International Journal of Economics and Finance; Vol. 16, No. 2; 2024
ISSN 1916-971X E-ISSN 1916-9728
Published by Canadian Center of Science and Education

Moving Beyond Silo Thinking: A Deductive Analysis of Financial Literacy, Financial Inclusion, FinTech, and the UN Sustainable Development Goals

Johannes Treu[1]

[1] IU International University, Berlin, Germany

Correspondence: Johannes Treu, IU International University, Berlin, Germany. E mail: johannes.treu@iu.org

Received: November 9, 2023 Accepted: December 11, 2023 Online Published: December 20, 2023

doi:10.5539/ijef.v16n2p1 URL: https://doi.org/10.5539/ijef.v16n2p1

Abstract

Financial literacy, financial inclusion, FinTech, and the UN Sustainable Development Goals (SDGs) have thus far been scrutinized only in pairs or separately, without considering their interdependencies and impacts. This lack of examination calls for a deductive argumentative approach to comprehensively analyze all four aspects coherently. The objective is to establish a holistic framework for attaining the SDGs through financial literacy, financial inclusion, and FinTech. The argumentation reveals the existence of intricate theoretical and empirical links between all four objects of investigation. Previous silo thinking or bilateral approaches fall short of fully understanding the comprehensive effects. This paper adopts a holistic perspective, with financial literacy serving as the starting point, as it is indispensable for establishing a positive correlation between financial inclusion, FinTech, and the SDGs. Therefore, financial literacy fosters the adoption and utilization of FinTech, contributes to financial inclusion, and facilitates the achievement of the SDGs. The holistic framework can also guide policymakers in formulating recommendations. Decision-makers should adopt a comprehensive outlook encompassing all four points and prioritize the promotion and expansion of financial education.

Keywords: financial literacy, financial inclusion, FinTech, financial technology, SDGs, UN Sustainable Development Goals

1. Introduction

The financial system fulfills a variety of different tasks. These include, on the one hand, the allocation function expressed, among other things, through the granting of loans and the accumulation of savings. Secondly, the diversification function, e.g., by offering various products, financial services, and risk diversification. Consequently, the financial sector acts as a multiplier and facilitator of economic stability and a guarantor of long-term economic development (Sujlana & Kiran, 2018). At the same time, free and affordable access to financial services is crucial for poverty reduction and prosperity, as countries with deep and developed financial systems have higher economic growth and a greater reduction in poverty and income inequality (Pazarbasioglu et al., 2020). Furthermore, financial services help to increase income capacity by allowing investment in education, health, housing, and business, smooth consumption, and strengthen resilience to shocks such as illness, job loss, or crop failure through savings, credit, and insurance products (Pazarbasioglu et al., 2020).

In addition to these positive effects and to promote more sustainable economic development, political decision-makers in many countries have taken differentiated implementation measures (Ozili, 2021). In particular, the point of more sustainable economic development is to be achieved by expanding the financial system to include sustainability aspects. Such a financial system can make a positive contribution to achieving the Sustainable Development Goals if financial flows stimulate the improvement of natural resources, the environment, and human life as a whole (Farahani, Esfahani, Moghaddam, & Ramezani 2022). Given the multitude of different interrelationships, Ozili (2022a) proposes a broad discussion on the link between financial inclusion and sustainable development.

The current discussion paper takes up this proposal and supplements it with the points (i) financial literacy, (ii) FinTech and substantiates it, and (iii) concerning the Sustainable Development Goals (SDG). This approach is necessary as all four points and their relationships and effects have so far only been considered separately or bilaterally. Arner, Buckely, Zetzsche, and Veidt (2020) take a similar view, stating that there is no link between

FinTech, financial inclusion, and sustainability. Instead, most research focuses on these three areas as separate, unconnected silos of knowledge. Also, Kumari and Ferdous (2019) speak of the novelty of the concepts. However, there is no unified theory to understand the relationship between them. In addition, according to various authors, there is a great and diverse, albeit unrelated, need for research in this nexus. For example, Atkinson and Messey (2012) see a need for more research into the interplay between financial literacy and financial inclusion. The authors Arner et al. (2020) and Ozili (2020) name the connection between FinTech/financial innovation and financial inclusion as a field of research. Moenjak, Kongprajya, and Monchaitrakul (2020) suggest further research into how FinTech can be used to expand financial literacy and financial inclusion. BIS (2019) calls for a timely investigation into whether FinTech can deliver on the promise of promoting financial inclusion and how it will be implemented. Hinson, Lensink, and Mueller (2019) state the need for more research between economic sustainability and FinTech models and how the SDGs can be achieved through economic inclusion. Pauliukevičienė and Stankevičienė (2021) and Vergara and Agudo (2021) also see a research gap between FinTech and the SDGs. Ozili (2018) calls for more research to better understand the relationship between digital finance, financial inclusion, and digital financial inclusion. At the same time, Ozili (2022a, 2022b) notes that there is little research on the intersection between financial inclusion and sustainable development. Future research should therefore explore ways in which financial inclusion can be integrated into the sustainable development agenda. On the institutional side, the UN Secretary General's Task Force on Digital Financing of the Sustainable Development Goals (2020) sees an urgent need for action to integrate the SDGs into the concept of financial inclusion and the digital finance ecosystem. At the same time, there is a great need to develop and coordinate a common framework to guide future developments in the field of digital finance to achieve the SDGs.

Based on the aforementioned points and various separate research gaps, this discussion paper takes a coherent look at the issues of financial literacy, financial inclusion, FinTech, and SDGs. Accordingly, the research motivation can be summarized as follows Developing a holistic framework to achieve the SDGs through financial literacy, financial inclusion, and FinTech. The aim of the work is therefore to describe the four points and their effects, to derive interrelationships between all four components, and finally to integrate them into a common framework.

The structure of the paper is as follows. Following the introduction, chapter 2 describes the methodological framework and the procedure. This is followed by a description of financial literacy, the phenomenon of financial inclusion, FinTech, and the SDGs in chapter 3. Chapter 4 synthesizes and discusses the previous chapter by highlighting the connections between all four components and transferring them into a holistic framework. A conclusion in chapter 5 finalizes the explanations.

