

Financial Innovation for Financial Inclusion: Mapping Potential Access to Finance

Egidijus Rybakovas and Gerda Zigiene
Kaunas University of Technology, Lithuania

egidijus.rybakovas@ktu.lt

gerda.zigiene@ktu.lt

Abstract. The importance of access to finance as a significant problem for business development is considered one of the measures representing the level of financial inclusion. Developing financial innovations, such as crowdfunding, mobile payments, AI-based credit scoring systems, and even blockchain technologies has an immense potential to increase financial inclusion, increase access to finance for individuals and businesses, enabling the unscored or unbanked population to become active members of financial markets. Studies have shown the positive impact of financial technology on individuals' financial inclusion and access to finance, but the development of the Fintech phenomenon does not itself imply improved access to finance for businesses. The spread and adoption of Fintech are taken as evidence of financial innovation. This research aims to explore the expected interaction between financial innovation and financial inclusion in selected European countries. The data from the Global Fintech Ranking and Survey on the access to finance of enterprises (SAFE) is used in this study, examining them by comparing countries by their Fintech rankings and respective rank position obtained by measuring the importance of access to finance as a problem in business development. The analysis of 29 European countries indicates that theoretically defined expectations are met in most cases: access to finance is not an important problem for the companies from the countries that are ranked higher in the Fintech rating report. But part of the sampled countries deviates from this trend. These findings indicate that besides financial innovation other factors also may determine the financial inclusion of the companies.

Keywords: financial innovation, financial inclusion, access to finance

1. Introduction

In this paper, we analyse possible ties between financial innovation and financial inclusion. Let us start with the terminology of both. In recent years, financial innovation, incorporating technology into financial solutions has been a hot topic in the business and academic world. *Fintech* is defined as an interdisciplinary subject that integrates finance, technology management and innovation management (Leong, 2018). The term *FinTech* is commonly used by many researchers to mean "financial technology" abbreviation (Agarwal & Zhang, 2020; Chen et al., 2019; Goldstein et al., 2019; Sangwan et al., 2019). The Fintech sector, deploying financial innovations, plays an important role in the global economy and prosperity, including its impact on financial inclusion.

Financial inclusion means the ability of access to financial products and services for individuals and businesses to meet their needs (World Bank, n.d.) The relationship between Financial Innovation (FINN) and Financial Inclusion (FINC) is well known and widely explored. It was concluded, that "Financial innovation is a major driver of financial inclusion" (Yawe & Prabhu, 2015). Often the problem is observed and explored at the individual/household level and is mostly related to payment services (Hollanders, 2020; Hughes, 2021; Joia & Cordeiro, 2021; Yawe & Prabhu, 2015), transaction accounts (Hollanders, 2020), developing infrastructure and links between poverty rates, racial makeup, and rates of Fintech (Arner et al., 2019; Friedline et al., 2020) or even philanthropic financing of poor individuals and communities (Gabor & Brooks, 2017).

However, there is limited research on the FINN implication for firms' FINC, especially focusing on Small and Medium Enterprises (SMEs). Business companies, especially SMEs, could also experience financial exclusion, evidenced by limited access to finance. Thus, in this article, research will be focused particularly on the impact of FINN development on the FINC of firms.

The pieces of evidence of FINN in business include crowdfunding platforms, mobile payments, artificial intelligence-based credit scoring systems, and blockchain technologies. Most of these innovations fall under the Fintech category, which is considered here in this research as an appropriate proxy for FINN.

FINC, on the other side, is associated with the indicator reporting access to finance as a significant problem in business development.

Several research pieces have been conducted to analyse the impact of FINN on greater FINC and access to finance in developing countries. Finkelstein-Shapiro et al. (2022) have built a model with a traditional banking system and endogenous Fintech intermediary creation and have found that greater Fintech entry delivers positive long-term effects on aggregate output and consumption. However, the potential of the rapid development of the Fintech industry to increase the FINC of companies and their ability to attract financing has not yet been properly explored.

This article builds upon recent scholarship on Fintech, FINN, and FINC by (i) discussing conceptually the expected positive relationship between FINN and FINC, which is observed through indicators of Fintech developments and business experience in terms of access to finance; (ii) contending that increased Fintech development not necessarily by itself influences financial inclusion and sustainable access to finance; and (iii) arguing that, as new financial technologies evolve, we should not overlook the actual impacts and effects estimating the potential benefits of innovations. The research aims to explore FINN-FINC relationships in selected European countries. The methodological approach to classifying countries in terms of differentiating levels of FINN and FINC is provided as a conceptual outcome from the review of existing relevant literature.

