ARTICLE – FinTech – increasingly rapid interaction between financial operations and technological innovation

FinTech – financial services combined with new technological innovations – have received considerable attention in recent years. New technological innovations have the potential to make the financial system more efficient, for instance, by substantially reducing transaction costs. At the same time, there is a risk that faster and more decentralised transactions, combined with increased IT dependence, can have a destabilising effect. Government agencies and international standard-setting organisations have therefore begun analysing FinTech and its effects on the financial system. This article provides a historical retrospective of the interplay between technological innovation and financial services, followed by a discussion of potential effects on financial stability.

FinTech – a broad phenomenon

FinTech is a collective term for the ongoing interaction between financial businesses and technical innovation. FinTech includes both new services that are based entirely on technical innovation, for example payments with virtual currency with the help of blockchain technology,[100] and traditional services that have been streamlined with the help of technical innovation. FinTech is a very broad phenomenon that can in principle affect all parts of the financial system, which opens up for a spectrum of risks and opportunities. In this article, FinTech refers to both the technology used by traditional agents on the financial market and technology used by new agents.

The telegraph was the start of globalisation

To put the current FinTech developments in context, it is important to see them in a historical perspective. Current developments are a continuation of a long, ongoing trend of interaction between technological advances and financial businesses. The difference now is that it is going considerably faster.

The introduction of the telegraph in the early 19th century can be regarded as a linchpin of financial globalisation. When a telegraph cable linked together financial centres in London and New York in 1866, it created the conditions for a rapid transfer of information on transactions over long distances. Towards the end of the 19th century, the telephone began to be used on a larger scale. This allowed greater centralisation in the banking system, as local offices could now coordinate their activities. Customers were communicating with the banks by telephone as early as 1890.

When the size of the banks' transactions grew, greater capacity for information processing was required. In the 1930s punch card machines (a precursor to today's computers) was used to an increasing extent. During the decades following the Second World War, the banks also started to use computers to an increasing degree.

Development of payment forms

One important technological innovation was the ATM, which was introduced in the United Kingdom and in Sweden in 1967. Now customers had access to cash 24 hours a day.

Credit cards were introduced in the United States at the beginning of the 1950s. The possibilities to pay by transferring money between bank accounts increased when debit cards were introduced in the mid-1970s. However, conflicts between banks and businesses led to the technology being implemented at a slow pace.

It is important to also draw attention to technology that did not make an impact. Videotex, which was introduced at the end of the 1970s, was a form of communication technology that used existing telephony networks. This technology made it possible to conduct banking errands at home via a terminal. During the 1980s, several attempts were made to introduce Videotex, but this technology never really caught on. The Cash Card is another example of technical innovation that never had an impact. The Cash Card was launched by Swedish banks in the late 1990s as a replacement for cash. The system allowed smaller amounts to be transferred from bank accounts to a special card.

[100] Segendorf, B. (2014). Has virtual currencies affected the retail payment markets? *Economic Commentary* No. 2 2014. Sveriges Riksbank.

The Internet entailed a breakthrough for conducting banking errands at home

The breakthrough of the Internet in the 1990s entailed a new opportunity to carry out banking errands at home. In Sweden, the first on-line bank was established in 1996, and in 1999 Swedish on-line banking was considered the best in the world, according to an international study. However, it took longer to establish than forecast. There were problems with slow bit rates and unreliable connections. Many potential customers were also suspicious with regard to the safety of on-line banking services. In the year 2000, The Economist declared that on-line banking services were a failure.[101] Better bit rates, safer connections and a growing number of home computers meant that online banking services became increasingly common. When mobile phones, and in particular smart phones, entered the scene, the establishment of on-line banking services made more rapid progress.

New opportunities for making payments

The area where FinTech developments are perhaps most visible for consumers is payments. Many new opportunities to make payments, in addition to cards and cash, have emerged in recent years. Initially, these involved changes in the form of new, relatively simple methods of, for instance, storing credit card data for payments over the Internet. This development has then moved over from the computer to today's smart phones. Combined with new digital methods of identification, such as BankID, this development has led to several new methods of payment that do not require card terminals or cash handing – all that is needed is a telephone connected to the Internet. Simple and fast payments between private individuals and business operators can be made in principle anywhere, as the technology is not based on any fixed infrastructure. The mobile payment service Swish is a good example of one such innovation that is based on solutions created in cooperation between the Riksbank and the commercial banks.[102] Although these payment solutions can have major advantages in the form of efficiency, they do not essentially change the stability of the financial system or the way it functions, as the solutions are still based on moving money between bank accounts.