2. Method

A post-positivist framework is adopted as the chosen methodological framework, in conjunction with an argumentative-deductive analysis (Treu, 2022b). This approach is based on a set of interrelated assumptions about the world, which serves as a conceptual framework for systematic exploration (Williamson et al., 2002; Saunders, Lewis, & Thornhill, 2009). It posits that reality and facts are open to comprehensive critical examination, allowing for the incorporation of multiple perspectives and interpretations. Moreover, it acknowledges that certain facts are subject to interpretation or construction by human beings, thereby distinguishing them from natural phenomena. This enables an examination of the conditions under which various facts emerge within a social context (Williamson et al., 2002; Saunders, Lewis, & Thornhill, 2009).

The deductive analysis method is grounded in a realistic depiction of empirical evidence. Three approaches can be categorized within this framework: (i) formal-deductive, (ii) conceptual-deductive, and (iii) argumentative-deductive analysis (Wilde & Hess, 2006). According to deductive logic, conclusions logically follow from one or more arguments (premises) and progress from a general to a specific level. A deductive approach is organized in such a manner that the conclusion is implicitly encompassed within the arguments (premises). If the arguments (premises) are true or valid, then the resulting conclusion must also be valid (Turvey, 2012). Consequently, argumentative-deductive analysis is characterized as a top-down process, employing logical reasoning to derive overarching conclusions about problems or facts by considering multiple perspectives, even those that may conflict with one another (Saunders, Lewis, & Thornhill, 2009; Keating, Demidenko, & Kelly, 2019).

To be able to use a deductive analysis method within the framework, it is necessary to find arguments or premises with the help of a systematic literature review (Treu, 2021). This is an independent scientific method that aims to identify and evaluate relevant literature on a topic to derive its own conclusions for the research

question (Nightingale, 2009; TU Berlin, 2019). The chosen method makes it possible to show the current state of research on a topic and to identify gaps and research needs about a selected objective (TU Berlin, 2019). The method also allows contradictory and/or consistent findings to be examined. In addition, the method is particularly useful for integrating information from a group of different studies or works that investigate the same phenomenon (Štrukelj, 2018).

Another advantage is the possibility of summarizing and synthesizing evidence for a specific research question (Štrukelj, 2018). Furthermore, it has good validity compared to other scientific papers, as there is no personal connection to the selected articles and therefore no conflict of interest. The method also takes the approach of including and critically evaluating older works, articles in low-impact journals and/or conference papers, non-empirical works, and minority opinions as well as negative opinions on the prevailing mainstream in the respective scientific discipline (Nightingale, 2009). Another advantage is that the method is more than a mere description and inventory of the literature, as it attempts to change or improve research results, research methods, definitions, constructs, etc. through nuance or gradations (Durach et al., 2017).

Regardless of the subject area, discipline, or philosophical superstructure, a multi-stage procedure is chosen, which usually consists of six to eight steps (Durach, Kembro, & Wieland, 2017; Štrukelj, 2018; TU Berlin, 2019). According to Durach Kembro and Wieland (2017), for example, the following steps are part of the method: (1) definition of the research question(s), (2) determination of the required characteristics of literature, (3) procurement of potentially relevant literature, (4) selection of relevant literature, (5) synthesis of the literature and (6) evaluation of the results.

Since the evaluation of literature, especially in the field of economics, does not follow a generally applicable scheme, as in medicine, for example, the quality assessment therefore depends on the research question(s) (TU Berlin, 2019). Thus, the findings of the individual studies are used at a meta-level to try to find out what similarities and differences exist between the publications and what research gaps, research questions or similar exist (TU Berlin, 2019). Figure 1 below summarizes the methodological framework and procedure.

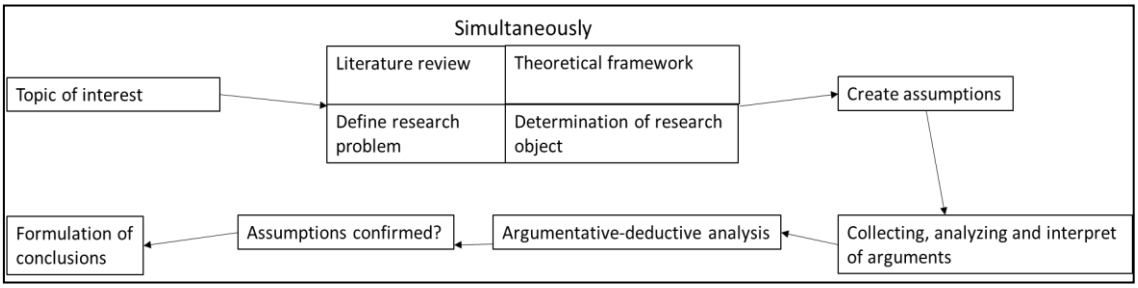

Figure 1. Methodological framework and procedure

Source: based on Williamson et al. (2002).

In this study, the application of Figure 1 denotes that the "topic of particular interest" is clearly defined in the title of the paper and subsequently elaborated upon in the introduction. The selection of relevant literature is conducted through the utilization of various electronic databases, namely GBV, GoogleScholar, EconBiz, IDEAS/RePEc search, Econstor, and EconPapers. These databases offer several advantages, predominantly a substantial number of open-access resources and journals. Additionally, for fee-based journal articles, the databases provide access to pre-publication versions or preprints, alongside abstracts or summaries, and links for library access. The search process itself is conducted using keywords, and all six steps outlined above are executed in parallel. The theoretical framework and objects of investigation encompass financial literacy, financial inclusion, FinTech, and the Sustainable Development Goals (SDGs). The research problem revolves around delineating the interrelationships among these four phenomena and developing a comprehensive conceptual framework. Key assumptions and interdependencies are derived from all four objects of investigation. Through an analysis and interpretation of arguments for confirmation or rejection, as gathered from the literature, argumentative-deductive conclusions are drawn from general to specific. Simultaneously, the study examines whether the assumptions can be confirmed, contributing to the formulation of final conclusions.

