

Technological innovation and the Dutch financial sector

Opportunities and risks for financial institutions,
new market participants and supervision

DeNederlandscheBank

EUROSYSTEEM

Summary

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Technological innovation is considered to be one of the most influential developments affecting the financial sector in the near future. Innovation carries both opportunities and risks for established and new financial institutions and for the financial sector as a whole.

The increased competition generated by technological innovation makes it more difficult for established financial institutions to continue providing financial services profitably. The larger banks and insurers in the Netherlands are particularly aware of the potentially major impact of new technologies on their business models and strategies.

This report discusses the impact of technological innovation on the financial sector and its implications for supervision. Given the inherent uncertainty related to this impact, this study applies a scenario analytic approach to develop three alternative scenarios for the future. In the first, established financial institutions embrace and successfully exploit innovation, thereby changing the structure of the financial sector relatively little. In the second, the market becomes fragmented as new, specialist players compete effectively with established financial institutions. In the third, large technology companies such as Google and Apple displace established institutions by exploiting their scale and innovative capacity.

A number of positive effects of innovation emerge from the analysis. For example, innovation can increase efficiency and diversity by boosting competition within the financial sector. Competition can also reduce market concentration and result in better services for consumers. A more diverse financial sector can also reduce systemic risk by increasing heterogeneity between risk profiles of market participants.

The analysis further shows that technological innovation carries potential risks. For example, innovation can put pressure on earnings and the stability of IT systems of financial institutions. Innovation can also give rise to concentration risks, for example if a new entrant comes to dominate parts of the financial services market. Furthermore, innovation opens the way to a more thorough analysis of customer data, which in turn carries privacy risks.

De Nederlandsche Bank (DNB) intends to facilitate the positive contributions that technological innovation can make, whilst at the same time address potential risks. This study therefore recommends that the following steps be taken:

- 1 DNB will examine how its supervisory approach can be brought more closely in line with a financial sector that is undergoing structural change.** For example, DNB is exploring whether a more differentiated approach to licensing is desirable. In conjunction with the Netherlands Authority for the Financial Markets (AFM), DNB will also establish an innovation centre which aims to support innovative market operators with regard to regulation and policy. Finally, DNB will engage in further research into the potential risks of technological innovation in the financial sector.
- 2 DNB will step up its interactions with other stakeholders.** The speed and complexity of technological innovation demands regular knowledge sharing with other stakeholders, such as market participants, supervisors and legislators.
- 3 DNB will work to increase the knowledge and capacity of its staff in relation to technical innovation.** This can be achieved through training of DNB staff and a targeted recruitment policy. DNB will also monitor innovative developments in the financial market in a structured way using early warning indicators.

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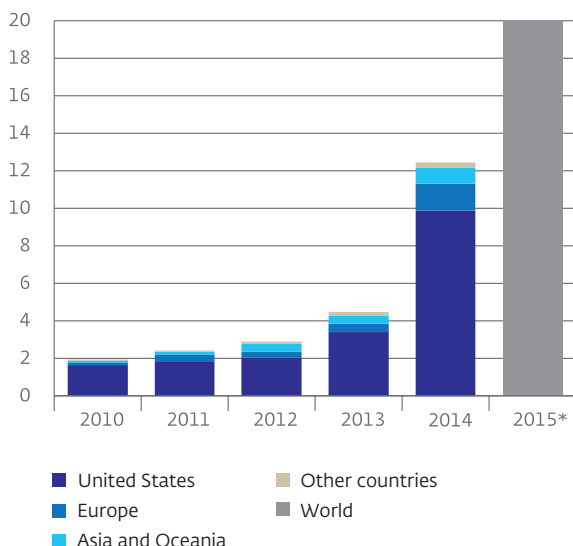
1 Introduction

8 Technological innovation is considered to be one of the most influential developments affecting the financial sector in the near future. Innovations related to payments, lending, asset management and insurance pose a challenge to business models and strategies of financial institutions, yet they also bring opportunities for both these market participants and newcomers. At the same time, innovation can create new risks for individual financial institutions and the financial system as a whole.

Technological development is not a new phenomenon in the financial sector. For example, banks in the Netherlands have been at the forefront in online and mobile banking. However, the growing number of new initiatives in recent years makes it difficult to estimate the speed of innovation. On the one hand, the pace¹ of innovation is increasing partly thanks to the exponential growth in the amount of venture capital being invested in financial technology, or 'FinTech' initiatives (Figure 1). On the other hand, most of these initiatives, at least in the Dutch context, are relatively small in scale. In addition, the bursting of the dot-com bubble at the end of the 1990s demonstrates that market expectations regarding innovations can be inflated.

Figure 1 Venture capital investments in FinTech companies

Investments (Billion USD)



Source: CB Insights, Accenture and KPMG

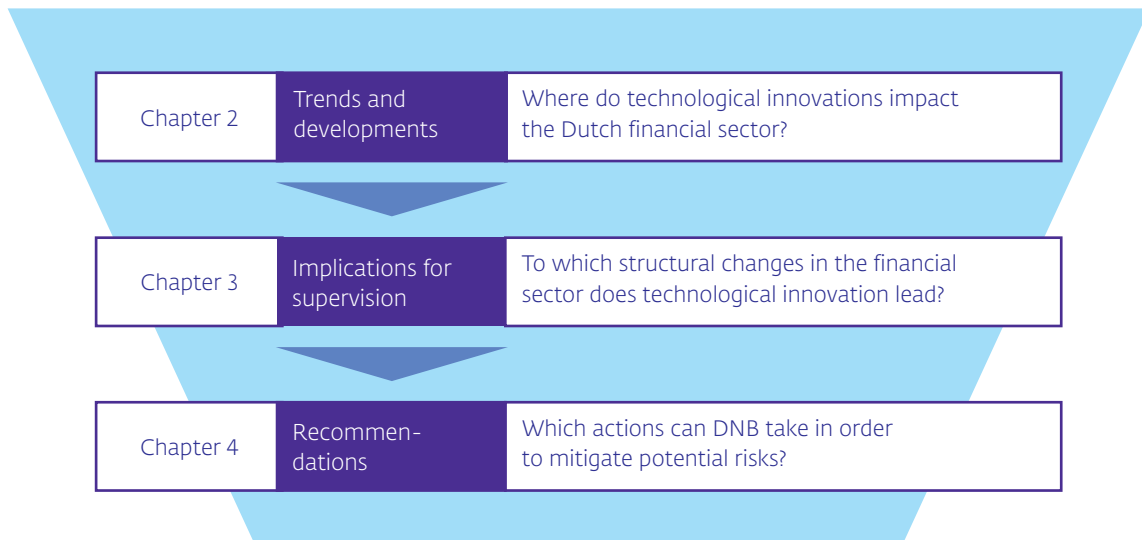
*Estimate

¹ This is demonstrated by, for example, the rise in the number of annual patent applications for payment innovations. See also the report by Autonomous, 'European banks: PSD2 – Let a hundred flowers blossom', dated 27 October 2015.

