), *Vision for the future of the Dutch insurance sector*.

21 EIOPA (2016), *Insurance Stress Test Report*.

22 Dutch insurers Aegon, Nationale Nederlanden and Achmea are to be tested by EIOPA this year. ASR and VIVAT are to be included on a national level at the request of DNB. The stress test includes different market and underwriting scenarios. Among other things, a company's vulnerability to different interest scenarios is tested. EIOPA plans to publish the test results in early 2019.

23 Dutch Association of Insurers (figures include health care insurers)

24 Delta Lloyd was taken over by Nationale Nederlanden last year, and ASR took over Generali Nederland at the start of this year.

Table 2 Key figures for insurers, banks and pension funds

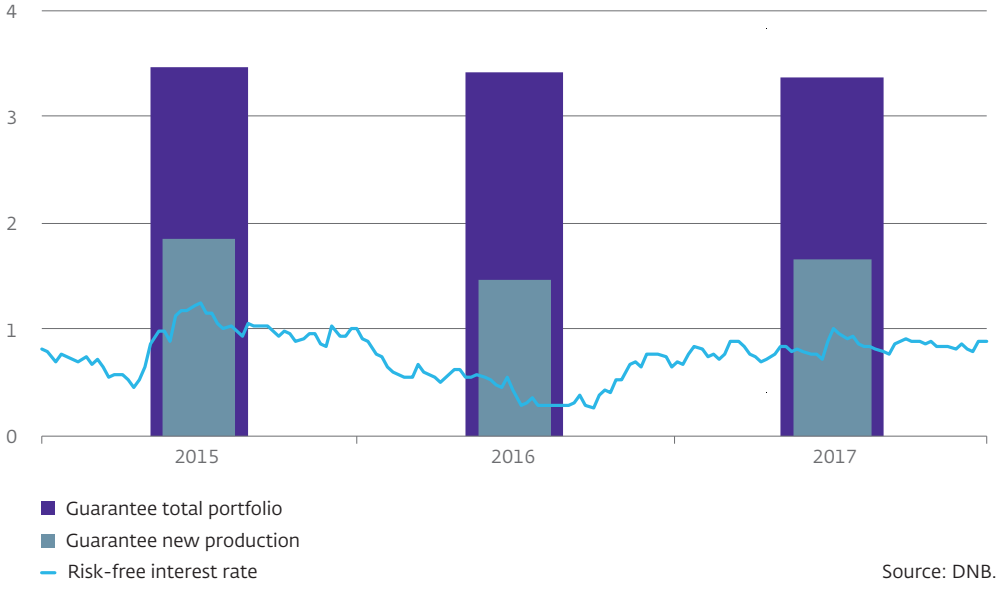
	Insurers	Banks	Pension funds
Total assets in EUR billion (% GDP)	479 billion (63%)	2,548 billion (337%)	1,451 billion (192%)
Market share of the five largest players in total assets	87%	84%	58%
Investments in equities and bonds (% balance sheet)	63%	9%	89%
Number of licensed entities	166	92	247

Insurers have also become more cautious in issuing return guarantees. Guaranteed returns exacerbate the vulnerability to low interest rates and fuel risk taking in terms of searching for yield. Since as long ago as 2009, the risk-free interest rate has for instance been lower than the average return guarantees issued in insurers' investment portfolios. A positive point, however, is that life insurers have issued fewer and less high return guarantees these past few years. A recent survey among insurers has for instance revealed that new production of life insurance policies with guaranteed returns more than halved between 2015 and 2017. In addition, in the past years, the average guaranteed return on new policies has been considerably lower than it used to be (Figure 9). The average return guarantee on new policies for instance came to 1.6% in 2017, while the average guaranteed return in the current portfolio is still at 3.4%. At the same time, the average guaranteed return is still some way above the risk-free interest rate and the downward trend seen in the past years was not continued in 2017.

The implementation of Solvency II has ensured important improvements. Established at European level, this solvency framework became effective in 2016 and has dramatically changed supervision of insurers and decision-making in the insurance sector. Unlike Solvency I, Solvency II takes account of the actual risks taken by an insurance company in the calculation of its solvency capital requirement. Another important principle of Solvency II is market-based balance sheet valuation. Consequently, Solvency II has ensured improved risk management in the insurance sector. Since the introduction of Solvency II, the average solvency ratio of life insurers has climbed to 193%, from 166%. The solvency position of non-life insurers has remained largely unchanged.

Figure 9 Guaranteed returns in life insurance

Percentages



Source: DNB.

Note: Guaranteed returns are based on a survey among life insurers. Their assets account for 90% of the life insurance sector as a whole. The risk-free interest rate is the 10-year swap rate.

The financial position of insurers nevertheless remains vulnerable. The prolonged low interest rates and declining new production of life insurance policies continue to bother life insurance companies. In addition, the solvency position of Dutch insurance companies only partly reflects the impact of low interest rates. Although Solvency II is based on market-based balance sheet valuation, the valuation of insurance liabilities deviates from valuation against current market rates on a number of points. Liabilities with maturities longer than 20 years are for instance discounted based on a yield curve that is higher than the current market rate, due to the use of the ultimate forward rate.[25] Dutch insurance companies also use another addition to the curve under Solvency II in the form of a volatility adjustment (VA).[26] The statutory solvency position is therefore considerably more favourable than that based on economic factors. The large discrepancy between the statutory and a more economically based value of insurance liabilities may be particularly problematic in case of liquidation or transfer. In case of liquidation

25 The level of the UFR is calculated annually, based on a calculation method established by EIOPA in 2017, which partly depends on interest developments. According to the current calculations, this method will cause the level of the UFR to drop gradually to 3.6% in the years ahead, which is still well above current market rates. The annual change in the UFR is also limited to a maximum of 15 basis points. The current UFR is 4.05%, and will be lowered to 3.9% on 1 January 2019.

26 The VA is an addition to the interest curve, the level of which is determined by a risk-adjusted spread on the investments in a reference portfolio. Widening credit spreads lead to a higher VA, meaning a lower valuation of liabilities. The impact that the VA has on valuation varies sharply with time, as the spread on the reference portfolio also varies.

or transfer, market-based valuation is what really matters, rather than valuation based on statutory parameters.