3. Results

3.1 Financial Literacy

The evolution of the global financial system has brought with it a host of new products, services, and more

complex decisions. In the same breath, consumer knowledge needs have increased to enable individuals to make sound financial decisions and to understand the short and long-term implications of their financial actions (Haupt, 2021). To achieve this state of affairs, a strong academic focus on the area of financial literacy has formed since the beginning of the new millennium (Cude, 2021). However, there is still no generally scientifically accepted definition of the term, as it is a multidimensional concept and difficult to measure. The reasons for this lie in the easy interchange of the term's financial literacy and knowledge, the existence of concept and working definitions, and the emergence of digitalization, which expands the nature of financial literacy to digital financial literacy (Cude, 2021; Haupt, 2021; Morgan, 2021).

However, more and more countries and international organizations have recognized the importance of measuring the level of financial literacy, as it has become a long-term policy priority in many countries and economies and is seen as an important complement to managing market behavior (OECD, 2020b, 2013). In this context, the first institutionally elaborated definition of the term emerged in 2005 by the Organization for Economic Co-operation and Development (OECD). The term was understood as (OECD, 2005):

"...the process by which financial consumers/investors improve their understanding of financial products and concepts and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being."

In 2012, the G20 countries agreed on a revised definition of the concept, based on the work of Atkinson & Messy (2012), who presented the results of the OECD / International Network on Financial Education (INFE) for the first time. Financial literacy is understood as (Atkinson & Messy, 2012; OECD, 2020b):

"A combination of financial awareness, knowledge, skills, attitudes and behaviors necessary to make sound financial decisions and ultimately achieve individual financial well- being."

Using this definition, more than 70 countries and economies worldwide were in the process of developing or implementing national financial literacy strategies in May 2020 (OECD, 2020b). For example, the European Commission uses this definition to develop a standardized framework for building and promoting financial literacy (European Commission, 2021). Within the EU, Austria with its national strategy on financial literacy can be taken as a prominent example of the application and expansion of the definition. All elements of the definition are used, and the goal of financial well-being is supplemented by "contribute to the sustainable development of the economy and society." (OECD, 2021).

To measure and compare financial literacy between countries, three dimensions with the following content can be derived from the definition (OECD, 2022; Cude, 2021; Haupt, 2021; Davies, 2015; OECD, 2013; Atkinson & Messy, 2012):

(i) Knowledge (compound interest, inflation, interest on loans, time value of money, risk vs. return, and risk diversification)

(ii) Behavior (assessing affordability, paying bills on time, monitoring personal finances, setting and using long-term financial goals)

(iii) Attitudes (preference between spending and saving, long-term vs. short-term view)

Based on these dimensions and using the OECD/INFE toolkit to measure financial literacy among 26 countries from Asia, Europe, and Latin America, the OECD (2020a) concludes that financial literacy is low in all participating countries. The average score is 12.7 out of a maximum of 21 possible points.

Another approach to measuring financial literacy is known internationally as the "Big Three" (Haupt, 2021; Lusardi, 2019; Lusardi & Mitchell, 2014). The questions relate to the concepts of compound interest, inflation, and risk diversification. In this context, according to Lusardi and Mitchell (2014), financial literacy is defined as:

"Ability to process economic information and make informed decisions about financial decisions about financial planning, wealth accumulation, debt, and pensions."

An extension of the "Big Three" are the so-called "Big Five". This includes additional questions on the pricing of bonds and mortgages (Haupt, 2021). Various country comparisons based on the "Big Three" come to a similar conclusion as in the OECD study (2020a). Financial literacy is at a low level and urgently needs to be improved. Only around 30% of all participants in the various countries were able to answer all three questions correctly. In addition, only just under 50% of respondents can answer two out of three questions correctly (Lusardi, 2019).

In the course of digitalization, Morgan (2021) proposes an extension to digital financial literacy to describe various aspects of digital financial literacy. At the same time, it is pointed out that there is no uniform definition

here either. Like digital literacy and financial literacy, the extension is a multidimensional concept with four dimensions (Morgan, 2021):

(i) Dimension: Knowledge of digital financial products and services

Economic agents should be aware of the existence of non-traditional financial products and services offered via digital means such as the internet and cell phones.

(ii) Dimension: Knowledge of the risks associated with digital products and services

Economic entities should be aware that additional risks arise from the use of digital financial services and products. These are different and more difficult to recognize than risks associated with traditional financial services and products.

(iii) Dimension: Control and management of digital financial risks

Economic entities should know how to protect themselves against risks arising from the use of financial digital products and services. They should be able to use computer programs and mobile apps to avoid spamming, phishing, etc. Users should know how to protect their personal identification number and other personal information when using digital financial services.

(iv) Dimension: Knowledge of consumer rights and redress procedures

Economic entities should know their rights and know where to turn and how to obtain compensation if they are victims of fraud or other losses. They should also know their rights about their personal data and how to take action against unauthorized use.

The general positive effects of financial literacy can be described in different ways. For example, Atkinson and Messy (2013) list:

(i) Better understanding of financial services and willingness to forego non-standard services

(ii) A deeper understanding of opportunities and risks in financial services

(iii) Reduced search costs for obtaining information about financial services

(iv) Higher level of savings

(v) Protection against unfair and discriminatory financial practices

(vi) Low costs for money transfers

Lusardi (2019) also mentions other positive effects:

(i) Better decisions regarding savings and investment behavior as well as borrowing

(ii) Higher probability of accumulating wealth

(iii) Higher earnings through investments and in more complex systems

(iv) Greater likelihood of saving for retirement due to a better understanding of the compound interest effect

(v) Better ability to deal with financial emergencies or expenses

(vi) Higher probability of paying the full monthly loan installment

(vii) Lower probability of using cost-intensive financing alternatives

According to the OECD (2021), better financial literacy promotes the development of healthy, open, and competitive financial markets. This supports financial stability and leads to a strengthening of financial consumer protection. This can be achieved by:

(i) Households manage their finances better, make sound financial decisions with their disposable income, and raise awareness of the importance of saving for unexpected events

(ii) Creating an understanding of the risks and opportunities of the capital markets, which should lead to better-informed decisions being made about long-term investments

