

НАЦІОНАЛЬНА ЕКОНОМІКА

UDC 330.101

DOI: <https://doi.org/10.32782/2415-8801/2022-2.1>**Borzenko Olena**

Doctor (Economics),

Institute for Economics and Forecasting

National Academy of Science of Ukraine

ORCID: <https://orcid.org/0000-0002-1017-5942>**Hlazova Anna**

PhD (Economics),

Institute for Economics and Forecasting

National Academy of Science of Ukraine

ORCID: <https://orcid.org/0000-0003-0102-1420>**THE MUNDSELL-FLEMING MODEL APPLICATION IN DIGITAL ECONOMY:
CASE OF UKRAINE**

Modern development of the noosphere, the emergence of new industries and a qualitative transformation of production and distribution relations are determined by widespread digitalization throughout the world. The main goals of digitalization are the development of innovations focused on the development of society 5.0, ensuring the free flow of data and capital. Considering the Mundell-Fleming model application as the instrument to support economic welfare it should be admitted the “impossible trinity” of the model and the lack of research to solve it. The paper investigates the Mundell-Fleming dilemma solution on the ground of digitalization. The research methodology is based on fundamental tenets of modern economics and general scientific methods, namely: induction, deduction, dialectical method and systematic approach, analysis and synthesis – all of these for analyzing the process of digitalization and to establish the principles, forms and foundations of the Mundell-Fleming model application in the digital dimension, systematization and generalization (to substantiate the phenomenon of digitalization), abstract-logical method (for recent tendencies substantiation), economic-mathematical (to compare and analyze data), institutional-comparative (for the analysis Mundell-Fleming model application in the digital economy). The paper studies the Mundell-Fleming model application in digital economy, it investigates global trends as well as peculiarities of digitalization in Ukrainian economy. We believe digitalization is the instrument to solve the Mundell-Fleming trilemma. The study reveals trends of banking digitalization as external as internal.

Keywords: digitalization, the Mundell-Fleming trilemma, digital banking.

**ЗАСТОСУВАННЯ МОДЕЛІ МАНДЕЛЛА-ФЛЕМІНГА В ЦИФРОВІЙ ЕКОНОМІЦІ:
ПРИКЛАД УКРАЇНИ****Борзенко О.О., Глазова А.Б.**

Інститут економіки та прогнозування

Національної академії наук України

Сучасний етап промислової революції пов'язаний з розвитком комунікативних інтернет-технологій, які суттєво змінили технологію бізнес-процесів і отримали назву «цифровізація». Розвиток ноосфери, поява нових індустрій та якісна трансформація виробничо-розподільчих відносин зумовлені широкою цифровізацією в усьому світі. Цифровізація – це глибока трансформація, яка створює нові підстави для підвищення ролі країн у світовій економіці. Основними цілями цифровізації є розвиток інновацій, орієнтованих на розвиток суспільства 5.0, забезпечення вільного потоку даних і капіталу. Розглядаючи застосування моделі Манделла-Флемінга як інструмент підтримки економічного добробуту, слід визнати «неможливу триєдність» моделі та відсутність досліджень для її вирішення. Стаття досліджує рішення дилеми Манделла-Флемінга на основі цифровізації. Методологія дослідження базується на фундаментальних положеннях сучасної економіки та загальнонаукових методах, а саме: індукції, дедукції, діалектичному методі та системному підході, аналізі та синтезі – все це для аналізу процесу цифровізації та встановлення принципів, форм та основ застосування моделі Манделла-Флемінга в цифровому вимірі, систематизація та узагальнення (для обґрунтування явища цифровізації), абстрактно-логічний метод (для обґрунтування останніх тенденцій), економіко-математичний (для порівняння та аналізу даних), інституційно-порівняльний (для аналізу застосування моделі Манделла-Флемінга в цифровій економіці). У статті розглядається застосування моделі Манделла-Флемінга в цифровій економіці, досліджуються глобальні тренди, а також особливості цифровізації в українській економіці. Визначено, що цифровізація є інструментом вирішення трилеми Манделла-Флемінга. Дослідження розкриває тенденції банківської цифровізації як зовнішні, так і внутрішні.

Ключові слова: цифровізація, трилема Манделла-Флемінга, цифровий банкінг.

Introduction. The current stage of the industrial revolution is associated with the development of communicative Internet technologies, which significantly changed the technology of business processes and was called “digitalization”. Digitalization is a profound transformation that creates new grounds for countries to increase their role in the world economy.

Object of the paper is studying the peculiarities of digitalization as potential instrument of Mundell-Fleming trilemma solving.