2. Relevant literature review

The emergence of FINN fostered in turn the attention of scholars towards the phenomena of the ability to stimulate FINC by the employment of financial technologies. Financial inclusion is the precarious link amidst enhanced economic opportunity and improved economic results. FINC is indicated by United Nations (UN) as an enabler of seven of seventeen UN Sustainable development goals (SDGs): SDG1, on eradicating poverty; SDG 2 on ending hunger, achieving food security and promoting sustainable agriculture; SDG 3 on profiting health and well-being; SDG 5 on achieving gender equality and economic empowerment of women; SDG 8 on promoting economic growth and jobs; SDG 9 on supporting industry, innovation, and infrastructure; and SDG 10 on reducing inequality (*Financial Inclusion and the SDGs - UN Capital Development Fund (UNCDF)*, n.d.). There is scientific evidence that FINC can support inclusive economic growth (Finkelstein-Shapiro et al., 2022; Friedline et al., 2020; Hollanders, 2020; Hughes, 2021; Joia & Cordeiro, 2021; Yawe & Prabhu, 2015).

The first studies linking the impact of financial technology on FINC were carried out when the intensive development of the sector yielded positive results in light of the disruptive effects of Fintech. In the areas where people did not have access to financial services or current accounts, Fintech companies replaced traditional financial institutions by offering access to financial services through Internet access and mobile device. It is not surprising, therefore, that the first effects of Fintech on financial inclusion were observed among individuals and included payment services (World Bank, n.d.; Yawe & Prabhu, 2015), which in turn attracted the attention of researchers to explore Fintech as a stimulator of financial inclusion. FINC via payments was analysed from various angles. Payments, as the first wave of financial inclusion of individuals and households, was researched by Hollanders (2020), Hughes (2021), Joia and Cordeiro (2021), and Yawe and Prabhu (2015).

Other researchers pointed out the possibility of lending through Fintech solutions in areas underserved by traditional financial institutions (Buchak et al., 2018; Fuster et al., 2019; Jagtiani & Lemieux, 2018; Wójcik, 2021). More aspects of FINN for FINC, such as developing infrastructure and links between poverty rates, racial issues, and impact investment in poor communities have been studied by several authors (Arner et al., 2019; Bartlett et al., 2022; Friedline et al., 2020; Gabor & Brooks, 2017). Although some experts still define FINC as "...broader access to and usage of financial services, in particular, payment services" (Hollanders, 2020), there are much more financial inclusion aspects besides payments and the scope covers business too, as defined by the World Bank: "Financial inclusion means the ability of access to financial products and services for individuals and businesses to meet their needs" (World Bank, n.d.). World Bank's definition broadens the concept from individuals to businesses and points out financial products and services that might vary from a current account to individuals, to artificial intelligence solutions for easing the creditworthiness estimation, thus access to finance for SMEs. SDGs, connected to financial inclusion, as listed above, also bring attention to various areas of the impact of financial inclusion.

In terms of the impact of Fintech sector development on SME businesses, the range of Fintech services is expanding to include not only mobile payments but crowd financing (Kim & De Moor, 2017; Serwaah, 2021), artificial intelligence solutions for more accurate SME credit assessments (Bughin et al., 2017, 2019; Rybakovas & Žigienė, 2021; Taylor, 2018; Westermann, 2018; Zhang et al., 2018; Žigienė et al., 2019), the impact of platform

economies (Langley & Leyshon, 2021) on financing, and more. The application of individual technologies helps SMEs to overcome the barrier of access to finance for business development, thus the potential of increasing business financial inclusion. Although the coherent studies on the overall impact of FINN on FINC covering business are hard to find, research suggests Fintech targets the underdeveloped banking and finance area, and firms with low access to finance. Academic research reveals the crowdfunding potential to overcome traditional financial institutions' barriers for young businesses. The employment of artificial intelligence in improving the credit scoring accuracy of SMEs helps to turn SMEs from unscored and unbanked to scored and banked.