This report discusses the impact of technological innovation on the financial sector and its implications for supervision. Chapter 2 identifies the main trends and developments in technological innovation and analyses their impact on business models and strategies of financial institutions.

Chapter 3 discusses the implications for supervision based on three potential future scenarios. Chapter 4 concludes the report by recommending a number of specific risk-mitigating actions for DNB. See also Figure 2.

Figure 2 Analytical framework



2 Trends and developments

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Behind the rise of technological innovation in the financial sector are four broader societal developments. First, consumers are better informed and more articulate in relation to the products and services that they buy and use. This is due in part to the increasing importance of social media, comparison websites and other platforms. Second, the high levels of market concentration and uniformity in, for example, the Dutch banking sector leaves room to market participants to offer more specialised services. Legislation and regulations also influence the use of innovation in financial services, for example by removing entrance barriers to new market participants (e.g. PSD2; see Box 1). Finally, technology itself makes innovation in the financial sector possible; better connectivity and the growing capabilities of computers, smartphones and tablets enhance the trend whereby products and services are increasingly being sold through digital rather than branch networks.

These societal developments give rise to two trends in the financial sector. The first is the emergence of new initiatives within existing financial market segments/ sectors (e.g. payment services, insurance); the second relates to new initiatives that transcend existing sector divisions (see Figure 3 for examples; these are discussed in this chapter). Both trends have the potential to exert a far-reaching influence on existing business models in the Dutch financial sector. This could affect not only banks, but also investment firms and insurers, in several ways. Payment service providers have been quick to adopt innovations into their business models in comparison to other financial institutions.

The competition generated by technological innovation makes it more difficult for existing financial institutions to continue providing financial services profitably. Most financial institutions offer many different financial services, using the profits of some of these to pay for loss-making services – a practice known as cross-subsidisation. A motivation to engage

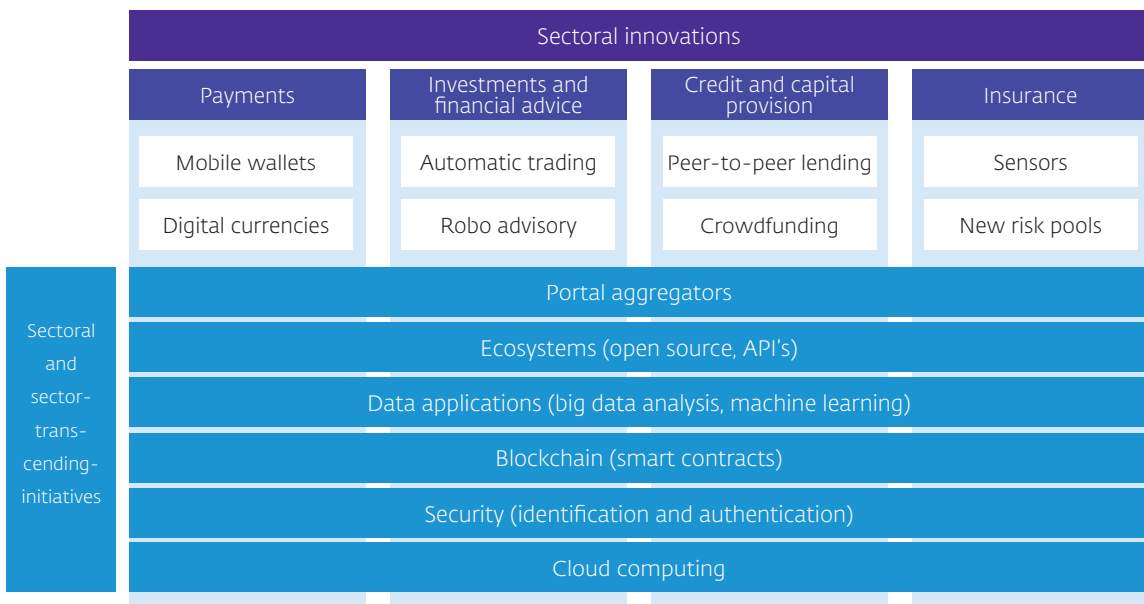
Box 1 Payment Services Directive

The EU Payment Services Directive (PSD) addresses the supervision of payment service providers, their rights and obligations and those of users. The Directive is intended, amongst other things, to establish an integrated and efficient European payment market, to ensure strong consumer protection, to monitor security and to promote common technical standards and interoperability. The revised PSD (better known as PSD2) is primarily a response to the growing importance of online payments. The main change concerns Article 66, which allows third party payment service providers to access consumer bank account details. This means that consumers are no longer restricted to their bank to make payments from their bank account.

in such loss-making activities is when these activities help to sell other services that are profitable – this is called cross-selling. An obvious example of a service that is used by banks to cross-sell is the current account; banks make hardly any profit on these accounts, but they often lead to the sale of products that do generate profit, such as savings accounts or personal loans. FinTech companies, however, tend to specialise in one particular service with which they enter into competition with existing financial institutions. By now, FinTech companies are active in most financial services, allowing them to compete with existing firms across business lines.

The above societal trends and developments have made technological innovation a ‘top of mind’ topic in the financial sector in recent years. The larger banks and insurers, in particular, are aware of the potentially major impact of new technologies in general and technology-driven companies in particular on their business models and strategies. They are seeking to respond to the complex and rapidly changing environment by making their business operations more flexible so as to enable them to react to developments more quickly. This is relevant in particular with regard to IT infrastructure and staffing structures. In addition,

Figure 3 Technological innovation in the financial sector: sectoral and sector-transcending initiatives



financial institutions are seeking to increase their knowledge in relation to technological innovation, both through partnerships with innovative companies and by investing in or acquiring such companies. Despite this, there are wide differences in the preparedness of market participants for these changes in practice; not all of them are taking action to adapt their business model and strategy.