Discussion. The Mundell-Fleming model is a model for analyzing economic processes in an open economic system, which provides solutions to the problem of achieving a balance of external and internal balances through the use of fiscal and monetary policy instruments. It is developed in the early 60's of XX century by American economists R. Mundell (Mundell, R., 1961) and M. Fleming (Fleming, M., 1962) as an extension of the Keynesian LM-IS model for the case of an open economic system.

The Mundell-Fleming model analyses the short-run relationship between an economy's nominal exchange rate, interest rate, and output. The Mundell-Fleming model has been used to argue that an economy cannot simultaneously maintain a fixed exchange rate, free capital movement, and an independent monetary policy. An economy can only maintain two of the three at the same time. This principle is called the “impossible trinity”.

We believe it could be solved in the modern condition of digital environment. Information-communication technologies are the instrument to use 3 pillars simultaneously, e.i. the government could maintain 2 of 3 pillars, that are a fixed exchange rate and independent monetary policy whereas the free capital movement can be provided by digitalization. The digital economy became the basis of the Fourth Industrial Revolution and the third wave of globalization.

Practical meaning of digitalization benefits introduction (free flow of information and capital) into the Mundell-Fleming model are in solving the dilemma of “impossible trinity” that allows to develop a more effective export-import strategy of the state with improving the structure of the economy.

The digital economy is an economy based on digital computer technology and information and communication technologies (ICT), but, unlike informatization, the digital transformation is not limited by the introduction of information technology, but radically transforms areas and business processes into the Internet-based and new digital technologies (Slozko, O., Pelo, A., 2014).

Achieving the most complex levels of digitalization in the economy is a radical transformation of production relations of participants, resulting in the integration of production and services into a single digital (cyberphysical) system, in which:

- all elements of the economic system are present simultaneously in the form of physical objects, products and processes, as well as their digital copies (mathematical models);

- all physical objects, products and processes become part of an integrated IT system due to the presence of a digital copy and the element of connectivity;

- due to the presence of digital copies (mathematical models) and being part of a single system, all elements of the economic system continuously interact with each other

in a mode close to real time, model real processes and predicted states, provide constant optimization of the system.

The main segments of the digital economy:

- information and communication technology sector, e-business infrastructure (networks, software, computers, etc.);
- digital production and e-business, including industry, i.e. business organization processes using computer networks;

- e-commerce, i.e. retail online sales of goods (Razumkov centre, 2020).

The world economy has entered an active phase of digital transformation aimed at accelerating economic growth, increasing productivity and creating new areas of activity. The digital economy is expected to reach \$ 23 trillion by 2025 (or 23.3% of world GDP). At the same time, a huge role in the development of economies in different countries in the near future is given to digital banking.

A recent study by Juniper Research Retail Banking: Digital Transformation & Disruptor Opportunities 2020–2024 shows that by 2024 the number of digital banking users in the world will reach 3.6 billion, which is 50% more than in 2020. The following banks are recognized as leaders in digital transformation: Bank of America, BBVA, JPMorgan Chase (Fursova, V., Fadyeyeva, I., Borovik, L., 2020).

Moreover, according to the European Retail Banking Radar report conducted in 2019, it is expected that about 20% of Europeans will start using digital banking services in the next five years, and by 2023 the number of customers of such banks will reach 85 million compared to 15.6 million in 2019 (Chikova, D., Kent, S., Freddi, R., 2019). The growth in the number of digital banks will be primarily due to the Y- (millennials) and Z-generations, who prefer digital products (Zhang, W., Suo, S., Yang, Y., Yang, S., 2020).

As for the domestic banking sector, according to a study by Ernst & Young in the framework of the USAID Financial Sector Transformation Project (October 2016 – December 2020), its development trend is completely contrary to the global trend of banks fintech solutions, that is, Ukrainian banks accept digital transformation not as an opportunity, but as a “parallel world”. Thus, domestic banks currently have a low level of participation in the capital of fintech companies (85.7% of banks do not have shares of fintech companies), members of the bank have limited experience in the fintech industry (only 28.6% of the surveyed banks there is at least one member of the board with knowledge of the fintech industry), moreover, only 50% of banks have a developed digital strategy.

Today, four digital banks (neobank, bank without branches) have been launched in Ukraine, created on the principle of “bank within a bank”, i.e. an independent structure that develops digital products under a separate brand. Among them: O.Bank (Idea Bank), Monobank (Universal Bank), Todobank (Megabank JSC), Izibank (Universal Bank). The optimal rates are offered by O.Bank (maximum grace period and cashbacks for any online purchases, as well as for subscriptions to paid services of Google and Apple), but for such transactions as transfers, withdrawals or replenishment, these rates valid for the first four months from the date of registration of the card. As for mobile applications, according to the Ministry of Finance, they are currently represented in 39 banks out of 76, whose services run on both Android and iOS (World Digital Competitiveness Ranking, 2019).