Risks to financial stability

The collapse of an insurance company may have severe implications for the financial system and the economy. Relative to the banking and pensions sector in the Netherlands, the size of the insurance sector is fairly modest, with a balance sheet total of 63% of GDP (Table 2). Problems in the insurance sector may nevertheless filter through to the financial system and the real economy (Box 2). This is because insurers play an important role in the economy by insuring against risks. In addition, the failure of an insurance company may lead to public upheaval, especially in a concentrated market. This will certainly be the case if an insurer fails to pay out large numbers of policies, or if specific insurance policies cannot be taken out, temporarily or permanently. Problems at individual institutions may also cause negative confidence effects for the sector as a whole and may prompt policy holders to surrender their policies, which is accompanied by liquidation of investments. And last but not least, insurers are large institutional investors (Table 2), due to which their investment behaviour affects the bond markets in particular. European insurers for instance hold 13% of European bank and corporate bonds, and 17% of government bonds.

The vulnerabilities seen in the insurance sector and the possible impact of the failure of an insurer have prompted the establishment of a recovery and resolution framework. The failure of an insurance company may have severe implications for the financial system and the real economy and may cause public upheaval. This is why an effective framework for the orderly resolution of insurers in trouble is welcomed. As the current set of instruments for recovery and resolution of insolvent insurers is insufficient, it has been decided to strengthen and expand the framework. The legislative proposal for recovery and resolution of insurers was accepted by the House of Representatives of the Netherlands in June of this year, and has now been put up for consideration by the Senate. The framework will provide DNB with new instruments and authorities. It for instance provides a legal basis for requiring larger insurance companies to prepare crisis plans. The plans must include different scenarios, including the action taken if the company's financial position deteriorates. DNB will also draw up resolution plans for larger insurers, which will document the appropriate resolution strategy and identify any obstacles to the resolvability of insurance companies. The plans are intended to improve the resolvability of these companies.

Not all insurers qualify for resolution. The basic premise remains that insurance companies can go bankrupt. Insurance companies qualify for resolution only if their bankruptcy has a severe impact on society at large, financial markets or the real economy. Consequently, DNB will draw up resolution plans only for insurers that are expected to fall into this category; this is referred to as the public interest test for resolution. In this test, the relevance of an insurance

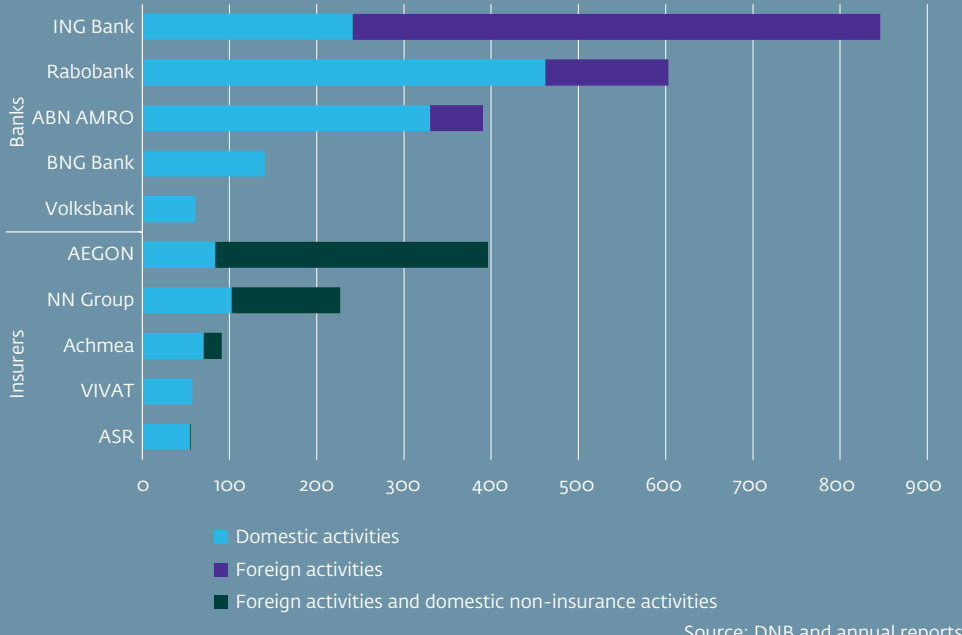
Box 2 Dutch insurers and financial stability

Within DNB's task to promote the stability of the financial system, identification of systemically important institutions plays a key role. Institutions are systemically important if their bankruptcy disrupts the financial system and the real economy. This is why DNB evaluates systemically important banks once a year. Systemic buffers have been imposed on the five Dutch banks that DNB earmarked as systemically important (Table 1).

Owing to the nature of their activities, insurers are less systemically important than banks and no additional capital requirements are imposed on them. The liabilities of banks for instance largely consist of demand deposits and short-term market financing, while those of insurers are spread across longer periods of time and are easier to predict. Nevertheless, insurers can also be important to the financial system, due to their size, their interconnectedness with the rest of the financial system or because of their limited substitutability. The size of the five largest Dutch insurance groups is for instance comparable to or larger than that of the smallest Dutch systemically important bank (Figure 10). Partly based on their size, DNB therefore subjected the five largest insurance groups to the heaviest supervisory regimes.

Figure 10 Banks and insurers by size

EUR billion, year-end 2017



Source: DNB and annual reports.

Note: Bank figures are based on supervisory reports. For insurers, domestic activities represent the balance sheet totals of their Dutch insurance entities, and their foreign activities and domestic non-insurance activities represent the difference between the consolidated balance sheet total and the domestic activities.

company for the financial system plays a large role, but the test is not limited to this criterion. The application of resolution planning is consistent with the proportionality of supervision of the insurance sector.

The arrival of a recovery and resolution framework is beneficial to financial stability. By preparing crisis and resolution plans, both the relevant insurers and DNB are better prepared for an emergency situation. Resolution planning also contributes towards boosting the resilience of these institutions. The new framework aims to ensure that DNB, when financial problems prove to be irreversible, is able to resolve insurance companies orderly. This limits the impact of the failure of an insurance company on financial stability.

The framework will also contribute to policy holder protection, if orderly bankruptcy is not possible. Resolution enables policies to be continued, while bankruptcy may imply that policies cannot be continued against the same conditions. This means that even an adjustment in policy conditions as part of resolution may be better for policy holders than bankruptcy of their insurance company. The "no creditor worse off" (NCWO) principle applies, which stipulates that policy holders and other creditors of an insurer put into resolution by DNB may not be worse off than they would have been if their insurance company had gone bankrupt. Policy holders are also given a preferred status. Before policy holders incur losses in the form of curtailments on accrued rights, shareholders and other creditors must take their share of losses first. At the same time the legislative proposal also improves the position of policy holders in case of bankruptcy, as they will be enabled to receive interim payments while the bankruptcy process is ongoing.

