Digitalization in financial services and household finance: fintech, financial literacy and financial stability

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In this study we characterize and discuss digitalization in the financial services industry, focusing on the link between fintech and financial stability. Digitalization and the emerging fintech industry offer a large variety of new products and ways to save. As a result, the process of matching savers with investors will become more direct and the share of wealth invested through other channels than the traditional bank lending channel will increase further. At the same time, the volume of intermediated private wealth is rising as a share of GDP. These developments will likely require changes in regulation and supervision but also new approaches toward financial education, as the more direct link between savers and investors calls for new forms of financial literacy.

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In the current environment of fast digitalization, the financial industry is changing rapidly. After decades of bank-based finance, we are now confronted with new savings vehicles that offer a more direct matching of lenders and borrowers. This implies that there are more choices available to both households seeking to insure themselves against the contingencies of life, and to firms looking for ways to finance the production of goods and services. The advantages of fintech come with new risks. As the OECD (2016) rightly points out, some of these risks are market driven, some stem from regulation and supervision and others from unprepared consumers. Not only is access to financial products changing, but also the need to invest savings. Long periods of peace have allowed for an unprecedented accumulation of wealth. Combined with demographic developments, this implies that, in the future, we will be seeing increasing volumes of inherited wealth and rather affluent households with substantially higher capital-to-income ratios. Also, the public welfare system has been slowly declining over the past decades, which means that consumers need additional savings for bad times and for retirement. As a result, the relevance and volume of private wealth is increasing strongly.

Maintaining a sound and stable financial system in the face of rapid digitalization will require a combination of regulation, consumer protection and educational approaches. Informed consumers make better decisions.

The remainder of this study is structured as follows. Section 1 defines the concept of fintech and characterizes the fintech industry in Austria. In section 2, we discuss financial literacy in Austria and new needs for financial education that emerge from digitalization trends. Section 3 delivers facts about the increase of intermediated private wealth, and section 4 concludes.

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1 Fintech on the rise

The term fintech describes applications of technology for financial services. As such, the term is not clearly defined, since different authors include different technologies in their definitions. To create further confusion, the term is used to describe both technological innovations ("fintech") as well as companies[2] that use these innovations ("fintechs").

In this article we define fintech in a rather broad sense, including all technologically enabled financial innovations with material effects on markets, households and businesses.[3] However, in order to focus our analysis, we do not discuss so-called cryptocurrencies[4], for instance.

Fintech gives a substantial part of the population access to a large variety of financial products. In current discussions it is often argued that technological advances make it possible to lower the costs of services and to tailor products such as payments, transfers, insurance, credit or savings. Innovations are supposed to either create new products (horizontal innovation) or better products (vertical innovation). At present, most innovations in the financial industry can be considered vertical innovations as they increase and speed up the accessibility of existing products and services, such as managing a financial account, matching savers and investors, managing payments, providing guidance for portfolio choices, or analyzing (big) data. Still, some innovations, such as peer-to-peer lending, might be considered a horizontal innovation.

1.1 Fintechs' business models and technologies

The business models of fintech companies are wildly diverse. While all of them generally revolve around introducing innovative technologies to the financial sector, their focus ranges from backend developments to customer services and consulting. Most Austrian fintechs can currently be found in the areas of payment services, clearing and settlement services, as well as investment services.

The technologies promoted by fintechs are also quite varied. Although categorization is still quite fluid, they often relate to the following issues:

- big data (analytics), e.g. sentiment analysis, unstructured data lake analysis;
- artificial intelligence, e.g. chatbots, appliances of machine learning;
- cryptography, e.g. for the purposes of cryptocurrencies;
- distributed ledger technology, e.g. blockchain, Ethereum, R3 Corda.

1.2 Fintechs in Austria

When talking about Austrian fintechs, we need to distinguish between (1) companies that are established in Austria, (2) those that operate out of other EU countries[5] and (3) those that operate from outside the EU. From a national supervisory

[2] *As we will later see, these companies also come in different flavors – ranging from small innovative startups to big Internet incumbents.*

[3] *The European Banking Authority (EBA) fully describes fintech as "technologically enabled financial innovation that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services" (EBA, 2017).*

[4] *In this article, we deliberately refrain from discussing crypto token systems such as bitcoin; for an excellent discussion of this topic, please see Beer and Weber (2014) and Weber (2016).*

[5] *This is made possible by EU law, which defines freedom of establishment and freedom to provide services as crucial elements of an internal market for the EU (often synonymous with the loose term "EU passporting").*

perspective, category (1) fintechs are most important. Any company in Austria that provides banking services generally needs a banking license.[6] The same holds true for insurance companies and other regulated financial institutions. Many Austrian-based fintech firms, however, have switched their focus from acquiring a license to cooperating with licensees (i.e. supervised financial institutions) or concentrating on specific niches that do not require any license. In May 2018, less than a handful of fintechs held licenses for their business. The great majority is still without (need of) license by Austrian authorities or they fall under categories (2) or (3).