In order to identify the prospects for the development of digital banking in Ukraine, as well as the risks, a SWOT analysis resulted in a number of advantages i.e. access to banking operations 24/7, increasing labor productivity and improving its quality, improving operations and enhancing efficiency of operational management of the bank etc. As the main disadvantage of the digital transformation, most bank executives point to its high cost. On average, banks' IT expenditures are distributed as follows: 60.3% of the IT budget is spent on maintaining the existing infrastructure; 18.7% – for the development of new software infrastructure; 14.1% – for new hardware infrastructure; 6.9% – on strategy, business process development and planning. Thus, according to Ernst & Young, the central bank's IT budget in 2019 was in the range of UAH 10-15 million (400-600 thousand USD), which is not enough to promote digital transformation, especially if more than 60% goes to support the existing IT infrastructure.

The digital divide is also slowing the development of neobanks. Thus, in terms of access to information and communication technologies (ICT) Ukraine in 2019 was ranked 65th, and in terms of use – in 89-th place in the world ranking of 129 countries (The ICT Development Index, 2017). As for the level of Internet penetration, in cities with a population of more than 100 thousand, this figure is 74%, and in rural areas – 58%

The further development of digital banking will primarily depend on the improvement of IT technologies that

reduce the cost of digital transformation of banking institutions, the search for new ways to protect data in the face of growing cyber-attacks, as well as reducing the digital division between city and countryside. It should be noted that Ukraine currently has the necessary potential to develop the digitalization of its economy in a number of indicators, demonstrating strong positions in international rankings. Thus, according to the level of innovation development (The Global Innovation Index, 2020), Ukraine in 2019 was on the 47-th position out of 129 countries, in the International Digital Competitiveness Ranking was on the 60-th place in the International Digital Competitiveness Ranking ranked 54-th out of 63 countries, ranked 54-th out of 175 countries in the Global Cyber Security Index (2018), and 79-th out of 176 countries in the ICT Development Index.

Conclusion. Thus, modern background of “impossible trinity” solving is considered as digitalization of financial sector.

Digitalization in the global economy has upward trend, especially in digital banking.

Considering Ukrainian development trend we should admit it is completely contrary to the global trend of banks fintech solutions, that is, Ukrainian banks accept digital transformation not as an opportunity, but as a “parallel world”. Domestic banks currently have a low level of participation in the capital of fintech companies moreover only 50% of banks have a developed digital strategy, but it tends to be increased.

References:

1. Mundell R. (1961). A theory of optimum currency areas. *American Economic Review*, no. 53, pp. 657–665.
2. Fleming, J. Marcus (1962). Domestic financial policies under fixed and floating exchange rates. *IMF Staff Papers*, no. 9, pp. 369–379.
3. Digital economy: trends, risks and social determinants (2020). Razumkov centre. Available at: https://razumkov.org.ua/uploads/article/2020_digitalization.pdf
4. Fursova V., Fadyeyeva I., Borovik L. (2020). Digital transformation of the economy of Ukraine: opportunities and risks of development of digitalization on the examples of the banking sphere. Available at: http://pev.kpu.zp.ua/journals/2020/5_22_ukr/35.pdf
5. Zhang W., Suo S., Yang Y., Yang S. (2020). Future of Data Infrastructure. Available at: <https://www.idc.com/getdoc.jsp?containerId=CH46780120>
6. Slozko, O., Pelo, A. (2014). The Electronic Payments as a Major Factor for Further Economic Development. *Economics and Sociology*, vol. 7, no. 3, pp. 130–140.
7. Digital Banking Users to Reach 3,6 Billion by 2024, an Increase of 50% (2019). Available at: <https://technologymirror.com.ng/digital-banking-users-to-reach-3-6-billion-by-2024-an-increase-of-54/>
8. Chikova D., Kent S., Freddi R. (2019). European Retail Banking Radar. Available at: <https://www.kearney.com/financial-services/article/a/european-retail-banking-radar-2019>
9. Pisarev A. (2019). Osvoili tekhnologii [We have mastered technology]. Available at: <https://minfin.com.ua/2019/10/18/39314319/>
10. The Global Innovation Index 2020 (2020). Available at: <https://www.globalinnovationindex.org/gii-full-report-2020.pdf#>
11. World Digital Competitiveness Ranking (2019). Available at: <https://www.imd.org/wcc/world-competitiveness-center-rankings/world-digital-competitiveness-rankings-2019/>
12. The ICT Development Index (IDI) (2017). Available at: https://read.itu-ilib.org/science-and-technology/measuring-the-information-society-report-2017_pub/80f52533-e54ede5f-en#page1

E-mail: slozko2003@ukr.net