Policy conclusions

It is important to achieve proactive implementation of a recovery and resolution framework for insurers. The wave of consolidation in the insurance sector has made the insurance sector comparable to the Dutch banking sector where concentration is concerned (Table 2). This has put the insurance market in the hands of a small number of large players, which is accompanied by systemic risks. Partly due to this, the arrival of the recovery and resolution framework has become increasingly important. The resolution regime for insurers will be implemented at national level and makes the Netherlands (together with France and Romania) one of the first European countries to introduce a national resolution regime of this kind.

Harmonisation of recovery and resolution frameworks at European level is desirable. The insurance market has become increasingly international over the past years. Foreign insurers have expanded their life and non-life market shares in the Netherlands to 28% (measured by premium volume), and some Dutch insurers have activities in other countries. Large insurance groups in particular have a strong international character. The increasing size of their cross-border activities has made harmonisation of recovery and resolution frameworks

more important. There are currently large differences between the national approaches of recovery and resolution of insurance companies. This is hampering resolution of insurance companies, specifically if they have international activities.

Adequate valuation of insurers' liabilities is also important. Large discrepancies between the statutory and the economic solvency position of insurers, due to the application of the UFR and the VA, may mask problems in the insurance sector, which hampers prompt intervention. Insurers would do well to also focus on the transferability of their liabilities in addition to compliance with the legal framework. DNB already requires insurers to factor in the distorting effect of the UFR and the VA in their dividend policies. DNB is committed to ensuring valuations that are more consistent with economic reality. The long-term guarantee measures related to Solvency II, which are important to the valuation of long-term liabilities, will be evaluated in 2020 for instance. It is important that the adjustments to the statutory framework serve to reduce the discrepancy between the statutory and the financial economic position of insurance companies, which should not be enlarged further.

Systemic risks related to insurance companies require sufficient attention from national and international policymakers. On behalf of the Financial Stability Board (FSB) the International Association of Insurance Supervisors (IAIS) performs an annual review of globally systemically important insurers (G-SIIs). Dutch insurer Aegon is one of the G-SIIs required to draw up a liquidity plan and a recovery and resolution plan. The FSB at the end of last year decided not to update its list of G-SIIs, also due to the fact that the IAIS is reviewing its systemic risk framework, which is to replace the current approach for the identification of G-SIIs. Internationally, insurers are increasingly considered to be non-systemically important institutions, in particular in the United States. Large US insurers like Metlife and AIG are no longer on the list of national systemically important institutions, for instance. The financial crisis has, however, shown that problems at individual insurance companies may have severe implications for the financial system as a whole. This is why DNB sets great store by putting a solid framework in place to address systemic risks, including effective follow-up in the form of policy measures. Adequate and fitting instruments are required in order to address too-big-to-fail problems effectively.

In addition to this, insurers should continue working on making their sector sustainably healthy and sound, also by further reducing their return guarantees on new contracts. Reducing guarantees, e.g. by limiting their level or term, will make insurers less vulnerable to low interest rates. Dutch insurers have become more and more cautious in issuing new guarantees in the past years. Nevertheless, the average return guarantee, also on new production, is still considerably above the risk-free interest rate. Further reduction of return guarantees is therefore desirable.

4 Financial stability risks deriving from a disruptive energy transition

As part of the Paris climate agreement, approximately 200 countries committed themselves to limiting global warming to well below 2°C. These commitments require a transition to an energy supply based on sharply reduced emissions of greenhouse gases. If this energy transition is accompanied by abrupt shocks, this may affect financial stability. We performed a stress test in order to quantify the consequences of a disruptive energy transition.[27] This stress test indicates that a disruptive energy transition may lead to substantial losses for the Dutch financial sector. Governments can prevent unnecessary costs by implementing timely and effective climate policies. Financial institutions can curb energy transition-related risks by integrating them in their risk management.

At the 2015 United Nations Climate Change Conference in Paris, approximately 200 countries expressed their commitment to restricting global warming to well below 2°C, and to pursue efforts to limit the increase even further to 1.5°C. To pursue this commitment, a Climate Act was recently presented in the Netherlands, which stipulates that by 2050, greenhouse gas emissions must have been reduced by at least 95% as compared with the 1990 level. In order to achieve this objective, the government is aiming to reduce emissions by 49% in 2030 (relative to the 1990 level). The Dutch Climate Act also states that by 2050 all energy must be generated by carbon-neutral means. Negotiations are ongoing at five "Climate Tables" on the measures required to achieve the objectives of the Climate Act. The main themes of these negotiations were presented recently and include stimulating expansion of renewable energy generation, introducing more stringent carbon pricing, and realising natural gas-free newbuilding.[28] As burning of fossil fuels, which is the major source of emissions of carbon dioxide, is still playing a key role in the energy supply, a far-reaching energy transition will be necessary to reduce emissions of greenhouse gases sharply. In addition to climate policies, technological progress, e.g. in the area of energy storage, may also help achieve the required energy transition.

The energy transition may have profound implications for financial stability. In his 2015 speech *Breaking the Tragedy of the Horizon*, Bank of England governor Mark Carney describes how transition risks may emerge during the transfer to a climate-neutral economy. He argues that both technological developments that make renewable energy more competitive and policy initiatives curbing carbon emissions, may strongly impact the value of financial assets. [29]

27 This chapter is based on Robert Vermeulen, Edo Schets, Melanie Lohuis, Barbara Kölbl, David-Jan Jansen and Willem Heeringa (2018), *An energy transition risk stress test for the financial system of the Netherlands*, DNB Occasional Studies Vol. 16 – 7. This Occasional Study discusses the methodology in more detail and includes more detailed stress test results.

28 See also CPB (2018), *Beoordeling 'Voorstel voor hoofdlijnen van het Klimaatakkoord'* and Hekkenberg M. & Koelemeijer R. (2018), *Analyse van het voorstel voor hoofdlijnen van het klimaatakkoord*, Den Haag: PBL for a first analysis of potential measures that could be taken to accomplish the goals of the Climate Act.

29 Bank of England (2015), *Breaking the tragedy of the horizon – climate change and financial stability – speech by Mark Carney*, http://www.bankofengland.co.uk/publications/Pages/speeches/2015/844.aspx.