At the moment it is a substantial challenge to get a comprehensive overview of this bulk of mostly unlicensed fintechs. The market is characterized by high uncertainty caused by frequent and speedy rises and failures of startups. Moreover, there is no standardized sector categorization[7] and no regular tracking in place (like, e.g., regulatory reporting for banks) that would allow for a systematic monitoring of the institutions. At present, the best way to keep track of fintechs' activities is by constant exchange with different participants of the fintech ecosystem (practitioners, banks, official institutions, etc.).

As the rules laid down at the European level in Payment Services Directive 2 (PSD2[8]) started to apply at the national level in January 2018 and new types of payment licenses have been introduced, the number of fintechs may rise noticeably. On the other hand it is not yet clear how existing financial institutions and a restrictive data protection regime will mesh with such a newly developing market. In effect, a multitude of factors surrounding PSD2 are still unknown, and it remains to be seen how they will play out over the course of 2018 and beyond.

1.3 The small versus the big

PSD2 is not the only uncertainty for Europe and the Austrian market. In the past, big Internet incumbents have proven able to create new markets with unique ideas, self-sufficient infrastructures and innovative technological use. In recent years, their appetite for innovation has started to stretch slowly into the financial services sector. By now, the biggest players in the market already have established infrastructures and technologies that are potentially capable of thoroughly changing conventional payment and credit markets. They will likely play a major role and therefore also deeply influence fintech technologies as well as companies.

For the last two years, most incumbents have been expanding their businesses into (micro) payment services. At least one of the leading tech companies has entered the credit market business with a lending platform and nondisclosed rating models. This company only relies on its own world-spanning infrastructure. It is safe to assume that its rating models are built on real-time information at a very granular level (payment behavior, shipping, customer ratings and comments, etc.).

It is not hard to imagine that, because of the capabilities of such huge technological companies, these initiatives may easily have noticeable effects on a number

[6] *As of January 2018, there are three fintech companies operating under a regular license. Furthermore, a number of companies (mostly payment institutions) are seen as possible candidates for licensing in the near future.*

[7] *Fintechs usually defy any easy sector categorization as they operate based on various different business models in various stages of growth and maturity, from small startups to vast incumbents like Google (see next section).*

[8] *The PSD2 follows up on a former EU Directive with the aim of, very generally speaking, regulating market conditions and competition for payment providers. It had to be transposed into national law by January 2018.*

of industries ranging from the retail sector to banking. Fintechs are usually built on a wealth of information about customers that banks, or indeed any other sector, cannot hope to obtain.

1.4 Through a regulatory lens

Fintech is the subject of heated debates among regulators all over the globe. Europe is no exception, with opinions spanning a broad range of controversial views. The U.K. and Switzerland are on the forefront of fintech liberalism and promote regulatory sandboxing as a licensing model. Under such a regime, supervisors intensely accompany selected fintech companies through their startup phase and enable them to test innovative products on a small scale in the market. Most European countries, however, including Germany and Austria, favor a "same risk, same business, same rules" approach, while still arguing for proportionality in regulatory requirements.

The OECD (2016) rightly points out different risks that might become relevant with the rise of fintech. The most important market-driven risks are potential misuse and fraud in digital services as well as issues of data confidentiality and digital profiling. Marketing practices that reinforce behavioral biases (e.g. self-control problems, short-termism) can turn out problematic if access to credit and investment products expands rapidly. Furthermore, the Financial Stability Board (FSB, 2017) has pointed out potential financial risks, such as maturity mismatches in fintech lending and liquidity mismatches that may arise because fintech credit platforms typically do not hold client money and therefore by definition do not perform liquidity transformation.

The uneven protection within and across countries with regard to different service providers is one of the main regulation-driven risks. Cross-border selling, regulatory arbitrage and inadequate disclosure make it difficult for consumers to base their financial decisions on valid and complete product information. Often, fintech activities are not covered by existing legislation. Especially with smart contracting and robo-advisors there are issues of legal uncertainty. Furthermore, it might prove difficult to identify accountable firms and obtain certainty about liability in case of losses, especially in fintech cases where no bank or other legal entity is the custodian of all records involved (FSB, 2017).