(iii) Raise awareness of the need for long-term planning to promote an understanding of changes to the state pension system, resulting in appropriate decisions about individual pension plans

(iv) Households are prudent in their use and level of credit to increase financial resilience to external shocks

(v) Households are familiar with the increasing integration of digital technologies in the financial sector and the use of digital channels

3.2 Financial Inclusion

Financial inclusion is a term that has emerged from various forms of combating global financial poverty. At the same time, there are different ways in which this term is defined, and which different aspects are highlighted (Barajas et al., 2020). The first steps on the path of financial inclusion came from programs to expand access to finance for poor people and unbanked populations (Ozili, 2022c). The best-known form is the microcredit model based on institutions such as the Grameen Bank in Bangladesh and BancoSol in Bolivia. The initial successes of this approach were recognized, for example, when 2005 was declared the International Year of Microcredit. Muhammad Yunus and the Grameen Bank were also awarded the Nobel Peace Prize in 2006 for their activities in this field. Many mechanisms and principles, such as group loans or joint liability, are based on the cooperative banking model of Central Europe in the late 19th century (Feyen, Frost, Gambacorta, Natarajan & Saal, 2021). Consequently, this can be seen as the origin of financial inclusion. As microcredit lending and product expansion progressed, the model and the term developed further into so-called microfinance.

In 2009, at the G20 summit in Pittsburgh, the participating countries committed to improving access to financial services for poor people by supporting the safe and sound distribution of new forms of financial services. At the same time, a G20 Financial Inclusion Experts Group was established, and the term was born (G20 Financial Inclusion Experts Group, 2010). The term is a further development of research carried out in the 1990s, which revealed the positive economic effects of more efficient provision of financial services in general. It was shown that better and broader financial development promoted economic growth at the national, sector, and company levels and increased productivity growth and capital accumulation (Barajas, Beck, Belhaj & Naceu 2020). Currently, financial inclusion is seen as a solution to reduce extreme poverty in developing and poor countries (Ozili, 2022c).

In the course of digitalization, the term digital financial inclusion was further developed by the G20 in 2016 to clarify the contribution of digital technologies such as FinTech (GPFI, 2016). According to the G20 countries, digital financial inclusion in the broadest sense refers to the use of digital financial services to promote inclusion. The aim is to reach financially excluded and underserved populations with a range of financial services that meet their needs and are delivered responsibly at a cost that is affordable for customers and sustainable for providers (GPFI, 2020). Furthermore, according to the UN Capital Development Fund (UNCDF), digital financial inclusion must provide opportunities for low-income account holders to engage in the economy to meet their daily needs, fulfill wants, and improve their skills, productivity, and marketability in the age of the digital economy (UN Capital Development Fund, 2019). Similarly, Ozili (2022d) sees digital financial inclusion to bring unbanked people into the formal financial sector by offering financial services through devices with a digital interface, such as cell phones or other digital devices. The aim is to offer financial services to all economic agents through such digital channels, thereby contributing to poverty reduction, increasing financial intermediation, and achieving the Sustainable Development Goals.

However, the use of the term financial inclusion "with or without digital" varies at the institutional level. While the G20 countries and the UN speak of digital financial inclusion, the World Bank and the OECD "only" use the term financial inclusion (Note 1). The World Bank (2022) defines financial inclusion as access by individuals and companies to useful and affordable financial products and services that meet their needs (transactions, payments, savings, loans, and insurance) and are offered responsibly and sustainably. According to the OECD (2020a, 2018a, 2013), financial inclusion is the process of promoting affordable, timely, and appropriate access to regulated financial products and services. Existing and innovative approaches (including financial awareness and education) should be tailored to extend their use to all parts of society. This will promote the goals of financial well-being and economic and social inclusion.

To enable international measurability and comparability, four indicators of financial inclusion can be named (OECD, 2020a, 2016, 2013):

(i) Product knowledge: This is a two-sided indicator that focuses on the provision of suitable financial products and services and awareness of these. It is assumed that the more products and services are known, the more intensively economic agents engage with them. The level of awareness of financial products and services is therefore an important indicator for influencing financial inclusion on the demand side.

(ii) Product ownership: On the demand side, this is the most important indicator of financial inclusion and at the same time relevant for a combined measurement of demand and supply aspects. Different levels of product ownership can provide indications of widespread financial inclusion or, alternatively, a high degree of exclusion. There are four categories for this indicator:

   a. Savings, investment, or pension products, such as private pensions, compulsory health insurance,

savings accounts, investment funds and shares

b. Payment products or transaction accounts, such as current accounts, mobile money or debit cards, or other prepaid payment cards

c. Credit products, such as all formal bank loans, mortgages, credit cards

d. Insurance products, such as car, health, liability, or household contents insurance

(iii) Active product selection: Financial inclusion requires active participation in the financial market. This means keeping an eye on the financial market, being able to switch providers at any time, and selecting new products when needs change.

Trust and reliance on family and friends: This indicator can illustrate the extent to which the financial sector is informal. If economic agents prefer to rely on family and friends to store or borrow money safely, this may indicate that there is no access to suitable financial products such as secure savings accounts or loans.

Positive effects of financial inclusion include (World Bank, 2022; Ozili, 2022d, 2020, 2018, Arner et al., 2020):

(i) Reducing extreme poverty and thus increasing prosperity

(ii) Pioneer and important strategy for achieving the SDGs

(iii) Increasing the level of social inclusion in many societies

(iv) Increasing the economic participation of women

(v) Promoting the growth and stability of the economy

(vi) Access to all types of formal financial services

(vii) Promoting economic participation by enabling asset ownership and capital accumulation

(viii) Reduction of financial risk, e.g., through loss, theft, and other financial crimes

(ix) Lower costs of digital transactions for customers and providers of digital financial services

Looking at all the definitions and the positive effects together, it can be concluded that free access to an account is a first step towards broader financial inclusion. This is because an account enables people to save money, earn interest, and send and receive payments (Grohmann & Menkhoff, 2020; Venet, 2019). It does not matter exactly what type of account is meant. As a result, the definitions can be interpreted broadly and there is no restriction to current accounts alone. This means that savings accounts and mobile accounts, which are very common in developing countries, can also be included (Grohmann & Menkhoff, 2020; Grohmann & Menkhoff, 2017).