Two previous DNB studies have shown that Dutch financial institutions have substantial exposures to transition-sensitive sectors.[30]

Climate developments and the energy transition are surrounded by great uncertainties. First of all, the projections of the degree to which global warming will materialise, i.e. to what extent and at which pace the energy transition will have to take place, are surrounded by great uncertainty.[31] Secondly, it is as yet unknown to what extent the ambitions of the Paris Agreement will be implemented globally into tangible measures that will enable the objectives to be actually achieved. And last but not least, the pace of future technological progress and its mitigating effect on global warming is uncertain.

Stress test

Four scenarios

To properly account for this high level of uncertainty, DNB developed a stress test to quantify the possible financial stability effects on the Dutch financial sector. This stress test should be taken as a first step: there is as yet no standard approach to analysing the energy transition by means of stress testing. Our stress test consists of an analysis of four scenarios that *may* materialise in case of a disruptive energy transition.[32] Although governments and market participants tend to assume that the energy transition will progress gradually, it may well be accompanied by shocks. Stress tests are intended to bring these tail risks into focus and to uncover vulnerabilities in the financial system.[33] Our stress test considers severe, but plausible scenarios, as is usually the case in this type of test. By definition, such scenarios have a small likelihood of actually materialising, as they are about tail risks. In order to verify the plausibility of the scenarios, we presented them to several experts.[34]

The scenarios have a global reach, are aimed at the short term and leave physical risks out of scope. Global warming is a worldwide problem, which can be dealt with most effectively if countries work together to reduce the emission of greenhouse gases. The Dutch financial sector has global exposures that may be vulnerable to the energy transition. This means that the effects of a global energy transition are relevant for Dutch financial institutions. Consequently, the analysed scenarios are not just aimed at the Netherlands, but have a worldwide scope. They have a five-year horizon.

30 DNB (2017), *Waterproof? An exploration of climate-related risks for the Dutch financial sector*. De Nederlandsche Bank; Guido Schotten, Saskia van Ewijk, Martijn Regelink, Diederik Dicou and Jan Kakes, *Time for transition: an exploratory study of the transition to a carbon-neutral economy,* DNB Occasional Studies (2016), Vol. 14-2.

31 See for instance IPCC (2014), *Synthesis Report*.

32 DNB will soon publish a study that considers the effects of various policy options of a carbon tax on the Dutch economy: Gerbert Hebbink, Laurien Berkvens, Maurice Bun, Henk van Kerkhoff, Juho Koistinen, Guido Schotten and Ad Stokman (2018), *The price of transition: an analysis of the economic consequences of CO_2 taxation*, forthcoming.

33 DNB Financial Stability Report, autumn 2017. See Chapter 4 *"Stress tests: past, present and future"*.

34 We spoke to experts from the Netherlands Environmental Assessment Agency (PBL), the University of Cambridge Institute for Sustainability Leadership (CISL), and the University of Utrecht among other institutions.

Although this is a relatively short horizon for climate change and climate policies, it does justice to the abruptness with which energy transitions may take place. This is illustrated by Germany's prompt decision to stop relying on nuclear energy following the Fukushima disaster and the speed at which the Netherlands recently decided to end mining of natural gas in the province of Groningen by 2030 at the latest. And further back in time, coal mining in the Netherlands ended within ten years after the closure of the coal mines was announced in 1965. Last but not least, the scenarios leave the physical risks of climate change out of scope (Box 3).

Box 3 Physical risks of climate change

Our stress test analyses the possible effects of short-term transition risks only, due to the complexity and uncertainties surrounding climate change and the energy transition. Our stress test is intended to identify where in the financial system vulnerabilities occur if abrupt transition shocks were to take place in the next five years.

Climate change, however, also implies physical risks. These physical risks relate to increasing damage from more volatile weather conditions, like hail storms, gales, extreme heat or flooding. If this damage is insured, the claims burden for insurers and re-insurers is likely to rise. If this damage is not insured, other parties like households, corporations or governments will have to bear the burden.[39]

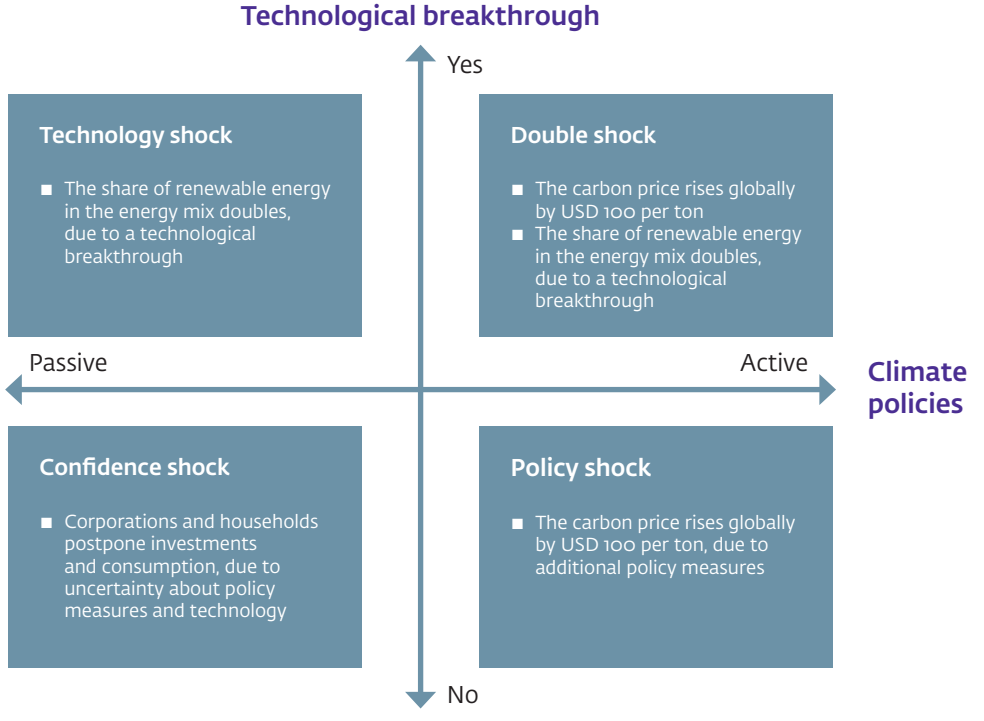
There is an interplay between transition risks and physical risks. If the emission of greenhouse gases is not reduced in time, climate scientists predict that the physical consequences of climate change will be more severe with the passage of time. An acceleration of the energy transition, as assumed in three out of the four stress scenarios tested, may actually curb these negative physical consequences. If policy and technological breakthroughs fail to occur, as our confidence shock scenario assumes, we may have to reckon with both more pronounced negative effects on the physical front and the necessity to pursue more drastic climate policies after all. Timely implementation of climate policies may soften the future negative impact of climate change.