And finally, there are consumer-driven risks: Consumers lack experience with (complex) financial products and have to deal with new forms of access to finance via fintech. Clearly, consumers need broader skills to successfully navigate fintech. Many fintech applications not only require financial literacy in a traditional sense, i.e. knowledge about financial products and their functioning or basic skills to calculate costs and assess risks, but also necessitate media literacy competencies in a broader sense.

2 Redefined financial literacy needs in a fintech era

Evidence from surveys suggests that people lack important knowledge for dealing with regular financial terms and products. For Austria, Fessler et al. (2007) show that younger people tend to have a lower level of financial literacy than older age cohorts based on data from the Household Survey on Financial Wealth. Not many households own risky financial products, and those that do usually rely on advice by their respective banks. Silgoner et al. (2015) confirm that there are important

financial literacy gaps in the population, analyzing data from the Austrian Survey of Financial Literacy (ASFL), the national contribution to the OECD/INFE survey on adult financial literacy (OECD, 2016). With the emergence of new fintech-based financial products, these knowledge gaps may become even more problematic, given the large spectrum of available choices and the lack of face-to-face advice.

2.1 Are Austrians open to new fintech products?

The ASFL makes it possible to draw tentative conclusions about respondents' affinity to new technologies and their potential openness toward new fintech products: According to survey results from end-2014, only 17% of respondents in Austria have a mobile phone payment account (chart 1). Even for the youngest age cohorts this share is only about 25%.

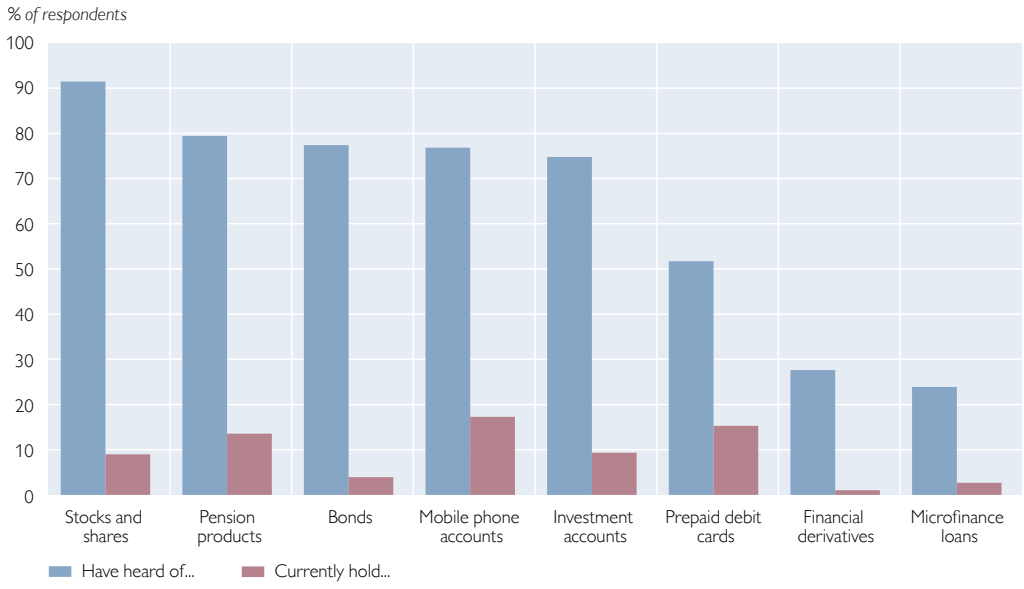
Furthermore, only 14% of respondents in Austria declare that product-specific or best-buy information found on the Internet is the source of information which most influences their financial product choice, as compared to more traditional sources of information, e.g. mail, newspapers, financial advisors or bank branches. Again, the share of respondents that tend to use the Internet as a source of product information is only slightly higher for the youngest age cohorts, remaining below 20%.

Overall, this suggests that the level of technical affinity is rather moderate in Austria. This message is supported by a cross-country comparison based on a World Bank indicator for the share of the population using the Internet (World Development Indicators): For Austria, the share was 84% in 2015, slightly higher than the euro area average (80%), but lower than in its neighboring countries such as Germany and Switzerland (88%) or the Nordic countries (more than 90%).