Overall, however, there is still a lack of consistent research to confirm the link between the development of the Fintech sector and the financial inclusion of companies. Especially if we are talking about different countries where the speed and the scope of Fintech development differs. So we question whether the country's development of the Fintech sector can accelerate firms' access to finance and, in turn, financial inclusion.

3. Method and data

The actual relationships and interactions between FINN and FINC at the country level are explored and mapped on the conceptual framework shown in Figure 1. The background for this approach is gained from a relevant literature review, which indicates that FINN-FINC interactions occur at the individual level while firm-level analysis remains underexplored and thus needs attention. Since the firm-level microdata describing both sides of the model is not available, the empirical analysis is done at the country level, combining separate data sources to measure FINN and FINC.

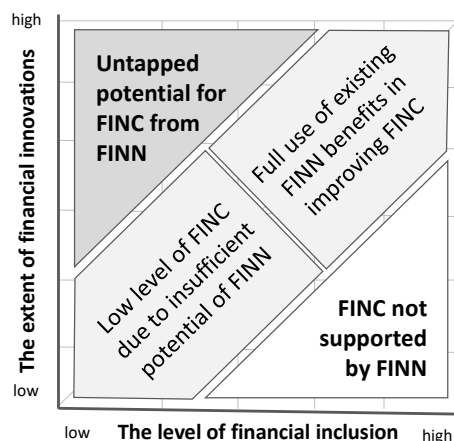


Figure 1: The conceptual approach to mapping the use of benefits from FINN to improve FINC

The top-left off-diagonal segment of the map positions countries where the FINN level is high, but it is not reflected in the respective FINC level, which indicates that FINN potential is untapped. The two segments along the diagonal represent theoretically explained expectations of the positive FINN effect on FINC; increasing the level of FINN expands FINC, while insufficiency of FINN results in a low level of FINC. Finally, the bottom-right off-diagonal segment of the map positions countries where FINC is relatively high, but this is supported by some other unexplained factors, as the FINN level is low.

The empirical data based position of the country in the conceptual framework (Figure 1) could work as a policy development guide. The reasons and factors that prevent benefiting from FINN should be uncovered in the countries with untapped potential for FINC from FINN. While new horizons explaining mechanisms of higher FINC might be discovered in countries showing relatively high FINC which is not supported by FINN.

The empirical research aims to explore the above-discussed expectation in selected European countries. The spread and adoption of Fintech are taken as evidence of FINN. The perception of access to finance as a significant problem for business development is one of the measures representing the FINC level.

Such operationalisation is validated by the common definition of FINC, which refers to “easy access to and use of financial services from the formal financial institutions in a timely, adequate, affordable manner (Nguyen, 2020)”. It should be pointed out that FINC as “a multidimensional concept cannot be accurately captured by individual indicators” (Nguyen, 2020), which means that this research leaves wide space for other attempts

based on another approach to the operationalisation of the FINN and FINC concepts. The decision to simplify and limit the research design to only two basic indicators is reasoned by the aim to study FINN-FINC interactions at the firm level, which still lacks research and empirical data-based evidence.

To explore the FINN-FINC relationship, we will use data from the Global Fintech Ranking (Findexable, 2021) and Survey on the Access to Finance of Enterprises – SAFE (European Central Bank, 2021) in this study, examining them by comparing countries by their Fintech rankings and respective rank position obtained by measuring the perception of access to finance as a problem in business development. The comparison of selected countries' rankings based on Fintech developments and access to finance measures is employed as a research method.

Fintech index (Findexable, 2021) only uses quantifiable data to determine ranked country scores. The ranking is based on the three main indicators: 1) the quantity of privately owned Fintech companies, 2) the quality of those companies (which is assessed by the web presence of the company, monthly visits, customer base, valuation, presence of major industry gatherings, Fintech events, as well as a ratio to the population of the country to assess the scale of the ecosystem), 3) the local business environment (which is referred to the World Bank's Doing Business Report). The rank position of the country is considered an indicator of FINN. A higher position in the ranking (smaller rank number) indicates advances in financial innovation.

The SAFE provides information on the latest developments in the financial situation of enterprises, and documents trends in the need for and availability of external financing. The survey is conducted twice a year: once by the European Central Bank covering euro area countries and once in cooperation with the European Commission covering all European Union (EU) countries plus some neighboring countries (European Central Bank, 2021).