2.1 Payment services

Of all financial services, the payment services industry has arguably been among the most innovative. Several payments firms have introduced innovative business models in recent years, which have helped them to compete successfully with banks. Banks too, however, have made progress in improving their payment services (e.g. iDEAL in the Netherlands). One recent innovation is the mobile wallet, which allows users to store their debit or credit card details on a smartphone and use them to make mobile payments. Both banks and other financial firms offer this service; the implementation of PSD2 (see Box 1) could potentially see the latter taking over a large share of online payments in Europe.² This is an area of concern for many banks, which fear a loss of contact with customers and therefore opportunities to cross-sell.

Blockchain, the technology behind digital currencies such as bitcoin, is still in its infancy, but could have a major impact in the longer term. This innovation allows payments to be made very rapidly between members of a decentralised digital network, separate from the mainstream banking system (see Box 2). Blockchain technology can also be used for other types of value exchange, for example involving contracts or securities.

2.2 Asset management

Traditional asset management is increasingly challenged by new applications. Whichever party possesses the fastest data connections (high-frequency trading) dominates stock market transactions. Automated investment funds using algorithms (such as robo advisory) as well as passive investment funds are gaining ground at the expense of traditionally managed investment portfolios. Reduced management costs (personnel expenses) make it possible to offer asset management services to an ever larger group of customers. This in turn means that investment firms are facing growing competition both from banks and insurers and from new market participants.

² In China, 85% of all online payments are made by financial firms other than banks. Alipay, a payment service provider owned by Alibaba, has a market share of almost 50%. By way of comparison, PayPal has only a 5% share of the online payment market in the United States (United Kingdom: 10%; the Netherlands: 4%). Source: Autonomous.

Box 2 Blockchain

Blockchain is a distributed ledger in which transactions (e.g. involving digital currencies or securities) are stored as blocks (groups of transactions that are performed around the same point in time) on computers that are connected to the network. The ledger grows as the chain of blocks increases in size. Each new block of transactions has to be verified by the network before it can be added to the chain. This means that each computer connected to the network has full information about the transactions in the network. Blockchain potentially has far-reaching implications for the financial sector, and this is prompting more and more banks, insurers and other financial institutions to invest in research into potential applications of this technology.

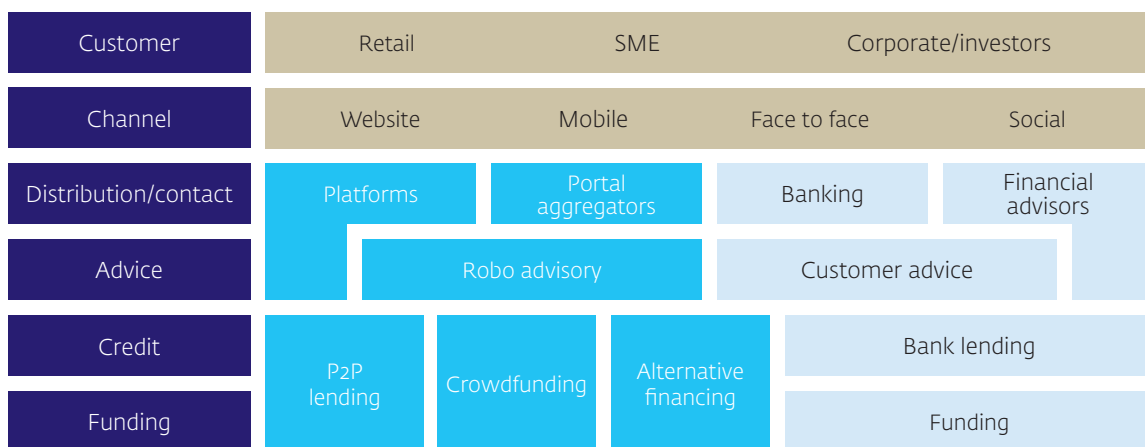
Frequently cited benefits of Blockchain are its transparency, security and the fact that transactions are logged in the network. Some of the disadvantages currently include the lack of coordination and the scalability of its technology. One of the best-known applications of Blockchain technology at the present time is bitcoin. Transactions in this virtual currency or in altcoins (alternative forms of bitcoin) are largely anonymous. This creates ethical risks for financial institutions dealing with users of this currency, because they are unable to (fully) verify their identity. DNB therefore classes these virtual currencies as products with a very high risk profile. This, however, does not extend to the Blockchain technology itself.

2.3 Lending

Innovation in lending services is already fairly well advanced in some countries, if not so much in the Netherlands at this stage. Peer-to-peer (P2P) lenders, which connect lenders and borrowers online, have the potential to capture the entire lending value chain from traditional banks (see Figure 4 for a schematic overview). Despite this, banks also make use of the P2P lending channel as a

means of mediating between borrowers and lenders on a commission basis (without taking on credit risk). P2P and other online forms of lending are growing particularly in the United States (and, to a lesser extent, in the United Kingdom). In the US, an online mortgage provider is currently a top three provider in terms of market share.³ In comparison, the volume of online lending in the Netherlands is currently still very limited.⁴

Figure 4 Lending value chain



- Value chain segments
- Innovative solutions
- Traditional solutions
- Types of customers/channels

Note: All figures are indicative. The size of the rectangles bears no relation to the size of the links or members of the chain.

³ This concerns Quicken Loans, which has provided mortgage loans to a total of more than € 200 billion since 2013, exclusively via the online channel.

⁴ Over 2015, online lending totalled € 128 million. The figure over the whole of 2014 was € 63 million. Source: Fundwijzer and Douw&Koren. By way of comparison, Dutch bank lending to the private sector amounted to € 781 billion at the end of 2015Q1. Source: Bank for International Settlements.

2.4 Insurance

At present, the insurance industry makes relatively little use of technological innovation. Having said this, the potential impact is considerable. Innovation in the insurance sector is currently mainly limited to the back office. Front office innovation is mainly confined to the non-life sector, for example with insurers exploring the possibility of using sensors installed in products to monitor the behaviour of customers and therefore reduce risks to the insurer. Loss prevention (and advising customers about this) is set to play a bigger role here. Further advances in sensor technology (e.g. Internet of Things,⁵ driverless cars, etc.) could lead to considerable changes in the insurance business model. This technology could also enable insurers to construct new risk pools. The likely impact of technological innovation in the different segments of the financial sector is described in Box 3.