Second, Austrian financial market participants appear to be rather traditional and cautious in their investment behavior. According to the ASFL, only 20% of the respondents in Austria currently hold investment funds, stocks, shares, bonds,

Chart 1

How familiar are Austrians with selected financial products?



Source: OeNB, Austrian Survey of Financial Literacy (ASFL) 2014.

financial derivatives, or have invested in microfinancing or crowd financing (chart 1), even though a majority of people have already heard of these financial products.

This rather cautious investment behavior of the Austrian population is consistent with the self-assessed high risk aversion of respondents. According to the ASFL, almost half (47%) of respondents state that they prefer investments that are characterized by "low return, no risk" as compared to more risky, but also more profitable alternatives. Given this high risk aversion, it is questionable whether easier access to riskier financial products through fintech innovations will be able to unblock the general skepticism against such products.

Finally, according to the ASFL, 24% of respondents have either taken out or could imagine taking out a loan for a rather short term or risky purposes. New fintech products may facilitate access to loans that are granted without thorough checks of the overall financial standing of the households in question.

2.2 Will fintech redefine financial literacy needs?

Fintech products may facilitate access to sophisticated financial products. If people lack the necessary knowledge to judge the risk profile of these products, easier access may entail new financial stability risks. And the knowledge necessary to understand the quality or the risks of new financial products or the skills needed to use the related IT technology (e.g. web-based applications, smartphones, etc.) certainly go beyond the aspects captured by traditional financial literacy surveys.

To successfully navigate new technologies, customers require additional skills and competences in terms of technical understanding and use of digital services. But in addition to that, a major challenge will be to distinguish between legitimate, reliable providers and shady ones, and to reflect on the consequences of fintech-related decisions. These skills are close to those discussed in the media literacy literature. Media literacy is a wide concept that, according to the definition put forth by the EU Media Literacy Expert Group (MLEG), "includes all technical, cognitive, social, civic and creative capacities that allow a citizen to access, have a critical understanding of the media and interact with it" (European Commission, 2016). The reflective component is very important for media literacy. In addition to the formation of certain skills, abilities and knowledge, this aspect also requires a critical evaluation of the choice set, an understanding of whom to trust and whom to ask for advice, and an awareness of the limits of one's own knowledge (Fessler and Swertz, 2010). We believe that these aspects are likely to be key in a future definition of financial literacy. Incidentally, Buckingham (2009) was among the first arguing for a digital literacy policy to tackle potential challenges resulting from digitalization.

3 Determinants of the degree of financial intermediation

There are several factors that determine the volume of assets and liabilities channeled through the financial system. In this study, we will focus on two factors that have recently become evident. First, the capital-to-income ratio is rising, accompanied by an increase of inherited wealth relative to wealth accumulated through lifetime income. Second, we are observing a relative decrease of public investment, accompanied by a dismantling of the welfare state.

Both phenomena imply that more private wealth will be available in the financial system. In the first case because households will have more assets than in earlier generations as the assets their parents accumulated in the peaceful and prosperous era since World War II add to what they can accumulate through lifetime income. This channel of intergenerational transmission works mainly through households which would also be wealthy without inheritances received. As for the second factor, the relative decline in public expenditure in welfare gives rise to a need for precautionary saving, saving for old-age provision or even education or health needs. This channel works mainly through middle class households that can still reduce their current consumption out of income but do not have large amounts of wealth.

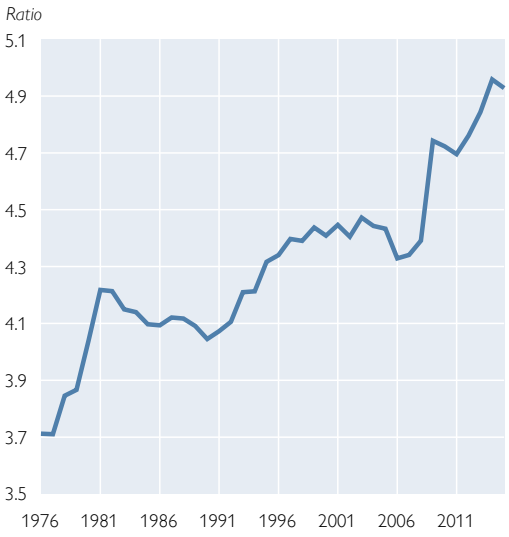
From the perspective of supervision, the riskiness of private investments is becoming more relevant. In the event of large private losses, a lack of state intervention would imply the risk of (old age) poverty. This reasoning increases the incentive for a bailout of a bank even in the absence of a "too big to fail" case. But supervision and control might be more difficult in a decentralized digitalized system of financial intermediation.