However, a look at the "Global Findex Database 2017" shows that only 69% of adults have an account. The proportion has risen steadily from 51% in 2011 and 62% in 2014. In addition, there are major differences in account ownership between the individual economies (Figure 2). In high-income economies, for example, 94% of adults have a bank account, compared to just 63% in developing countries (Demirgüç-Kunt, Klapper, Singer, Saniya, & Hess, 2018). There are still 1.7 billion people worldwide who do not have access to a bank account or financial services and are therefore excluded. The majority of these so-called "unbanked persons or adults" live in developing countries (Figure 3) and 56% of all unbanked adults are women (Demirgüç-Kunt et al., 2018).

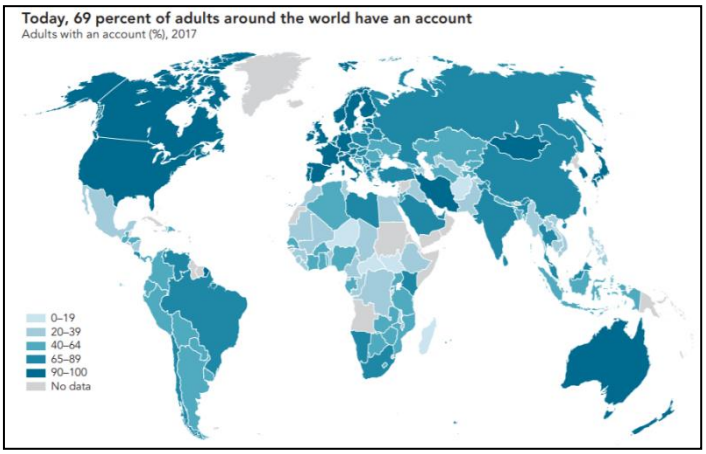

Figure 2. Proportion of the population with a bank account

Source: Demirgüç-Kunt et al. (2018).

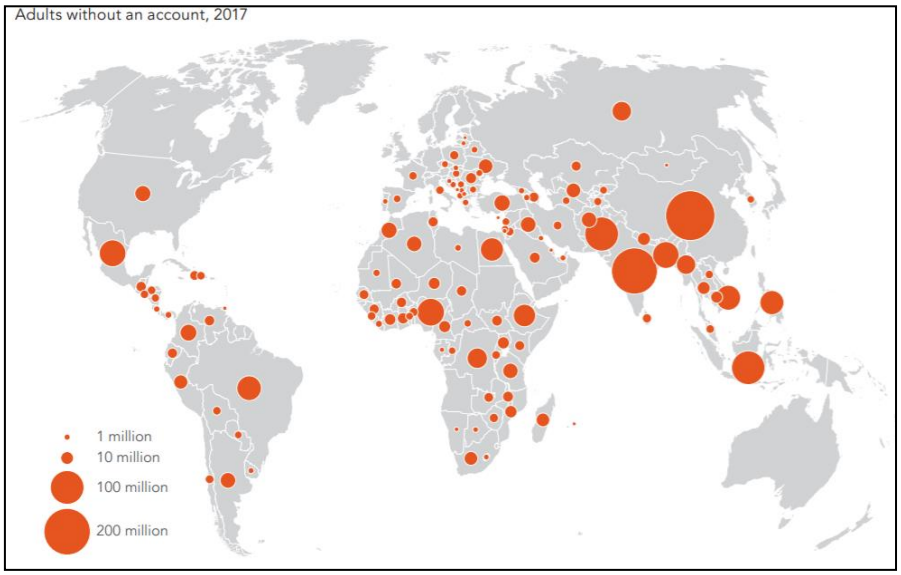

Figure 3. Distribution of adults without an account

Source: Demirgüç-Kunt et al. (2018).

If financial inclusion is a generally recognized social goal and is seen as a prerequisite for reducing extreme poverty and increasing shared prosperity, why are so many people still excluded from financial participation? The reasons for this are manifold and lie on both the supply and demand side (for a comprehensive description, see Treu 2023a, 2023b).

3.3 FinTech

Despite the contemporary nature of the fintech concept, its origins can be traced back over 150 years (Treu, 2022a, 2021). Technological advancements in the 19th century were already being utilized to enhance the efficiency of financial business operations (Nathmann, 2019; Arner, Barberis, & Buckley, 2015). The advent and adoption of telegraphy serve as a notable example. The establishment of the first transatlantic telegraph cable enabled connectivity between the financial hubs of New York and London. As early as 1870, Western Union began offering money transfers via telegraph to its clientele (Nathmann, 2019; Thakor, 2019, Hikida & Perry, 2019).

The origins of the term FinTech can be traced back to the Financial Services Technology Consortium, which was initiated in the early 1990s by what is now Citigroup (Treu, 2022a, 2021; Ratecka, 2020; Kerényi & Molnár, 2017; Arner, Barberis, & Buckley, 2015). This project aimed to address the bank's reputation for resistance to technological collaboration with external entities (Hochstein, 2015). The term FinTech, along with Citigroup's involvement in the emerging Smart Card Forum, was intended to signify a new strategic approach for the company and emphasize its openness. Despite almost three decades since its inception, the term has been understood in various ways (Allen, Gu, & Jagtiani, 2020; Rupeika-Apoga & Thalassinos, 2020; Elsinger, Fessler, Feyrer, Richter, Silgoner, & Timel, 2018; Schindler, 2017). Different perspectives have emerged, emphasizing either a technology-oriented focus, a functional-oriented focus, or a combination of both (Treu, 2022a, 2022b, 2021). For instance, the ECB (2020) adopts the former perspective, defining fintech as financial technology and an umbrella term encompassing any technological innovation used to change, support, or deliver financial services across various applications. On the other hand, Mirchandani, Gupta, and Ndiweni (2020) divide FinTech into different areas such as asset management, cryptocurrency, crowdfunding, investment management, and marketplace lending. Alternatively, the OECD (2018b) views fintech not only as the application of digital technologies to financial services but also as the development of business models and products based on these technologies. Regardless of these different perspectives, it is agreed upon that the term FinTech comprises the words "financial" and "technology" (Mirchandani, Gupta, & Ndiweni, 2020; Chemmanur, Imerman, Rajaiya, & Yu, 2020; Ratecka, 2020; Hikida & Perry, 2019). This neologism refers to the integration of technology into the offerings of financial services firms to enhance their usage and delivery to consumers. This etymological understanding represents the minimum consensus across all definitions and perspectives (Treu, 2022a, 2021).