2.5 Sector-transcending innovations

Technological innovation gives rise to new financial products and services, offered by both established institutions and newcomers. Portal aggregators are a frequently cited example of front office innovation. These are companies which gather financial information from different sources and aggregate it to produce a comprehensive picture. Following the implementation of PSD2, it will be possible to extend this functionality to include portfolio management (for example in combination with a robo advisory function), which will allow customers to develop and implement their entire personal financial planning from a single platform. Back office operations are increasingly focusing on big data. Banks, in particular, have access to valuable customer information which they can use for commercial purposes, although recent experiences in the Netherlands have led to some caution here.⁶ Yet, the commercial use of data is already a reality in some other countries.⁷

5 The Internet of Things describes a situation in which all kinds of devices are connected to the Internet. This allows for communication with these devices, at a distance. For example, think of a thermostat which can be adjusted using a smartphone. In addition, devices can also communicate with each other via the internet. An example of this is a car which contacts a garage itself when it signals that one of its components needs replacement.

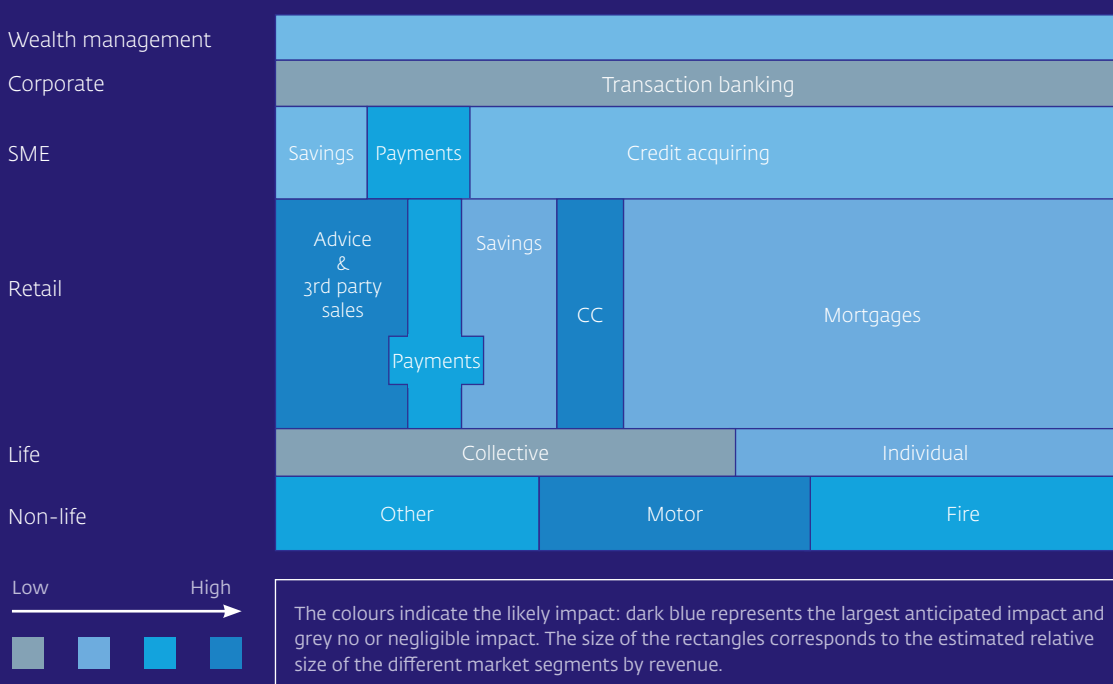
6 ING announced in the spring of 2014 that it was planning a trial with customers, presenting them with commercial offers from companies based on their payment behaviour. However, the announcement led to a public outcry about privacy and the handling of sensitive customer details, prompting the bank to announce in November of the same year that it had abandoned the plan.

7 Examples include the collaboration between Cardlytics and Bank of America (US) and iGaranti (Turkey).

Box 3 Basic scenario of likely impact on revenues in the Dutch financial sector in 2020

Figure 5 provides a rough estimate (based on linear extrapolation) of the impact of technological innovation on different market segments in the financial sector over the next five years, starting from the situation (i.e. degree of innovation) in 2015. The largest impact over the next five years is expected in financial advice, consumer credit (CC) and car insurance. The impact on payment services and other non-life insurance products is also likely to be considerable. Innovation is already relatively far advanced in payment services, therefore the likely future impact vis-à-vis today is smaller than for some other market segments, such as financial advice. The forecasts are based on a linear extrapolation of existing developments; any second-order effects, such as cross-selling in payment services, are left out of consideration.

Figure 5 Impact of technological innovation (linear forecast)



Technological innovation also fosters specialisation and outsourcing of particular services. A well-known example of this is cloud computing, but several market participants are exploring digital ecosystems in which different external parties are able to communicate with financial institutions via Application Programming Interfaces (API). Established institutions urgently need to update their IT infrastructure (legacy systems) in order to be able to integrate innovations successfully.

3 Implications for supervision

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The impact of technological innovation on the financial sector has consequences for DNB's supervisory objectives. These are articulated in the bank's mission statement, which states that DNB operates to ensure:

- Price stability and balanced macroeconomic development in Europe, together with the other central banks of the Eurosystem;
- A shock-resilient financial system and a secure, reliable and efficient payment system;
- Strong and sound financial institutions that meet their obligations.

3.1 Analytical methodology: scenario analysis

In this study, DNB uses a scenario analytic approach in order to estimate the impact of the trends discussed earlier on the financial sector. This impact is inherently uncertain and depends on a number of factors. By drafting scenarios one can visualise the potential impact of trends and developments (in this case, technological innovations) without allocating a probability to these scenarios. The analysis presented here uses three different scenarios. It was decided to develop a limited number of extreme scenarios in order to be able to present a

clear picture of the consequences for the financial landscape and for supervision.