The research takes September-October 2021 (wave 25) survey data. The actual indicator to measure the overall FINC level of business in a country is the survey question: "How important have the access to finance problems been for your enterprise in the past six months (please answer on a scale of 1-10, where 1 means not it is not at all important and 10 means it is extremely important)?" The countries' ranking was done based on the average value of the country sample. The distribution on country averages covers 2.8 – 7.0 values range. A higher position in the ranking (smaller rank position number) indicates lower importance of the problem of access to finance.

More than 13 thousand firms are included in the sample of the 25th SAFE wave (European Central Bank, 2021). Different country sample sizes vary in the range of 90 (Luxembourg) and 1400 (Italy) and correspond to the country size. The overall sample structure by firm size is as follows: 45% are represented by 1-9 employees firms, 30% – 10-49 employees firms, and 25% – 50-249 employees firms. In terms of the main activity of the enterprise, 17% represent industry, 11% – construction, 24% – trade, and 48% – services. In terms of ownership, the majority of sampled enterprises are owned by one owner only, that is respondent or another natural person (42%) or by family or entrepreneurs – more than one owner (38%). Among the remaining: 2% are owned by public shareholders (enterprise is listed on the stock market), and 18% are other enterprises and business associates (European Central Bank, 2021). Each country's sample deviates from this overall structure to maintain the representativeness of the country's enterprise population.

The mapping of observed countries based on the two above described indicators is done aiming to uncover the not- and over-exploited potential of FINC here represented as the problem of access to finance. The estimation of insufficiency in exploiting the potential access to finance and its over-exploitation is done according to the country's Fintech ranking. The generalised and conceptually reasoned rule is that a higher Fintech ranking should be associated with the respectively lower average evaluation of access to finance as the important problem for the business (which is evidence of the higher overall FINC in the country).

The sample of 29 European countries matched between two selected data sources (European Central Bank, 2021; Findexable, 2021). Since the 2021 Fintech index covers 36 European countries, the rank positions based on the FINN measure of some countries were slightly changed to match the total number of rankings based on two different data sources.

4. Findings

The analysis of 29 European countries indicates that theoretically reasoned expectations are met in most cases (Figure 2): companies from the countries, that are ranked higher in Fintech rating, report to the SAFE survey that accesses to finance is not an important problem and vice versa. But greater or lesser deviations from this trend also are present. Some of the outliers are particularly noticeable.

The companies from the United Kingdom, Germany, Estonia, Ireland, Lithuania, and Spain (e.i. countries that are ranked relatively high in Fintech rating) experience access to finance as a more important problem to the business than expected. Portugal, Bulgaria, and Turkey also fall into this category; representing the bottom part of the Fintech ranking (Figure 2). Lithuania and Spain are two especially noticeable cases among those that deviate to the more prominent problem of accessing finance than it could be expected according to the level of FINN, which here is represented by Fintech ranging.

Slovakia, Croatia, Czechia, Slovenia, and Hungary (representing south-eastern Europe) are a few examples of countries where access to finance is considered a less important problem to the business than expected based on their Fintech ranking. Finland and Denmark also fall into this category; these two countries are highly ranked in Fintech rating. These findings indicate that besides FINN other factors also might determine the FINC of the companies.