To give shape to the scenarios, two factors that are crucial to the effects of a disruptive energy transition were identified based on the existing literature: government policies and technological developments. The literature on climate stress tests often puts government policies centre stage.[35] Policy changes (e.g. higher carbon taxes) may lead to a sudden depreciation of assets, with repercussions for the balance sheets of banks, insurers and pension funds. Technological developments have been included in the scenarios as a second

35 See for instance Stefano Battiston, Antoine Mandel, Irene Monasterolo, Franziska Schütze and Gabriele Visentin (2017), *A climate stress-test of the financial system*, Nature Climate Change 7, pp. 283-288.

crucial factor (see e.g. ESRB 2016). We have developed four stress scenarios based on various assumptions about policy and technology (Figure 11).

Figuur 11 Four stress scenarios for a disruptive energy transition



Note: The main assumptions of the four stress scenarios that include a worldwide disruptive energy transition in the coming five years.

Our first scenario ("Policy shock") assumes that governments worldwide pursue active policies to curb carbon emissions. In practice, these policies may take various shapes, e.g. the introduction of an explicit carbon tax. Carbon emissions are currently priced in different ways. The European emission trading scheme (ETS) e.g. allows European corporations to trade emission rights, with the current price being around EUR 25 per ton of carbon emissions.[36] The policy scenario assumes that worldwide governments take additional policy measures equivalent to a USD 100 increase in the carbon price per ton for all companies. Such a sharp, abrupt across the board rise in the carbon price is consistent with a stress scenario. According to some estimates, the social costs of carbon emissions are even higher.[37]

36 The ETS price was a mere EUR 7 per ton one year ago. This year's sharp rise is related to the reduced availability of carbon emission rights from 2019 forward, stemming from the introduction of the market stability reserve.

37 For an overview of the available literature see Richard Tol (2018), *The economic impacts of climate change*, Review of Environmental Economics and Policy 12: pp. 4-25 or Steven Poelhekke (2017), *How expensive should CO_2 be?*, DNB Working Paper 579.

Our second scenario ("Technology shock") assumes a technological breakthrough that doubles the proportion of renewable energy in the energy mix. This scenario assumes that the costs of renewable energy will fall, leading to a sharp increase in investments in solar and wind parks and battery-driven technology, for instance. In this scenario, production means of corporations that are heavily dependent on fossil fuels, such as coal plants, lose value rapidly. This will cause the economy as a whole to experience a disruptive adjustment process.

The third scenario ("Double shock") analyses a combination of the policy shock and the technology shock of the first two scenarios. This scenario assumes a USD 100 rise in the carbon emission price per ton and a technological breakthrough that will double the proportion of renewable energy in the energy mix. This scenario does not include explicit assumptions on the correlation between these shocks.[38] In practice climate policies could be used to further stimulate technological developments. By the same token, climate policies could respond to technological developments. In this scenario, the economy must adjust to both higher carbon emission prices and the transition to renewable energy sources.

The fourth scenario ("Confidence shock") depicts the impact of ongoing uncertainty about climate policies and technological progress. This scenario assumes that governments will not introduce additional policy measures, and no technological breakthroughs will occur. The implied uncertainty will lead to a confidence shock. Such a confidence shock would for instance occur if it turns out that the ambitions and the actual progress diverge to such an extent that the ambitions become unattainable. This will cause consumers and manufacturers to anticipate severe government measures, but they are unclear about the shape that these measures will take. Due to this shock of confidence, corporations will scale down their investments, consumers will postpone spending, and investors will demand additional returns for making funding available. This combination of factors will induce an economic downturn in the short term.[40] The fact that more severe actions will be necessary to avert the effects of climate change in this scenario will remain out of scope, as our scenario assume that actions will not be taken until after the five-year scenario horizon expires. This scenario does not factor in the physical risks of climate-related damage either, e.g. flooding, although there is a greater likelihood of these risks in this scenario than in the other three.

38 The scientific literature does not provide a consistent picture of the direction of the correlation between climate policies and technological innovation. For more details see section 2.3 in Vermeulen et al. (2018), *An energy transition risk stress test for the financial system of the Netherlands*, DNB Occasional Studies Vol. 16 – 7.

39 For more details, see also Chapters 2 and 3 of DNB (2017), *Waterproof? An exploration of climate-related risks for the Dutch financial sector*. In 2017 we also performed a first climate-related stress test among non-life insurers.

40 See Nicholas Bloom (2014), *Fluctuations in Uncertainty*, Journal of Economic Perspectives 28(2), pp. 153–176 for an analysis of how policy uncertainty influences economic growth.

Modelling: macro-economic and industry-specific

The macroeconomic effects of the four scenarios were quantified with the NiGEM econometric multi-country model. Policy institutions and financial institutions frequently use multi-country models like NiGEM to make scenario analyses in order to quantify the international effects of different scenarios.[41] For the purpose of our stress test, we translated four transition scenarios into shocks in NiGEM. The use of a multi-country model like NiGEM has several benefits. The first one of these is that it enables the calculation of a consistent set of economic effects, which can then be used as input for stress test models. A second benefit that a multi-country model brings is that it does justice to the worldwide impact of climate policies, and that it also allows calculation of country-specific risks. This allows for a better insight into the possible effects of the international exposures of Dutch financial institutions. The use of NiGEM and alternative econometric multi-country models also has a number of drawbacks, however. These models are essentially not designed to calculate the effects of a fundamental economic change like the energy transition, as they assume historically observed relationships between economic variables. In view of these limitations, the outcome of our stress test should be interpreted with due care. This stress test should be taken as a first step to analyse the sensitivity of the financial sector to the energy transition. The analysis can be further refined in the future as more and better information on climate change, policy effects and technological change becomes available.