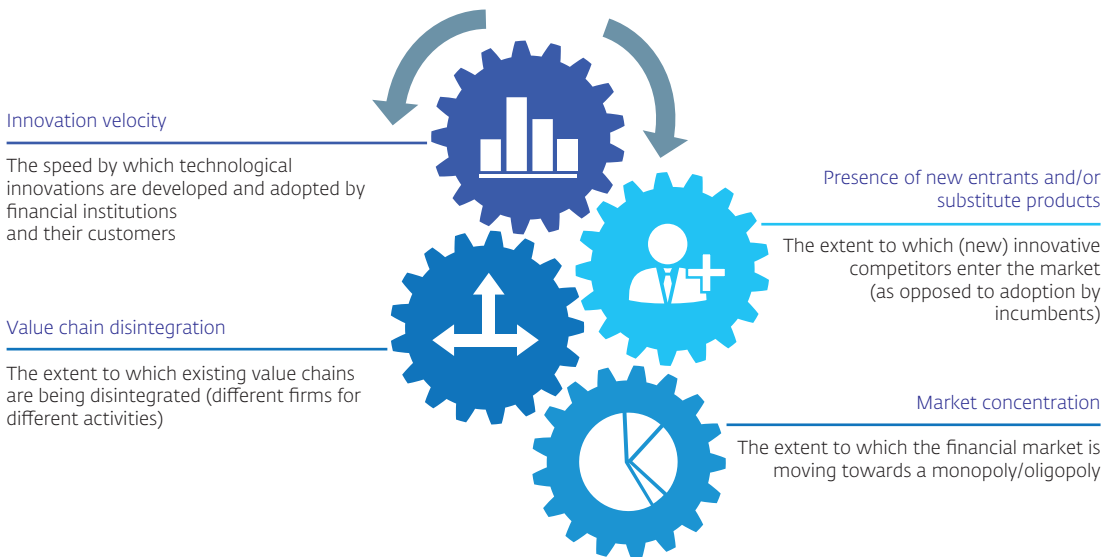
The scenarios are based on the societal developments and identified trends discussed in Chapter 2. Four variables were distilled from those trends and developments. Collectively these variables make up the building blocks for the different scenarios. They are 1) the speed/degree of innovation; 2) the presence of new market entrants/substitute products; 3) the degree of concentration of active market operators, and 4) the degree of integration/disintegration of the value chain. Figure 6 provides an illustration.

The identified variables have been validated using the five forces in Porter's Competitive Forces Model.⁸ This model, which is widely used in the industry, describes the way in which a number of forces (suppliers, customers, substitute products, new market entrants and competitive rivalry) influence the attractiveness (in terms of profitability) and therefore the growth potential and structure of the market. Technological innovation affects these forces and can therefore influence the structure of the sector. All five forces were incorporated in the variables for the scenario analysis.⁹

⁸ Porter's Competitive Forces Model aims to determine the growth potential of a market or sector. See Michael E. Porter. "The Five Competitive Forces that Shape Strategy", Harvard Business Review, January 2008, pp. 86-104.

⁹ Suppliers were included in accordance with their degree of integration; customers were included in relation to the speed/degree of technological innovation; substitute products and potential market entrants were included on the basis of the presence of new entrants/substitute products; and rivalry is based on the degree of concentration of active market operators.

Figure 6 Scenario analysis: variables



3.2 Scenarios

Figure 7 presents the three scenarios describing possible future states of play of the Dutch financial sector.

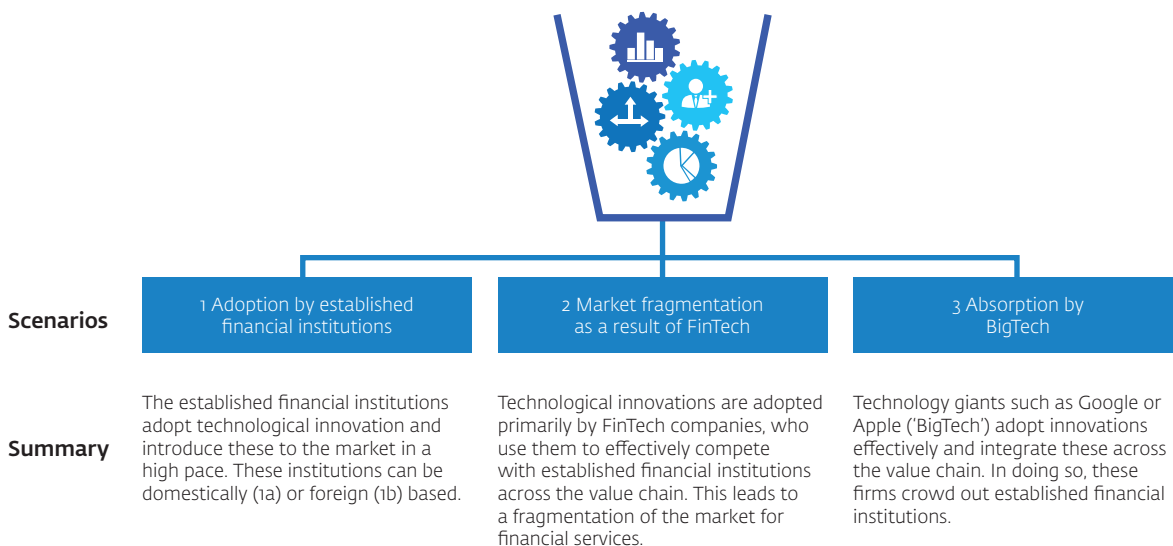
The three scenarios are compared with a baseline scenario which is characterised by a low level of innovation and few (if any) new market entrants. In this study, the degree/speed of technological innovation is assumed to be the root cause of changes within the financial sector. Only scenarios with a high degree of innovation are therefore relevant. These scenarios are then compared to the baseline scenario in order to gauge the impact of technological innovation.

Scenario 1: Adoption by established financial institutions

In this scenario, established financial institutions adopt technological innovations and bring them to market quickly. The current market participants are aware of the value of technological innovation for their business models and invest in tech-related skills and knowledge. They engage in strategic partnerships with or acquire technology companies, enabling them to convert the knowledge gained into new products and services.