Customer relations – centralisation versus diversification

The Swedish financial system is currently dominated by the four major banks, which offer a wealth of products – wage and savings accounts, asset management, mortgages and so on. To a large extent, customers tend to use the same bank for several different services, partly because bank prices are often designed to encourage customers to choose more services. The development of FinTech can contribute to this concentrated form of offering services instead being diversified, so that customers choose different suppliers of different financial services. New technology and new regulation has made it possible for financial companies to obtain easier access to all of a customer's financial data, given that the customer approves this. In this way, financial actors can more easily and cheaply form a clear impression of a customer's entire private finances without the customer having to take any action. This also creates opportunities for companies to offer customers to automatically change between different savings accounts or mutual funds to attain the best return without the customer needing to ascertain who offers the best interest rate on savings.

Such a development can lead to increased competition and efficiency. But the development can also undermine stability, as customers are no longer as loyal when they can easily and quickly change from one company to another. Ultimately, this can mean that, for instance, deposits will be more volatile, which could lead to greater liquidity risks for companies who finance themselves in this way. This development can also lead to fragmentation of the market with a large number of newly formed and potentially less robust agents with different technical solutions that are less compatible with each other. Yet another risk is larger short-term price changes on various types of funds and financial instruments, as customers may be more inclined to move their savings, especially if they do not need to actively take any such decisions themselves, but it occurs automatically.

New forms of saving and loans

In recent years, an increasing number of types of internet-based platforms have been established, matching customers wanting to save money with those wanting to borrow. The platforms do not usually take any credit risk, but contribute information in the form of a credit assessment of the borrowers and help to mediate money from savers to borrowers. Although these platforms do not take credit risks, they, like other financial market actors, are exposed to operational risks and it is therefore important that they allocate sufficient resources to prevent them. Similarly, this type of business can give rise to risks for borrowers and lenders. The risks for the lender may be that he or she lacks adequate knowledge or skills to be able to assess the borrower's creditworthiness, or has no knowledge of who the borrower is. The risks for the borrower may be that

[101] The Hollow promise of Internet banking, November 2000. *The Economist*.
[102] Payments in real time make it possible to use the mobile payment service Swish. Article in *Financial Infrastructure Report* 2013. Sveriges Riksbank.

credit is granted on the wrong grounds due to a lack of credit assessment, which can result in increased lending to individuals with a poor ability to repay.[103] While these operations have grown rapidly, the loan volumes are yet very limited. For some segments, such as very small companies, this form of lending has become relatively important on certain European markets. Given the strong growth rate of these platforms, there is thus reason to continue examining this development.

New type of trading on the financial markets

Trade in financial instruments has changed in that electronic trading has become increasingly common and some types of intermediary have declined in significance. Today it is rather hedge funds and actors specialising in computerised trading, often in the form of so-called high frequency trading, which accounts for the largest part of the turnover on many markets.[104] This has contributed to faster transactions and lower transaction costs, but at the same time the rapid and automatic trade is linked to instability on the market as a result of technical errors or operational risks. In recent years, situations have arisen where the prices of a number of different financial instruments have fallen very rapidly in a very short period of time, and have then quickly recovered again. Opinion is divided as to the cause of these "flash crashes", but some say that more automatic trading is at least part of the explanation.[105]

Infrastructure for trade and payments may face decentralisation

The possibility to make large payments or to buy and sell large volumes of financial instruments, such as equity and bonds, is currently based on the existence of a central actor. This central actor ensures that the money from those who, for instance, buy a share is transferred to the seller and that the share is then transferred from the seller to the buyer.

New technologies such as blockchains and "distributed ledgers" are instead based on a decentralised technique that means a central actor is no longer needed to the same extent.[106] Instead, the transfer of securities, for instance, can be carried out directly between buyers and sellers. This development could lead to reduced risks and to lower costs when buying and selling financial instruments. The development can also mean that it becomes more difficult for authorities to gain knowledge of financial transactions that no longer go through a central agent even though the business is still under the supervision of the authorities. However, the technology is new and it remains to be seen how far it will be possible to decentralise the financial infrastructure in a safe and efficient manner.

Cyber threats and RegTech – problems and possibilities

Increased digitalisation of the financial sector, combined with fragmentation and outsourcing of IT services could lead to new risks and vulnerabilities, so called cyber risks. It is becoming increasingly important to be aware of cyber risks as the financial sector becomes more dependent on interconnected IT systems.[107] As information on individuals and companies is stored and spread in the financial system, the need to manage this information in a safe way increases. If the information leaks to unauthorised parties, there is a risk that this will affect not only the people concerned, but also confidence in the financial system as such.

The risk of unsound or illegal activities such as money laundering and financing of terrorism could also increase if financial transactions are moved from central actors as public authorities opportunities to gain insight into the transactions deteriorates. At the same time, this development actually offers increased opportunities to automatically check customers' transactions and behaviour. Some of these opportunities are sometimes known as "RegTech" (regulatory technology). In simple terms, it is about making it easier and less costly for financial agents to follow applicable laws and regulations as a result of increased automation and computer use. One example is automated review of data reported from financial institutions to government agencies.