Like all over the developed world, the capital-to-income ratio is also rising in Austria. This ratio is defined as all capital (real assets, such as land, machinery or dwellings, and financial assets, such as bank accounts, stocks or bonds) divided by all yearly (capital or labor) income. But capital itself is accumulated past income. So the higher the capital-to-income ratio, the more assets are available in the economy relative to the amount of income generated in a given year. Put differently, past income (or labor) becomes more important relative to current income (or labor). As accumulated capital is transferred across generations, this also implies that inherited assets gain in importance compared to assets that are saved out of (labor) income in one's own lifespan (see chart 2).

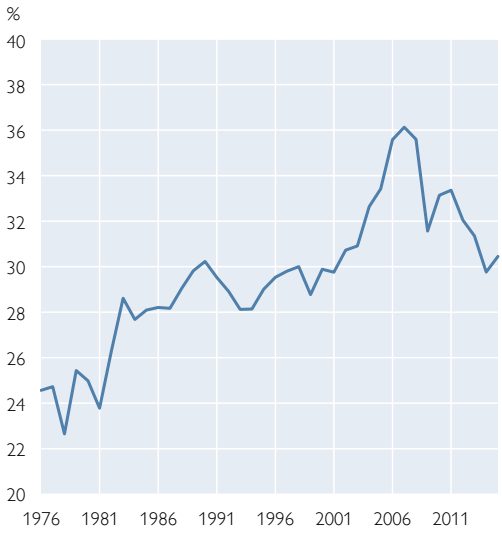
Chart 2

The rise in capital since the mid-1970s

Capital-to-income ratio



Share of capital income in total income



Source: Statistics Austria, OeNB.

Public welfare is a substitute for private wealth accumulation (see Fessler and Schürz, 2015). In terms of volume, pension and health insurance systems are most important. If pension and health insurance were to be privately organized, all the necessary savings would be channeled through the financial system, substantially increasing the volume of private assets. The same is true for education. In the Unites States, education loans add up to roughly USD 1,400 billion[9], so about USD 4,300 per capita. If Austria had an education system like the one in the United States, this would roughly add USD 35 billion in assets and debt to the Austrian financial system. Numbers for pensions and healthcare would exceed this by far. This illustrates the substitution between public welfare and private wealth.

In an ever more capital-intensive economy, ever-increasing investments are necessary to secure stable growth. A more capital-intensive economy also requires ever more educated people. This means educational expenditures need to rise in relation to GDP as productivity increases in education lag behind those in other sectors of the economy, and thus become (relatively) more expensive. This principle applies to many government expenditures, including infrastructure and health. The constantly rising state expenditures as a share of GDP since the emergence of capitalism were regarded as necessary for the progress of the capitalist economy (Wagner, 1893; Schumpeter, 1939). The increasing complexity and integration of production and urbanization is constantly raising the cost of delivering functioning markets, which, for instance, need to ensure the enforceability of property rights. As tax revenues and expenditures as shares of GDP have stayed rather constant in the last decades this implies a relative decline – due to the lower productivity growth – in state spending.

4 Concluding remarks

Fintech allows a larger share of the population access to a larger variety of financial products. It lowers the costs of many services and makes it possible to deliver more strongly tailored products. Fintech does not only affect payments and transfers but also insurance, credit and savings. It implies new technologies that require additional skills and competences in terms of technical understanding and use of digital services. Therefore, consumers need new forms of financial literacy, closely related to concepts of media literacy.

On top of these developments, the volume of intermediated private wealth will rise, primarily for two reasons: First, the capital-to-income ratio is rising, accompanied by an increase of inherited wealth relative to wealth accumulated through lifetime income. Second, we are observing a relative decrease of public investment, accompanied by a dismantling of the welfare state. As private wealth rises, financial stability becomes more important, especially given the growing importance of private wealth (and the lessening role of the state) in insuring against the contingencies of life.

For central banks it will be important to closely monitor the interactions between fintech, financial literacy and financial stability to understand how financial intermediation might be transformed in the future, but also to be able to make informed policy choices and express sound recommendations in the fields of supervision, regulation and consumer protection.

[9] *See https://www.federalreserve.gov/releases/g19/current/default.htm, retrieved on May 28, 2018.*

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