A version of this scenario concerns a situation in which financial institutions established outside the Netherlands adopt technological innovations and introduce them to the Dutch market. Financial

Figure 7 Summary of scenarios



institutions established outside the Netherlands perceive market inefficiencies in the Dutch financial services sector. They compete through more effective and more efficient use of technological innovations allowing them to gain market share. As in the domestic case discussed above, these financial institutions invest in the requisite knowledge by developing it in-house, forging strategic partnerships or acquiring technology companies.

Scenario 2: Fragmentation due to FinTech

In this scenario, it is mainly FinTech companies that adopt and develop technological innovations in specific parts of the value chain, leading to market fragmentation. Established institutions lose market share to FinTech companies in those segments.

Scenario 3: Absorption by BigTech

In this scenario, large technology firms such as Facebook, Google or Apple ('BigTech') are the main carriers of technological innovation and introduce new services across financial value chains. These companies displace existing financial institutions throughout the value chain by exploiting their scale and innovative capacity.

3.3 Impact of the scenarios

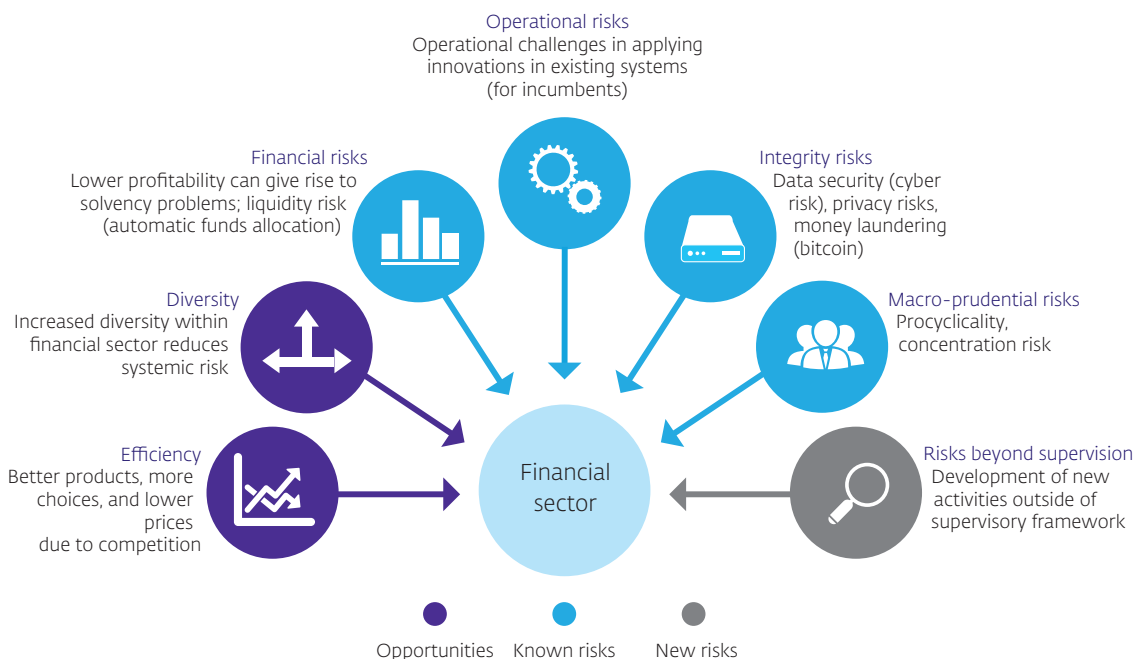
Analysis of the different scenarios produces both positive and negative implications for the financial sector. These are discussed in more detail below (see also Figure 8).

Technological innovations help making the financial system more efficient, especially if they lead to an increase in competition. New technological processes often result in greater user-friendliness.¹⁰ More competition leads to a greater choice of providers and products at a lower price, especially if there is competition in each segment of the value chain. Innovative new entrants provide an incentive

for established financial institutions to become more competitive and focus more on their customers, whilst at the same time also offering added value themselves to consumers. Moreover, competition can have a positive impact on integrity in the sector, because customers – pampered by greater choice – demand more transparency and integrity.

Figure 8 Main areas of impact for the financial sector

Overview of the opportunities and risks that occur to a greater or lesser extent in each scenario and that are relevant for several types of financial institutions



¹⁰ This applies particularly for the digitally competent section of the population. DNB is contributing to the public debate on the accessibility of this innovation, for example via the National Forum on the Payment System (MOB).

Technological innovation can increase the diversity of the financial sector. The entrance of new types of market participants creates a more varied financial landscape, which reduces systemic risk. This is because the more different the various activities are, the weaker is the correlation between the risks to which financial institutions are exposed. This applies in particular to the Dutch banking sector, which has become more homogeneous in recent decades.¹¹ Innovation also forces established institutions to focus on profitable products and services rather than on providing as many services as possible. This makes financial institutions more efficient.

In addition to these positive effects of technological innovation, DNB also perceives potential risks from technological innovation. Specifically, the three scenarios give rise to strategic, operational, financial, integrity and macro-prudential risks. These risks are most evident in the transitional phase from the present situation to the future as sketched out in the scenarios.

Financial risks

Innovative new market entrants increase financial risks in the financial sector. Existing financial institutions stand to lose a substantial part of their market share if foreign financial institutions, FinTech or BigTech companies are able to use innovations more efficiently. This can result in financial instability, especially if there is a rapid transition to the new situation. There is also a growing liquidity

risk if new entrants (such as portal aggregators) are able to automate the allocation of deposits between different banks. Moreover, the financial robustness of FinTech companies cannot always be taken for granted; a sudden failure or disorderly resolution can undermine consumer confidence in such institutions.

Operational risks

The implementation of new technologies and processes gives rise to operational risks. It is a challenge for established institutions to implement new processes and IT systems. BigTech companies, by contrast, have often geared their processes better to technological innovations. The emergence of FinTech companies also carries risks, for example in relation to cybersecurity.¹² Moreover, there are operational risks in outsourcing parts of the value chain to new entrants.

Integrity risks

Innovative products and services can make the financial sector more complex, fuelling integrity risks. The emergence of new, innovative services and providers makes the financial system more complex and less transparent. This in turn makes control and supervision more difficult and increases the risk of unethical behaviour. This not only makes it more difficult for financial institutions to identify illegal customer practices such as money laundering and terrorist financing, but could also drive financial institutions to be not fully transparent regarding the

¹¹ See DNB report "Perspective on the structure of the Dutch banking sector".