Regulation and FinTech

Agents active in FinTech and conducting financial operations come under the same applicable legislation as other agents on the market. This means that the business may require a license if the agents conduct activities in payment mediation, lending, deposits or trade in financial instruments. These agents then come under the supervision of Finansinspektionen (FI). In many cases, however, the agents are newly started, which means that they only have a small number of employees and a very limited turnover. The legislation can therefore contain special regulations exempting the agents from the same level of supervision as larger, established agents. An example of this is the Payment Services Act, which contains provisions on agents with a turnover of less than certain threshold

[103] *Gräsrotsfinansiering i Sverige – en kartläggning*, 2015 [Grassroots funding in Sweden – an analysis, 2015]. Finansinspektionen.
[104] Bergsten, M. and Forss Sandahl, J. (2013). Algorithmic trading in the foreign exchange market, *Sveriges Riksbank Economic Review* 2013:1. Sveriges Riksbank.
[105] See, for instance, The Sterling 'flash event' of 7 October 2016, January 2017. BIS.
[106] The block chain – a potentially important innovation, article in *Financial Infrastructure Report 2016*. Sveriges Riksbank.
[107] Cyber threats in the financial system. Article in the *Financial Stability Report* 2016:1. Sveriges Riksbank.

values only having to register their business operations with FI.[108]

In other cases, businesses run by FinTech agents can include new services not previously offered on the financial market. An example of this is agents who take on the role of intermediary and offer various types of technical platform aimed at matching borrowers and lenders. In many cases, the intermediary is not a contracting party but only supplies administrative and technical support in order to match borrowers and lenders. The boundary between licensed and non-licensed operations can be difficult to determine in these cases. Depending on which services are offered by the intermediary, the business may be covered by legislation on banks and financing businesses, payment services or consumer credit.

At the same time, regulation surrounding the financial market can make it difficult for new agents to establish themselves as complying with the requirements in the regulation can require significant resources. In this context, the regulation can constitute an obstacle to competition on the financial market. In recent years, however, lawmakers have tried to use regulation as a means of making it easier for new agents to establish themselves on the financial market. An example is the new payment services directive, which makes it possible for new agents, with the consent of the customer, to collect and present information about accounts from banks and to make payments on the bank account.[109]

FinTech and financial stability

FinTech can be positive for the financial system in that it enables faster and more cost-effective financial transactions, increases the supply of financial services and automates reporting between financial institutions and authorities. This can promote an efficient payments system.

At the same time, the development can pose risks to financial stability. One such risk is increasingly flexible financial transaction flows, which can pose liquidity risks for agents who obtain funding via new financial services. Rapid and automated movement of capital can also create risks with large and unexpected price movements on stock exchanges and in financial instruments. The trend of financial transactions being moved from central agents can also make it more difficult for authorities to gain knowledge of financial transactions, which in turn could make it more difficult to uncover unsound or illegal activities such as money laundering and the funding of terrorism.

Historical developments have shown that it can be difficult to predict how new technology may affect the financial sector, which services customers will choose and what risks the development may entail. The origin of the financial crisis of 2007–2008 is an example of how a lack of knowledge about the risks associated with complicated new instruments and innovative business models had major consequences for the global economy. This does not mean that FinTech necessarily poses this type of risk, but it is a development that can entail both new opportunities and new and poorly understood risks.

An important challenge is therefore to consider the interaction between technical development, technological innovations and its effect on the financial market.

International work to ensure stability

Global standard-setting bodies such as the Financial Stability Board (FSB), the Basel Committee for Banking Supervision (BCBS), the Committee on Payment and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO) are working on analysing FinTech from different perspectives, including what effect it might have on financial stability. However, as yet there are no standards that are solely aimed at FinTech. Instead, the purpose of the work at this stage is mainly to gather information and analyse which opportunities and risks the new technology can entail.

The Riksbank and FI are taking part in and influencing this international work. Sweden also has a prominent role in that the Swedish financial system is already digitalised to a large extent, the use of cash is very low and the use of smart phones is widespread. This has also contributed to a widespread emergence of FinTech companies in Sweden, primarily within different forms of digital payments. The reduction in cash use has also prompted the Riksbank to appoint an inquiry into the possibilities of continuing to offer households the option of holding a claim against the Riksbank by issuing digital money, e-kronor, in the future.[110] In some countries, also the financial supervisory authorities and central banks have adopted a more active role for the purpose of supporting innovation and technological advances by offering, for instance, various forms of test environment that private companies can use to test new solutions, while they receive information on existing regulations - known as regulatory sandboxing.

[108] The Payment Services Act (2010:751).

[109] *Financial Infrastructure 2016*, Sveriges Riksbank.

[110] The Riksbank's e-krona, *project plan*, March 2017. Sveriges Riksbank.