The macroeconomic effects of our scenarios differ widely: while a policy shock reduces GDP, GDP initially rises following a technology shock. In the policy shock scenario, the higher carbon emission price leads to rising energy prices, which will in turn fuel inflation. This will depress disposable income and consumption. At the same time, higher energy prices lead to higher production costs, which will dampen the profits of energy producers, who will then reduce their investments. GDP will decline further and the equity market will shed more than 5%. Long-term interest rates will rise in line with rising inflation expectations. The technology shock scenario will initially have beneficial effects on GDP as more investments are made in new technology. Equity prices will, however, fall as corporations that use obsolete technologies will have to write off a part of their capital assets. In the course of time this also leads to a lower GDP level, which will, however, recover quickly as the new technologies reduce the cost of energy production. Equity prices will then also find the way up again. In the medium term, the technology shock in this scenario creates positive macroeconomic effects.

41 For more information on NiGEM, see also https://nimodel.niesr.ac.uk.

In the double shock scenario, interest rates will show the quickest rises, while equity prices will take the sharpest falls in the confidence shock scenario. In the double shock scenario, a combination of macroeconomic effects of the first two scenarios will occur. Higher investments will initially push up GDP slightly, after which it will decline quickly due to depreciations on capital goods. By the end of the fourth year, the economy will recover, and the lower energy prices will start bearing fruit. Equity prices will, however, recover slowly in this scenario. In the confidence shock scenario consumers spend less and manufacturers reduce their investments, which depresses GDP. This creates deflationary pressures, which will cause interest rates to fall in due course. The economic stagnation will also strongly impact equity prices, which will take an 11% plunge after the shock.

The stress test takes account of the fact that specific industries may be especially vulnerable to a disruptive energy transition. This is because corporations with carbon-intensive production processes will have to make more fundamental adjustments than those that already have a relatively sustainable production process. This is why we have broken down the aggregate effects on equity and bond prices in each scenario into 56 individual industries. The breakdown is based on detailed data on carbon emissions by industry, including emissions in the entire production chain. Hence, the analysis of each industry takes account of the carbon footprint of its suppliers. If a specific industry emits twice as much carbon as the average for the economy as a whole, equity prices in this industry will be hit twice as hard. The industries on the receiving end of the biggest shocks vary according to the different scenarios. In the policy shock scenario, electricity and gas production, water transport, manufacturers of base metals and the concrete industry will be hit hardest, as these are the most carbon-intensive sectors. In the technology shock scenario, electricity and gas production, mining and the petrochemical industry will suffer the biggest blows. These sectors own large amounts of capital goods that are heavily fossil fuel-dependent, and switching to renewable energy sources is not always possible. In the confidence shock scenario, all sectors will be hit to the same extent.

We estimated the losses in the financial sector in the four scenarios by analysing to what extent macroeconomic and industry sector-specific shocks affect the exposures of financial institutions. First, we collected detailed data on the equity and bond portfolios of banks, insurers and pension funds for the fourth quarter of 2017.[42] We then calculated the direct losses incurred following the shocks. For corporate loans issued by banks, additional information was compiled about the breakdown across industries. For these loans, we calculated the additional losses incurred as a consequence of the shocks occurring over the five-year scenario horizon.[43] These calculations are based on DNB's Cassandra stress test model.[44]

42 Derivatives portfolios were excluded from the stress test. These may soften the effects of specific shocks.

43 Our approach to calculating over several years the losses incurred on the loan portfolio concurs with the methodology that the EBA uses in its regular stress test for banks. Our approach to calculating the losses incurred on equity and bond portfolios the moment the shock hits the financial markets concurs with the methodology that the EBA and EIOPA use in their regular stress tests for banks, insurers and pension funds.

44 Tijmen Daniels, Patty Duijm, Franka Liedorp and Dimitris Mokas (2017), *A top-down stress testing framework for the Dutch banking sector*, DNB Occasional Studies, 15-3.

In practice, financial institutions may opt to adjust their loan portfolios after their exposures are hit by shocks. On the one hand, this would have a mitigating effect, but it may also lead to fire sales (forced sales at relatively low prices) and additional losses. Adjustments to equity and to a lesser extent bond portfolios can be made relatively quickly, which is why the effects are calculated the moment the shock occurs. As it takes longer to reduce loan portfolios, the trends of current loans are analysed over a five-year period.

Our stress test focuses on the asset side of the balance sheets of financial institutions. The test includes assets to the total of a little over EUR 2,200 billion, of which EUR 970 billion is accounted for by banks, EUR 219 billion by insurers and EUR 1,067 billion by pension funds. For banks, loans, bonds and equities were subjected to a shock, and for insurers and pension funds, these shocked assets consisted of bonds and equities. The majority of the assets analysed concerns loans for banks (EUR 671 billion), bonds for insurers (EUR 171 billion) and equities for pension funds (EUR 583 billion).