¹² An example is the hacking of Looppay (the company behind Samsung Pay) in early 2015.

risks of new products. New applications involving the use of customer data can, moreover, lead to privacy infringements. All these risks can affect both established operators and new entrants. If the latter are FinTech or BigTech companies, they are currently subject to lighter regulation in comparison to banks.

Macro-prudential risks

Technological innovation can augment procyclicality in the financial sector, create new concentration risks and have a broad impact on public confidence.

P2P lending, for example, shifts risks onto the consumer, who may be less able to bear these risks and may therefore react more quickly to an economic downturn. New investment services, which carry the same 'buy/sell' recommendations, for example based on big data and automated models, can also increase market volatility.

New concentration risks will arise if a new market entrant dominates large parts of the financial services sector (scenario 3). This will make that institution by definition systemically important. If such an institution gets into difficulties, this could lead to instability in the financial system. As customer contact becomes ever more digitalised and reliance on data and sensors increases, customer trust and confidence can be seriously affected by a privacy scandal.

Non-supervisory risks

The rise of technological innovation is leading to the emergence of activities which could make for less sound and ethical financial institutions and affect financial stability, but which are not subject to supervision. New activities such as the use

of algorithms and the exploitation of customer particulars (big data analysis) are not currently covered by prudential supervision if they are provided by non-financial institutions. However, such activities can influence consumer confidence and the ethical operational management of financial institutions if they are linked to financial services.

3.4 Impact of scenarios on different types of financial institutions

The impact of the scenarios varies depending on the type of financial institution. This section looks at the main implications for each market segment of the financial sector (see also Figure 9).

Banks

Technological innovations will force banks to modify their operating systems and earnings models. Banks currently perform activities in several market segments (e.g. payment services, lending and investments). Technological innovation will lead to more high quality products at lower prices in these market segments. If banks do not adopt innovations quickly enough, this will put pressure on their business model on several fronts. Fragmentation of the value chain and loss of customer contact (scenario 2) could mean that banks are less able to take advantage of cross-selling. That would lead to reduced opportunities for cross-subsidisation, which could harm profitability. In addition, new technologies render existing legacy IT systems inefficient. This gives rise to risks in relation to the improvement or replacement of these systems

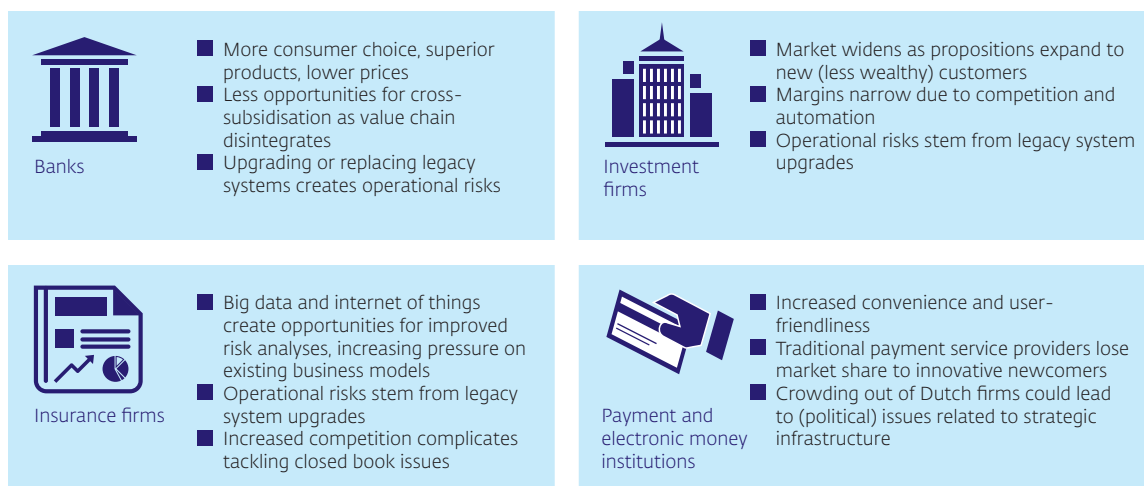
(such as business continuity risk) and possibly also to higher depreciation.

Insurers

Technological innovations in the insurance industry could help improving risk assessment accuracy, but could also lead to additional operational and financial risks. Traditional insurers could encounter difficulties in preparing their operating systems for completely new business models for the sale of products, assessing risks and handling claims. Shrinking demand for some products, for example due to the rise of driverless cars and the Internet of Things, could also lead to reduced premium

income in the non-life insurance sector. Moreover, insurers in the Netherlands are faced with the administration of closed book products,¹³ whose value is declining whereas their support systems have to be maintained. If new market entrants begin competing with insurers, this could lead to the accelerated run-down of closed book portfolios, or mean that insurers are no longer able to create growth elsewhere in the business to which they can attribute fixed costs. It is essential in this scenario that insurers establish their provisions for administration costs correctly, so that they are able to continue meeting all their obligations.

Figure 9 Main areas of impact by type of institution



¹³ Insurance products that are no longer sold but which existing customers may hold for many years to come, facing the insurer with the cost of administering them. Examples include some life insurance policies that no longer exist but on which insurers still have to pay out to people who purchased them in the past.

Investment firms

For investment firms, technological developments can lead to the disintegration of the value chain, a loss of profitability and an increase in operational risks. Technological innovation helps disintegrating the value chain (scenario 2), causing the primary customer contact to shift to new market operators. Together with the improved efficiency stemming from technological innovation, this squeezes the margins on investment products, potentially putting pressure on the soundness of the affected institutions. On the other hand, technological innovations mean that investment firms are able to address a larger market, which increasingly includes small retail investors. In addition, many existing investment firms find it difficult to integrate new technologies into their legacy systems. Acquisitions and alliances with other operators (scenarios 2 and 3) may tackle this challenge, but also bring additional operational risks.

Payment and electronic money institutions

Technological innovation could lead to an increase in the number of payment and electronic money institutions, with implications for traditional payment service providers. Payment institutions and electronic money institutions are a relatively new phenomenon in the financial sector, and they tend to be relatively innovative.¹⁴ These companies are introducing new products and services that are often more user-friendly than those of other market players.¹⁵ If the number of new institutions continues to grow (scenario 2) and if they offer services at the retail end of the value chain, this will mainly affect the traditional payment service providers – banks – which will lose their position in the value chain. This potentially has a major impact on their financial strength as opportunities for cross-subsidisation diminish. If Dutch payment institutions are losing market share due to market entrants from abroad, or if technology giants take over these institutions (scenario 3), this could give rise to political concerns (loss of key infrastructure) while increasing dependence on foreign supervisors.