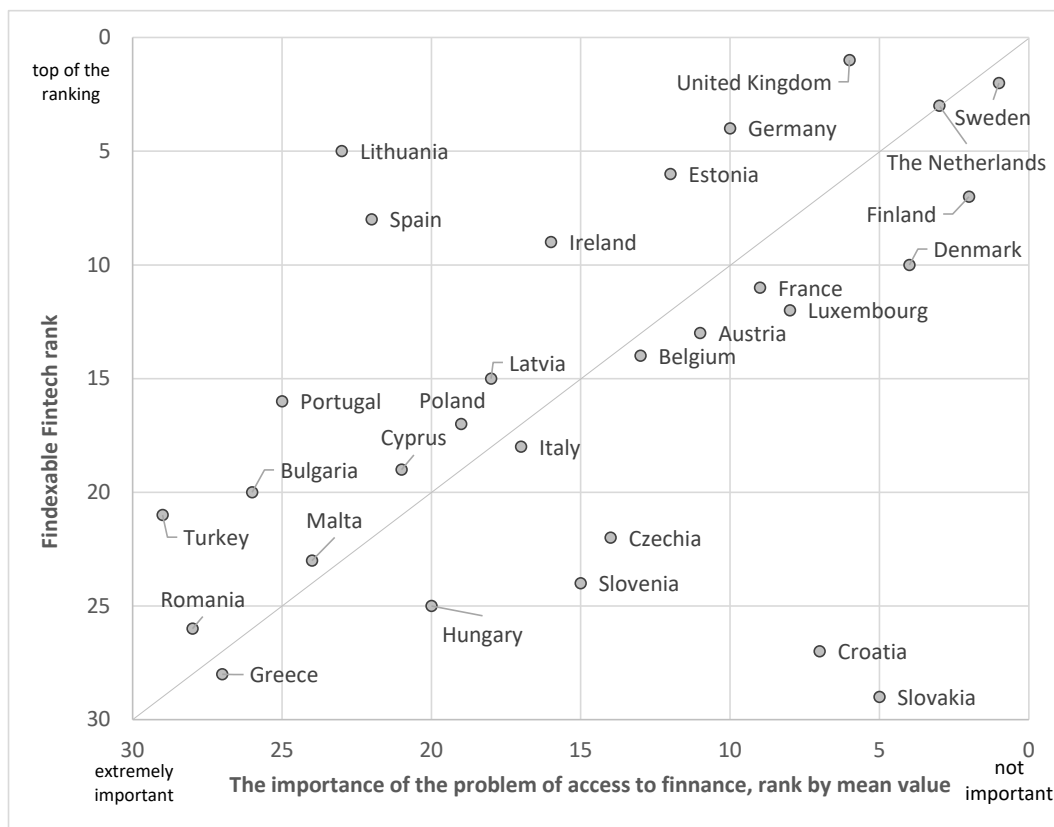


Figure 2: The comparison of Fintech index (Findexable, 2021) and importance of the access to finance as a problem for business (European Central Bank, 2021) ranks

These findings indicate that FINC in general or indicated by potential access to finance is associated with FINN and might be mapped accordingly. The above-mentioned outlier cases do not break the rule. They may represent special cases that illustrate either faster Fintech developments that benefits are not yet fully utilised by businesses (as in the cases of Spain and Lithuania) or indicate that not necessary FINN is the most important factor and reason for FINC as the south-eastern European region countries show. For example: “The development of Lithuania’s Fintech sector has been exceptional in the last decade, growing almost fivefold in seven years [...]. Lithuania has cemented its leadership as the EU’s biggest and most vibrant Fintech hub” (Invest Lithuania, 2021). Very similar advances are also reported in Spain (Ernst & Young, 2021).

Both directions of deviations from the explained mainstream are valuable for further research and theory developments.

5. Conclusions

The majority of research on a link between FINN and FINC is focused on individuals or households, exploring payment services, infrastructure, and connections between poverty rates, racial makeup, and rates of Fintech or even philanthropic financing. Although the positive link between FINN and FINC at the individual or community level is already well established, there is limited research on the Fintech implication for firms' FINC, especially focusing on SMEs. Another area of research that also shows positive results is the interaction between individual financial technologies (payments, crowdfunding, AI) and access to finance for SMEs, thus showing the potential of a positive link between the overall country's Fintech development and SMEs financial inclusion.

The study of FINN-FINC interaction in selected European countries let us classify the observed countries and indicate clear differentiation patterns. Distinct four groups of countries are identified. The majority of observed European countries are classified according to a theoretically reasoned explanation which says that higher levels of FINN should result in higher levels of FINC. The outlier countries were classified as representing the local context where the potential for FINC from FINN is untapped or FINC might be supported by other not FINN related factors. The south-eastern region of Europe unites the latter group of countries, while the common characteristics of the former group represented by Spain and Lithuania are not that evident. Though these two countries are poisoned as hubs and Fintech leaders, some wider comparative research is needed to find out the reasons that result in limited access to finance despite the high FINN level. It is concluded that the main focus and attention in this field of research should be paid to these outlier cases. In-depth case studies would be valuable in explaining the reasons which resulted from these unexpected deviations.

As the aim of this study was to see the link between the development of the Fintech sector and financial inclusion, and the results suggest that in some countries this link is more pronounced than in others, further research could also include a wider range of factors. In this way, other still uncovered factors that promote financial inclusion through the development of Fintech in some countries could be applied in others.