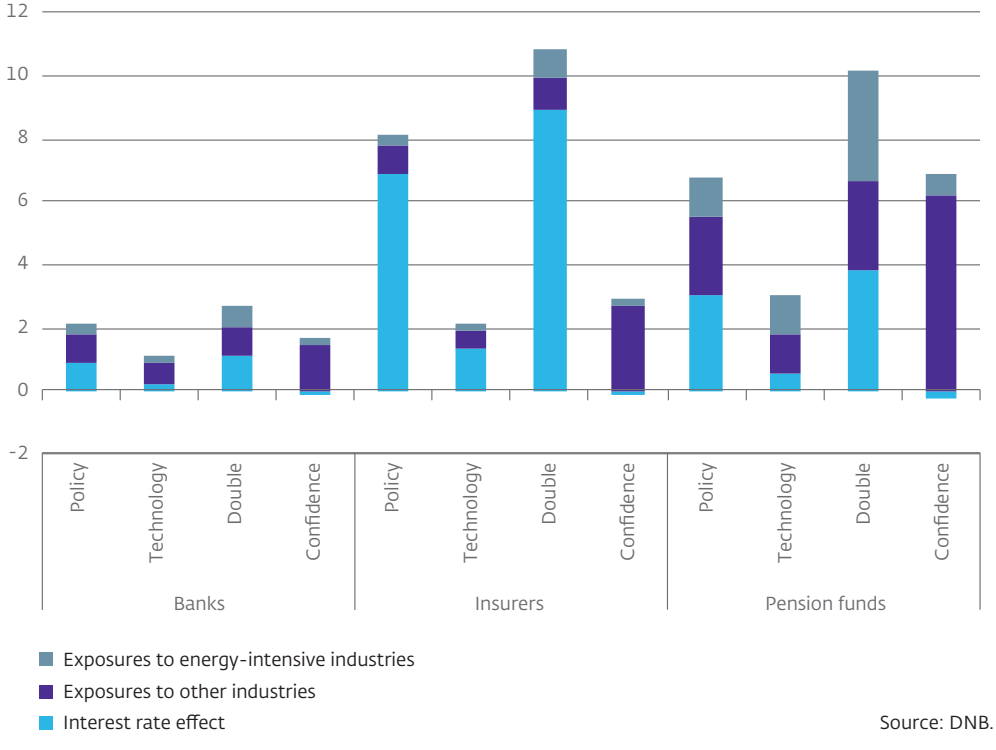
Stress test results

A disruptive energy transition may lead to substantial losses for the Dutch financial sector. If one of the above stress scenarios were to materialise in the next few years, total capital losses for Dutch financial institutions immediately following the shock may amount to between EUR 48 billion and EUR 159 billion. The highest losses (EUR 159 billion) will be incurred in the double shock scenario. The policy shock scenario leads to losses of EUR 111 billion, and the confidence shock scenario causes losses of EUR 98 billion. Losses remain relatively limited in the technology shock scenario (EUR 48 billion).

A disruptive energy transition will affect the economy as a whole, i.e. not only the carbon-intensive industries. Previous DNB research has shown that Dutch institutions had substantial exposures to carbon-intensive industries at the end of 2016. Our stress test confirms these findings. In addition, our current stress test shows that losses in carbon-intensive industries impact other industries and the economy as a whole through production chains. A disruptive energy transition would therefore not only hit banks, insurers and pension funds through their direct exposure on carbon-intensive industries, but particularly because of the deteriorating economic conditions. This is because most losses on asset positions are attributable to rising interest rates (Figure 12).

Figure 12 Possible losses on asset positions amid a disruptive energy transition and their causes

Percentages



Source: DNB.

Note: The y-axis depicts the possible losses as a percentage of the total amount of assets under examination of banks, insurers and pension funds, respectively. The level of the four bars shows the percentage value loss for each transition scenario. The colours depict the causes of these losses, i.e. losses on energy-intensive exposures, losses on other exposures and the interest rate effect.

A disruptive energy transition may hit banks relatively hard. The stress test shows that losses for banks may amount to between 1.1% and 2.7% of the examined assets (Figure 12). These losses are especially attributable to losses on exposures to energy-intensive and other industry sectors within the loan and bond portfolio. In addition, credit losses are related to the deteriorating macroeconomic conditions in the four scenarios. In the most severe scenario for the banking sector, the double shock, the average CET1 ratio will fall to 11.3% from 15.6%.[45]

45 Our calculations of the CET1-ratios, solvency ratios and funding ratios are based on a number of strict assumptions. For more details see Vermeulen et al. (2018), *An energy transition risk stress test for the financial system of the Netherlands*, DNB Occasional Studies Vol. 16 – 7.

Insurance companies will feel the effects of a disruptive energy transition most in their bond portfolios. The stress test shows that value losses for insurers may amount to between 2% and 11% of the assets under review. As Figure 12 shows, losses in three out of four scenarios are primarily caused by rising interest rates. Bond prices fall when interest rates rise. In the double shock scenario and the policy shock scenario, the interest shock will account for over 90% of total losses on bonds. Losses on direct exposures to energy-intensive sectors remain relatively low. In practice, rising interest rates will also lead to lower valuations of liabilities. This mitigates the impact of losses on the solvency ratios of insurers. In the confidence shock scenario, where interest rates will only show limited rises and losses will be entirely attributable to losses on energy-intensive and other exposures, solvency ratios will therefore decline the most. The average solvency ratio will decrease to 163% from 179% in this scenario.

During a disruptive energy transition, pension funds may incur losses on both their equity portfolios and their bond portfolios. Our stress test shows that for pension funds value losses would total between 3% and 10% of the analysed assets, whereby the losses on asset positions are the highest in the double shock scenario. As they do for insurers, rising interest rates lead to declining liabilities for pension funds. This will improve the funding ratio both in the policy shock and in the double shock scenario. It should be mentioned, however, that rising interest rates in these two scenarios are partly caused by higher inflation. If pension funds were to apply indexation in order to preserve the purchasing power of pension payments, the funding ratio would end up lower in these two scenarios. Without indexation, the funding ratio will only decrease in the confidence shock scenario (to 103% from 109%), and it will remain virtually unchanged in the technology shock scenario. Long-term interest rates hardly move in these two scenarios, due to which the effect on the asset side of the balance sheet dominates.

In summary, the effects of a disruptive energy transition on the asset side of the balance sheet are the most pronounced for insurers and pension funds. Insurers will be hit especially through losses on their bond portfolios. Pension funds will also feel the pinch in their equity portfolios. And last but not least, banks will bear the brunt of a disruptive energy transition mainly through credit losses and losses on bonds.

Policy conclusions

Governments must implement timely and effective climate policies, thus mitigating the necessity for abrupt policy measures and preventing unnecessary costs. In all four scenarios, a disruptive energy transition will have significant consequences for the Dutch financial sector in the short term. Losses in carbon-intensive industry sectors impact other industries and the economy as a whole through production chains. The confidence shock scenario illustrates the price of ongoing uncertainty. Postponing tangible policy actions aggravates the risk of abrupt action in the future, which leads to costs. Timely, reliable and effective government policies serve to prevent as much as possible a disruptive energy transition and the related economic damage.

Financial institutions should include the possible implications of a disruptive energy transition in their risk management. A disruptive energy transition will impact the economy as a whole, whereby carbon-intensive industry sectors will suffer the biggest blows. Our stress test shows that in the different scenarios, a major part of financial losses may be concentrated in a small number of industries. Although this assessment depends on the examined scenarios and the methodology used, this type of concentration risk deserves special attention from both financial institutions and supervisory authorities. An excessive concentration of exposures to transition-sensitive industries may under specific disruptive transition scenarios lead to problems at individual institutions. In order to identify and quantify concentration risks, adequate and detailed information is essential, as is ongoing development of methodologies, e.g. by means of stress tests. By incorporating transition risks when analysing their exposures, financial institutions can mitigate the impact of a disruptive energy transition both on their own institution and on the financial system as a whole.