¹⁴ Payment institutions were introduced in the Payment Services Directive 2007. Electronic money institutions were introduced in the first Electronic Money Directive (EMD1), in 2000.

¹⁵ This does not by definition mean that these products will also improve the accessibility of the payment system (see also section 3.3).

4 Recommendations for risk-mitigating actions

DNB supports innovation while simultaneously keeping a close eye on potential risks. In this context, DNB will undertake action on three main fronts: a realignment of its supervisory approach, stepping up the dialogue with stakeholders and building knowledge. Figure 10 summarises these actions, which are discussed in more detail below.

4.1 Realignment of supervisory approach

DNB will examine how its supervisory approach can be brought more closely in line with a financial sector that is undergoing structural change.

Where appropriate, the impact of technological innovation will be incorporated in DNB's supervisory approach. For example, supervisors can engage with supervised institutions in order to assess how they deal with innovation. DNB will also examine whether and how its supervision imposes barriers to innovation, and whether these can be removed. Thirdly, DNB will include technological innovation in its micro-prudential and macro-prudential risk analyses.

DNB will examine whether a more differentiated approach is appropriate in its licensing policy. A strict licensing policy is desirable if it protects the market against entrants which take excessive risks.

Figure 10 Risk-mitigating actions



However, an unintended and unwanted effect of this policy is that it can prevent small firms from entering the market. This is known as the 'too small to comply' effect and can lead to a concentration of large firms in the market.¹⁶ To limit this risk without adversely affecting their objectives, supervisors could aim for a differentiated approach to authorising market operators. In consultation with the legislator, DNB will therefore examine whether such a differentiated approach is warranted and whether this will require regulatory amendment.

Examples of a differentiated approach could be the granting of temporary authorisation for experimental services (in line with the regulatory sandbox that was recently announced by the British FCA; see Box 4) and authorisations based on specific activities or specific risks of financial institutions.

DNB also plans to set up an innovation centre to support market operators with questions about regulation and policy. This is expected to benefit small firms, in particular, potentially encouraging

Box 4 A sandbox for innovation

On 10 November 2015, the UK Financial Conduct Authority (FCA) announced its intention to develop a so-called Regulatory Sandbox for testing innovative financial products. This concept, which was developed at the request of the British government, allows businesses to test innovative products, services and business models under a 'light' supervisory regime.

The aim of the Sandbox is to shorten the time to market of innovations and therefore to encourage innovation. At the same time, restrictions related to the market scope of the experimental service are imposed in order to contain the risks in the event of failure. The concept is derived from the 'sandboxing' model that is widely used in the IT industry, in which a separate area is created where new or updated computer programs can be run without disrupting core processes.

The FCA applies strict criteria for the use of the Sandbox related to, amongst others, the potential benefits for consumers, the degree of innovation and the solidity of the proposal. The Monetary Authority of Singapore (MAS), the prudential supervisor in Singapore, advocates a comparable concept.

¹⁶ This is because the regulatory burden caused by the measures that each institution has to take is so heavy for small financial institutions that institutions below a certain minimum size cannot survive. See Actal report 'Advies Regeldruk bij kredietverstrekking' ('Advisory report on regulatory pressure in the lending market') dated 23 July 2015.

Box 5 Innovation Hub

The Australian Securities and Investments Commission (ASIC) is the Australian body responsible for supervising financial conduct. In the spring of 2015, ASIC announced that it was creating an 'Innovation Hub' to answer questions about supervision and innovation from new entrants and existing institutions wishing to introduce new applications. This followed a similar initiative by the FCA which was launched in November 2014 and which to date has provided advice to 175 firms.

One innovative instrument used by both ASIC and the FCA is the 'informal steer', entailing the provision of non-binding legal advice on how new financial services can meet the regulations. This instrument enables supervisory authorities to provide quick guidance to firms, and can also help in speeding up authorisation procedures.

innovative new market entrants. DNB will act in partnership with the AFM here, which has for some time operated an 'Innovation Room' with a similar purpose. Other supervisory authorities, including the British FCA, the Australian ASIC and the Monetary Authority of Singapore, have also launched similar initiatives (see Box 5).

Finally, DNB will carry out further research on the potential risks stemming from technological innovation in the financial sector. DNB will look at the activities of both supervised and non-supervised institutions, focusing attention both on the impact of innovation on risk categories falling within the current supervisory framework (such as financial, operational, liquidity and integrity risks), and potential new risks or risk categories stemming from technological innovation.

4.2 Interactions with stakeholders

DNB will step up its interactions with other stakeholders. The speed and complexity of innovation requires regular knowledge sharing between stakeholders, such as supervised institutions, other market participants, supervisors and legislators. It is also important to put innovation firmly on the agenda of financial market supervisors and legislators, both in the Netherlands and internationally. The scenarios described in this report show that technological innovation in the financial sector can have both prudential impact and effects in relation to behaviour, privacy and competition. The effectiveness of prudential and integrity supervision benefits from regular coordination of activities with national regulators and supervisors, such as the Ministry of Finance, AFM and the Dutch Authority for Consumers and

Markets (ACM). In performing its supervisory tasks, DNB is also increasingly working together with international partners, and effectively addressing technological developments therefore demands international coordination. DNB will aim to adopt standpoints on new regulations at an early stage and will raise and help shape the international debate. In order to facilitate this, DNB will develop its own policy stance on innovation.

4.3 Strengthening knowledge

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DNB will further train its supervisory staff in relation to technological innovation. The penetration of digital technology in the financial sector demands continuous investment in developing the appropriate knowledge and skills within DNB. Moreover, technological innovation offers opportunities for supervisors, for example with respect to the automation of certain supervisory processes. DNB seeks to achieve these goals by means of staff education and an appropriate recruitment policy.

DNB will also monitor innovative developments in the market related to innovation in a structured way. Early warning indicators will help to make these developments measurable and comparable. For example, one could monitor investments by financial institutions in financial technology and the number of new authorisation requests.

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