References

- Agarwal, S., & Zhang, J. (2020). FinTech, Lending and Payment Innovation: A Review. *Asia-Pacific Journal of Financial Studies*, 49(3), 353–367. <https://doi.org/10.1111/ajfs.12294>
- Arner, D. W., Buckley, R. P., Zetzsche, D. A., & Veidt, R. (2019). *Sustainability, FinTech and Financial Inclusion* (SSRN Scholarly Paper ID 3387359). Social Science Research Network. <https://doi.org/10.2139/ssrn.3387359>
- Bartlett, R., Morse, A., Stanton, R., & Wallace, N. (2022). Consumer-lending discrimination in the FinTech Era. *Journal of Financial Economics*, 143(1), 30–56. <https://doi.org/10.1016/j.jfineco.2021.05.047>
- Buchak, G., Matvos, G., Piskorski, T., & Seru, A. (2018). Fintech, regulatory arbitrage, and the rise of shadow banks. *Journal of Financial Economics*, 130(3), 453–483. <https://doi.org/10.1016/j.jfineco.2018.03.011>
- Bughin, J., McCarthy, B., & Chui, M. (2017, August 28). A Survey of 3,000 Executives Reveals How Businesses Succeed with AI. *Harvard Business Review*. <https://hbr.org/2017/08/a-survey-of-3000-executives-reveals-how-businesses-succeed-with-ai>
- Bughin, J., Seong, J., Manyika, J., Hämäläinen, L., Windhagen, E., & Hazan, E. (2019). *Notes from the AI frontier: Tackling Europe's gap in digital and AI*. McKinsey Global Institute. <https://www.mckinsey.com/~media/mckinsey/featured%20insights/artificial%20intelligence/tackling%20europes%20gap%20in%20digital%20and%20ai/mgi-tackling-europes-gap-in-digital-and-ai-feb-2019-vf.ashx>
- Chen, M. A., Wu, Q., & Yang, B. (2019). How Valuable Is FinTech Innovation? *The Review of Financial Studies*, 32(5), 2062–2106. <https://doi.org/10.1093/rfs/hhy130>
- Ernst & Young. (2021). *Spanish Fintech Ecosystem*. https://assets.ey.com/content/dam/ey-sites/ey-com/es_es/topics/financial-services/ey-spanish-fintech-ecosystem-v9.pdf?download
- European Central Bank. (2021, November 24). *Survey on the access to finance of enterprises (SAFE)*. European Central Bank. https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html
- Financial Inclusion and the SDGs—UN Capital Development Fund (UNCDF). (n.d.). Retrieved April 12, 2022, from <https://www.uncdf.org/financial-inclusion-and-the-sdgs>
- Findexable. (2021). *The Global Fintech Index: Global Fintech Rankings Report. Bridging the Gap*. Findexable Limited, The Global Fintech index. <https://findexable.com/gfi-live/>
- Finkelstein-Shapiro, A., Mandelman, F. S., & Nuguer, V. (2022). *Fintech Entry, Firm Financial Inclusion, and Macroeconomic Dynamics in Emerging Economies*. Inter-American Development Bank. <https://doi.org/10.18235/0003918>