FinTech is characterized by its extensive utilization and omnipresence in various sectors, including insurance,

real estate, and wealth management, commonly known as InsurTech, PropTech, and WealthTech (Treu, 2022b, Treu, Ells, Buono, & Winkler. 2021). Furthermore, major e-commerce companies such as Google, Amazon, Facebook, and Apple, known as BigTech companies, leverage their network effects, economies of scale and scope, customer base and data, as well as their market power to provide their own cryptocurrencies, payment services, and other financial services through the employment of financial technologies (Treu, 2022b; Feyen et al., 2021; Treu et al., 2021). Their aim is to fortify their competitive position. Figure 4 demonstrates the extensive utilization of FinTech in various domains, accompanied by selected example companies.

Figure 4. FinTech in various sectors

Source: VentureScanner (2021).

The arguments and reasons for the emergence of FinTech are just as numerous as the various definitions and perspectives. It is precisely this prevailing heterogeneity that is responsible, among other things, for the fact that there are many different justifications for the FinTech phenomenon (Treu, 2022a, 2021). For a better understanding and categorization, Treu (2022a, 2021) divides the different arguments and reasons into supply-oriented and demand-oriented groups with three subgroups. The first group includes supply-side technological reasons such as application programming interfaces (APIs), availability of mobile banking and smartphones, or cloud computing. The second group focuses on supply-side regulatory reasons. These include aspects such as new regulatory and supervisory requirements following the 2008/09 financial crisis, the promotion of competition around the topic of open banking, or the opening of the market to new market participants. The third group contains macroeconomic or macroeconomic supply-side arguments and motives. Examples include the excessive costs of financial intermediation, a less competitive banking sector, and the current low interest rate environment. On the demand side, the arguments, and reasons for the emergence of FinTech can first be divided into demand-side demographic and sociological reasons. These include, for example, the influence of digital natives or millennials, who are more willing to accept fintech services than similar services from traditional banks. The second group includes microeconomic reasons, e.g., determinants of individual demand behavior such as consumer decisions, expectations, preferences, and trust in financial services. The final demand-oriented group comprises arguments that focus on the demand for specific financial services and products. These include network externalities of a FinTech application, ease of use, or availability of financial services.

The FinTech phenomenon is also associated with several positive effects, such as (Treu, 2023a, 2023b, 2022a, 2022b, 2021):

(i) Reducing market frictions and information asymmetries and avoiding the resulting agency conflicts, while at the same time promoting financial inclusion

(ii) Strengthening global financial stability by improving the degree of decentralization and diversification of the financial system

(iii) Improved efficiency through better diversification of investment risk, increased competition, and less dependence on geographical proximity to financial services or products

(iv) Reduction of company-specific costs such as fixed and marginal costs for the provision of financial services

(v) Greater convenience for users and lower transaction costs

(vi) Improving access to credit for excluded groups, especially those who have no collateral or credit history

(vii) Improved risk assessment to reduce the need for collateral as an indicator of creditworthiness when granting loans

(viii) Greater transparency and trust between providers and borrowers, so that the intermediation of funds via third parties can be superfluous and investors and borrowers can negotiate directly with each other

3.4 Sustainable Development Goals (SDG)

The development of the SDGs and the 2030 Agenda began at the Rio Conference in 1992. The foundations were laid here with Agenda 21, the Millennium Summit in 2000, and the Millennium Development Goals (MDGs). The idea was to promote a holistic approach by combining the goals of ecological sustainability, social justice, economic efficiency, social participation, and democracy. During the UN conference (Rio+20), the participants took up the criticism of the limited focus of the MDGs and began the process of formulating more comprehensive goals for sustainable development. This time, all dimensions of sustainable development were to be considered (Martens & Obenland, 2017).

In 2015, the General Assembly of the United Nations (UN) adopted the "2030 Agenda for Sustainable Development" and the 17 SDGs as its centerpiece (see Figure 5). These are further subdivided into 169 targets in terms of structure and measurability and are made measurable by 231 indicators (Destatis, n.d.). In this way, the UN makes it clear how comprehensive and ambitious this new universal agenda is. At the same time, a clear time frame of 15 years has been set (UN, 2015a). The Agenda 20230 with its SDGs can therefore be seen as a "roadmap" for humanity and the planet to ensure sustainable social and economic progress worldwide. Its aim is not only to eradicate extreme poverty but also to integrate the three dimensions of sustainable development (economic, social, and environmental) in a balanced way into a comprehensive global vision. At the same time, the SDGs apply to all societies and countries around the world (UN, 2016).

Figure 5. Sustainable Development Goals (SDGs)

Source: UN (2023).

The effective implementation and success of the SDGs depends on the individual countries and their agendas, plans, and programs for sustainable development. At the same time, national and country-led implementation strategies require resource mobilization and financing measures. The Addis Ababa Agenda, which emerged from the Third International Conference on Financing for Development, contains concrete strategies and measures to support the implementation of the 2030 Agenda and the SDGs (UN, 2015b). The annual investment required to achieve the SDGs across all sectors is estimated at around 5-7 trillion dollars. With global financial assets estimated at over USD 200 trillion, financial resources are available, but most of these resources are not being channeled into sustainable development at the scale and pace required to achieve the SDGs and the goals of the Paris Agreement on climate change. As a result, the current level of investment is far from the scale required (UN, n.d.). A global plan for financing the SDGs is needed. The realization of the SDGs should essentially be an investment agenda in physical infrastructure and human capital (Sachs et al., 2022).