Annex: Macroprudential indicators

	Most recent observation	Trend after 1998 Min	Max	Average	Period under review
Credit conditions					
Trend deviation credit/GDP ratio [1]	-17.3	-17.3	9.9	-1.0	1998Q1-2018Q1
Growth in household lending (y-o-y)	1.2	-1.9	16.2	5.7	1998Q1-2018Q1
Growth in non-financial corporations lending (y-o-y)	1.3	-0.7	10.6	4.7	1998Q1-2018Q1
Credit conditions for non-financial corporations [2]	-26	-47	98	6	2003Q1-2018Q3
Credit conditions for residential mortgages [2]	-50	-53	100	13	2003Q1-2018Q3
Leverage					
Leverage ratio under CRD IV. fully loaded [3]	4.8	3.4	4.9	4.1	2014Q1-2018Q2
Tier 1-capital/balance sheet total of the banking sector (up to 2013Q4)	5.0	3.0	5.0	3.9	1998Q1-2013Q4
CET1 ratio of banks under CRD IV. based on transition rules	16.7	13.6	16.9	15.2	2014Q1-2018Q2
Tier 1 ratio of banks under CRD III (up to 2013Q4) [4]	12.5	8.2	12.8	10.0	1998Q1-2013Q4
Household debt (% of GDP)	103.3	73.6	118.4	103.3	1998Q1-2018Q1
Non-financial corporations debt (% of GDP)	142.1	115.0	151.1	129.0	1998Q1-2018Q1
Real estate market					
Growth in house prices (y-o-y)	9.0	-9.9	20.1	4.2	1998Jan-2018Jul
Growth in commercial real estate prices (y-o-y)	8.4	-7.5	9.1	2.3	1998Q1-2018Q1
Loan-to-value ratio of first-time buyers [5]	90.6	90.6	95.7	93.6	2013Q2-2018Q2
Loan-to-income ratio of first-time buyers [6]	428.3	388.7	445.0	421.0	2012Q4-2018Q2
Interest rates on new mortgage loans 5-10 years (bp)	244.0	228.0	553.0	422.8	2003Jan-2018Jun
Bank liquidity					
Loan to deposit ratio [7]	140.4	140.4	188.5	170.3	1998Q4-2018Q2
Proportion of market funding with maturities < 1 year	27.9	16.6	38.3	29.7	2003Aug-2016Dec
Systemic importance					
Size of bank balance sheets (% of GDP)	337.3	306.5	562.5	412.4	1998Q1-2018Q2
Share of the five largest banks in balance sheet total of the banking sector [8]	84.0	79.9	90.3	86.7	1998Q1-2018Q2
Rating uplift of systemically important banks (in steps) [9]	1.0	1.0	2.3	2.0	2012-2017
International risks					
Long-term interest rates (bp) [10]	47.3	2.7	566.6	316.2	1998Jan-2018Aug
BAA-AA risk premium (bp) [11]	97.0	74.0	463.0	164.5	2001Jan-2018Aug
Risk premium in money market (bp) [12]	4.1	1.0	186.0	20.2	1999Jan-2018Aug
Risk premium on senior unsecured bank bonds (bp) [13]	70.6	12.6	321.5	82.7	1999Jan-2018Aug
Financial stress index [14]	-0.09	-0.55	3.27	0.21	1999Dec-2018Aug
Growth in global lending to non-financial corporations (y-o-y) [15]	11.8	-5.9	20.2	6.2	2000Q1-2017Q4
Global growth in house prices (y-o-y)	2.1	-7.8	10.3	2.9	2001Q1-2017Q3

Concentration of exposures of Dutch banks [16)]

	Netherlands	Abroad	2018Q2
Total of debt securities and loans	51.3	48.7	
Central bank	8.0	2.3	
Governments	5.7	5.1	
Credit institutions	0.9	9.8	
Other financial institutions	1.6	5.6	
Non-financial corporations	11.0	17.2	
Of which: Small and medium-sized enterprises	3.0	3.4	
Of which: Commercial real estate	4.5	3.1	
Households	24.0	8.8	
Of which: Mortgage loans	22.8	7.4	
Of which: Consumer credit	0.7	0.8	

Source: Bloomberg, BIS, CBS, DNB, IMF, IPD, Moody's, Thomson Reuters Datastream.
Figures are expressed as percentages, except where otherwise indicated. Bp = basis points.

1) The difference between a) the ratio of lending to the non-financial private sector and Dutch GDP and b) the long-term trend for that ratio as calculated in ESRB (2014), Occasional Paper No. 5: *Operationalising the countercyclical capital buffer: indicator selection, threshold identification and calibration options*.
2) The proportion of banks tightening credit conditions and easing credit conditions, with a positive number reflecting a net tightening and a negative number reflecting net easing.
3) Calculated based on the most recent definition of the leverage ratio as agreed by the Basel Committee in January 2014.
4) The Tier 1 ratio reported here includes the Basel I floor.
5) The ratio of the amount of the mortgage loan to the value of the home at the time the mortgage loan is taken out. First-time buyers are defined as individuals younger than 35 at the time the mortgage loan is taken out. DNB estimate based on a sample of Dutch mortgage loans.
6) The ratio of the amount of the mortgage loan to the income of the borrower at the time the mortgage loan is taken out. First-time buyers are defined as individuals younger than 35 at the time the mortgage loan is taken out. DNB estimate based on a sample of Dutch mortgage loans.
7) The ratio of loans (including sensitised loans) to deposits made by the domestic non-financial private sector.
8) Assets of the five largest Dutch banks (ABN AMRO, ING, Rabobank, Volksbank and BNG) as a percentage of the Dutch banking sector's total assets.
9) The difference between credit ratings including and excluding government support, based on Moody's methodology. This is an average of ABN AMRO, ING, Rabobank and Volksbank, weighted by balance sheet total.
10) Yields on Dutch ten-year government bonds.
11) The yield differential between international BBB-rated corporate bonds and international AA-rated corporate bonds.
12) The difference between three-month EURIBOR interest rates and the three-month EONIA swap index.
13) The yield differential between European senior unsecured bank bonds and the five-year swap rate.
14) Index based on indicators of Dutch equity, bond and forex markets.
15) Trend in lending to the non-financial private sector in all countries reporting to the BIS.
16) The share of Dutch and foreign counter sectors in the exposures of all Dutch banks, based on reported consolidated figures for supervisory purposes.

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De Nederlandsche Bank N.V.
PO Box 98, 1000 AB Amsterdam, the Netherlands
+31 (0)20 524 91 11
dnb.nl