- Friedline, T., Narahariseti, S., & Weaver, A. (2020). Digital Redlining: Poor Rural Communities' Access to Fintech and Implications for Financial Inclusion. *Journal of Poverty*, 24(5–6), 517–541. <https://doi.org/10.1080/10875549.2019.1695162>
- Fuster, A., Plosser, M., Schnabl, P., & Vickery, J. (2019). The Role of Technology in Mortgage Lending. *The Review of Financial Studies*, 32(5), 1854–1899. <https://doi.org/10.1093/rfs/hhz018>
- Gabor, D., & Brooks, S. (2017). The digital revolution in financial inclusion: International development in the fintech era. *New Political Economy*, 22(4), 423–436. <https://doi.org/10.1080/13563467.2017.1259298>
- Goldstein, I., Jiang, W., & Karolyi, G. A. (2019). To FinTech and Beyond. *The Review of Financial Studies*, 32(5), 1647–1661. <https://doi.org/10.1093/rfs/hhz025>
- Hollanders, M. (2020). FinTech and financial inclusion: Opportunities and challenges. *Journal of Payments Strategy & Systems*, 14(4), 315–325.
- Hughes, H. (2021). The Complex Implications of Fintech for Financial Inclusion. *Law & Contemporary Problems*, 84(1), 115–128.
- Invest Lithuania. (2021). *The Fintech Landscape in Lithuania: 2021–2022 Report*. <https://investlithuania.com/report/fintech-report-2021-2022/>
- Jagtiani, J., & Lemieux, C. (2018). Do fintech lenders penetrate areas that are underserved by traditional banks? *Journal of Economics and Business*, 100, 43–54. <https://doi.org/10.1016/j.jeconbus.2018.03.001>
- Joia, L. A., & Cordeiro, J. P. V. (2021). Unlocking the Potential of Fintechs for Financial Inclusion: A Delphi-Based Approach. *Sustainability*, 13(21), 11675. <https://doi.org/10.3390/su132111675>
- Kim, H., & De Moor, L. (2017). The Case of Crowdfunding in Financial Inclusion: A Survey. *Strategic Change*, 26(2), 193–212. <https://doi.org/10.1002/jsc.2120>
- Langley, P., & Leyshon, A. (2021). The Platform Political Economy of FinTech: Reintermediation, Consolidation and Capitalisation. *New Political Economy*, 26(3), 376–388. <https://doi.org/10.1080/13563467.2020.1766432>
- Leong, K. (2018). FinTech (Financial Technology): What is It and How to Use Technologies to Create Business Value in Fintech Way? *International Journal of Innovation, Management and Technology*, 74–78. <https://doi.org/10.18178/ijimt.2018.9.2.791>
- Nguyen, T. T. H. (2020). Measuring financial inclusion: A composite FI index for the developing countries. *Journal of Economics and Development*, 23(1), 77–99. <https://doi.org/10.1108/JED-03-2020-0027>
- Rybakovas, E., & Žigienė, G. (2021). Is Artificial Intelligence a Magic Pill Enhancing SMEs Access to Finance? 2021 IEEE International Conference on Technology and Entrepreneurship (ICTE), 1–6. <https://doi.org/10.1109/ICTE51655.2021.9584833>
- Sangwan, V., Harshita, Prakash, P., & Singh, S. (2019). Financial technology: A review of extant literature. *Studies in Economics and Finance*, 37(1), 71–88. <https://doi.org/10.1108/SEF-07-2019-0270>
- Serwaah, P. (2021). Crowdfunding, gender and the promise of financial democracy: A systematic review. *International Journal of Gender and Entrepreneurship*, ahead-of-print(ahead-of-print). <https://doi.org/10.1108/IJGE-07-2021-0115>
- Taylor, P. (2018). *The Robots Are Coming To Corporate Finance*. Forbes Technology Council. <https://www.forbes.com/sites/forbestechcouncil/2018/05/01/the-robots-are-coming-to-corporate-finance/#8959bae56b6e>
- Westermann, C. (2018). *Opportunities and Risks of Artificial Intelligence in the Financial Services Industry*. PwC Switzerland. <https://www.pwc.ch/en/insights/fs/opportunities-and-risks-of-artificial-intelligence-in-the-financial-services-industry.html>
- Wójcik, D. (2021). Financial geography II: The impacts of FinTech – Financial sector and centres, regulation and stability, inclusion and governance. *Progress in Human Geography*, 45(4), 878–889. <https://doi.org/10.1177/0309132520959825>
- World Bank. (n.d.). *Financial inclusion* [Text/HTML]. World Bank. Retrieved April 12, 2022, from <https://www.worldbank.org/en/topic/financialinclusion/overview>
- Yawe, B., & Prabhu, J. (2015). Innovation and financial inclusion: A review of the literature. *Journal of Payments Strategy & Systems*, 9(3), 215–228.
- Zhang, Q., Wang, J., Lu, A., Wang, S., & Ma, J. (2018). An improved SMO algorithm for financial credit risk assessment – Evidence from China's banking. *Neurocomputing*, 272, 314–325. <https://doi.org/10.1016/j.neucom.2017.07.002>
- Žigienė, G., Rybakovas, E., & Alzbutas, R. (2019). Artificial Intelligence Based Commercial Risk Management Framework for SMEs. *Sustainability*, 11(16), 4501. <https://doi.org/10.3390/su11164501>