The UN has committed to the "Leave No One Behind" strategy to achieve the SDGs. However, only about half of the countries have created or implemented a roadmap for the SDGs or are in the process of developing one (Zhao et al., 2022). This is largely due to gaps between the requirements of the SDGs and the prevailing sustainability vision in the countries, especially where the SDG framework sets higher requirements than a country's development capacity allows. Inadequate technology and resource efficiency also limit the achievement of the SDGs, including economic growth and social needs. In addition, high environmental costs occur, which in turn harm the achievement of the SDGs (Zhao et al., 2022). This underlines that further development and improvement of (financial) technology is key to accelerating progress on the SDGs and closing the gap between the goals and the actual state.

The world is currently making no progress on the SDGs for the second year in a row (see Figure 6). The average SDG Index score has fallen slightly in 2021, partly due to slow or non-existent recovery in poor and vulnerable countries. At the same time, multiple and overlapping health and security crises have led to a reversal of progress on the SDGs (Sachs et al., 2022). Furthermore, the SDG dashboard provides a snapshot of progress toward achieving the 17 SDGs by region and income group, as well as levels and trends (Sachs et al., 2022; UN, 2022). This shows that only a few SDGs have been achieved and that the majority, regardless of region and income group, face major challenges in achieving the goals (see Figure 7).

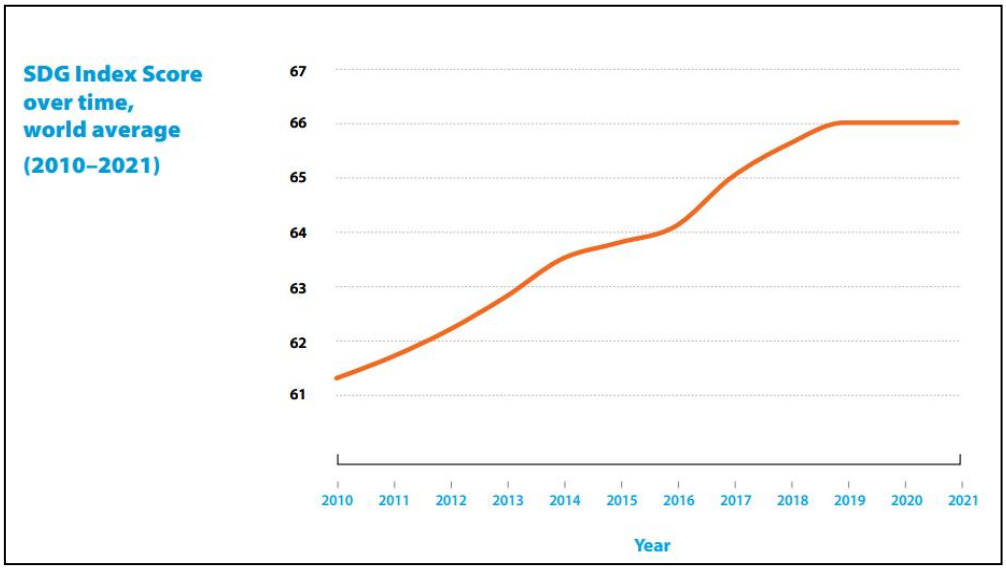

Figure 6. SDG index score

Source: Sachs et al. (2022).

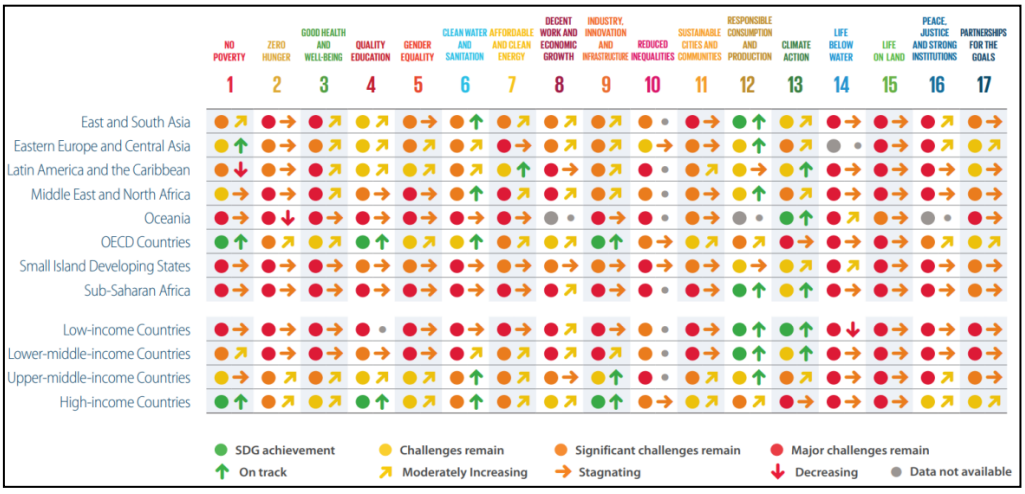

Figure 7. 2022 SDG dashboards by region and income group (levels and trends)

Source: Sachs et al. (2022).

4. Discussion

4.1 Impact and Interrelationships of Financial Literacy, Financial Inclusion, FinTech, and SDGs

Having described the four objects of investigation in the previous chapters, the following section attempts to close the separate research gaps characterized in Chapter 1. This is achieved by conducting a coherent argumentative-deductive analysis of the effects and relationships between financial literacy, financial inclusion, FinTech, and the SDGs. On the one hand, this is necessary as all four points have so far only been considered individually or bilaterally. On the other hand, the argumentative-deductive approach serves to derive relationships between all four components to finally integrate them into a common holistic framework.

4.2 Financial Literacy

Lack of awareness of different types of financial products and lack of trust in them create barriers to access and inhibit use. Insufficient knowledge of how the products work and their likely costs also reduces the likelihood of inclusion (Atkinson & Messy, 2013). Thus, without basic financial literacy or deficits, policy makers and service providers face challenges in extending financial services to previously excluded and underserved groups. Only by improving the understanding of how to use specific financial instruments, providing simple guidance on how they work and information, and offering recourse for mistakes, will it be possible to reduce these challenges. Otherwise, inequalities in access to and use of financial services may be further exacerbated (GPFI, 2016).

As a strong proponent of financial literacy, the OECD has shown in many studies that there is a positive correlation between financial literacy and the four indicators of financial inclusion (OECD, 2020a, 2016, 2015, 2013; Atkinson & Messy, 2013). Thus, financial inclusion measures that only focus on supply-side factors cannot guarantee the effective use of financial services. In this context, financial literacy is seen as an important tool to overcome demand-side barriers by addressing low levels of financial literacy, psychological barriers, and lack of awareness. Improved financial literacy can therefore increase awareness and understanding of financial products and services, thereby increasing demand for financial products and their effective use (OECD, 2015). As a result, several countries have made financial inclusion one of their policy priorities and have developed strategies in this regard. Within this context, measures to improve financial education are a key pillar. Conversely, financial education strategies that aim to promote financial inclusion, among other things, are also possible (OECD, 2015, Atkinson & Messy, 2012). Austria, for example, considers financial literacy to be important in its strategy to achieve gender equality. This helps women to better manage their financial lives and reduces the impact of fragmented employment biographies on their financial assets and retirement income (OECD, 2021). Furthermore, the OECD (2020b) in its recommendations on financial literacy and the United Nations Secretary-General's Special Advocate for Inclusive Finance for Development see it as a building block for achieving financial inclusion and financial market stability (Sahay et al., 2020).

Other different empirical country studies confirmed the positive correlation between the two variables. For example, Fanta and Mutsonziwa (2021) show for Kenya and Tanzania that a higher level of financial literacy increases financial inclusion. Kumari and Ferdous (2019) show for Sri Lanka that financial literacy has a positive effect on the economic participation of poor women in rural areas and that there is a direct link between financial literacy and financial inclusion. Hasan, Le, and Hoque (2021) and Bire, Sauw, & Maria (2019) also show a positive correlation for Bangladesh and Indonesia. For poor and rich countries measured by GDP per capita, Grohmann and Menkhoff (2017) conclude that financial literacy supports financial inclusion for both types of countries, as there is a positive correlation and a positive causal relationship. Grohmann, Klühs, and Menkhoff (2017) also confirmed the result again in a cross-national study considering the demand side. In a broad-based study of 61 countries, Geraldes, Gama, and Augusto (2022) concluded that financial inclusion does not necessarily occur if someone only has one account. Instead, the account must be used rationally, which is only possible with a certain level of financial knowledge. Financial literacy is therefore linked to financial inclusion. Also, three out of four setups show that the presence of financial literacy is a core condition to achieve a high level of financial inclusion. Consequently, all people should be financially literate to achieve a high level of financial inclusion.

However, financial literacy alone cannot achieve financial inclusion (Hasan, Le, & Hoque, 2021; Ozili, 2020). This is because pure knowledge does not remove barriers that restrict access to financial services and products. FinTech has a very important role to play here. Mobile banking, for example, is an alternative for people without access to banking services. This form is easily accessible and available everywhere in the country. At the same time, the use of FinTech products requires specific knowledge in this regard, which can only be achieved through financial education. Only then can the advantages of FinTech, such as lower costs, higher speed, high availability, and ubiquity, be properly applied. As a result, potential restrictions on access to finance can be reduced

(Pazarbasioglu et al., 2020). At the same time, the risks associated with the use of FinTech must also be controlled, as otherwise the benefits may be reversed (BIS, 2020). This is also made possible by better financial literacy. Thus, sound financial literacy is a prerequisite for greater adoption of FinTech and the safe use of digital financial products and services to improve financial access (Morgan, 2021; Hasan, Le, & Hoque, 2021; OECD, 2018c).

Several studies from different countries show a positive correlation between financial literacy and FinTech. For Vietnam, Nathan, Setiawan, and Quynh (2022) and Morgan and Trinh (2020) show that higher financial literacy is positively related to both awareness and acceptance of fintech products. The results for Japan are similar. A higher level of financial literacy has a positive influence on the use of mobile digital payment apps and the use of electronic money. Financial education also influences the intensity of the use of FinTech services, as there is also a positive correlation (Yoshino, Morgan, & Long, 2020). Corresponding results can also be found for Germany, Laos, and Indonesia (Setiawan et al., 2021; Morgan & Trinh, 2019; Jünger & Mietzner, 2019). Consequently, improving financial literacy can accelerate the acceptance of fintech products and services and thus promote financial inclusion.

Another positive effect of financial literacy is the improvement of well-being and a contribution to sustainable development (OECD, 2022, 2021, 2015; Atkinson & Messey, 2012). Well-being can be expressed in the fact that people who are financially educated are also more financially resilient. They are therefore better able to manage and finance their daily living costs and recover from potential shocks. This is synonymous with the twin factors of financial security and financial stability. This promotes social, sustainable economic, and political development and thus serves to operationalize the SDGs (Ansong, Okumu, & Koomson, 2023). In terms of sustainable development, measured by the achievement of the SDGs, Pandey, Kiran, and Sharma (2022) show an indirect and mediated impact of financial literacy on the factors of sustainable growth. Lontchi, Yang, and Su (2022) also show for Cameroon that financial literacy has a positive and significant impact on sustainable development by playing a mediating role.

4.3 FinTech

The relationship between FinTech and financial inclusion is described as positive by various authors (Ozili, 2022c, 2022d, 2018; Morgan, 2021, Arner et al., 2020; Beck, 2020). Technological development has made great strides in recent years, particularly in the area of electronic payments (BIS, 2020). The FinTech area of digital payments is therefore the most widespread instrument of financial inclusion (Ozili, 2022c; Sahay et al., 2020). At its simplest, cell phones are used to enable individuals and merchants to carry out transactions without physical cash. For example, 2/3 of all "unbanked persons" worldwide already own a cell phone (Demirgüç-Kunt et al., 2018). In conjunction with a (e.g., digital) account, the provision of financial services and the ability to use them can be facilitated or expanded. The digital financial services provided by FinTech also reach rural and poor areas more easily. This reduces, for example, the distance to access financial resources that would otherwise arise due to poor transportation networks or long waiting times in bank buildings (Ozili, 2022c, 2018; Demirgüç-Kunt et al., 2018). By also shifting routine cash payments to this area, governments and companies can reduce the number of people excluded. At the same time, this will reduce inefficiencies in cash payments as well as theft and corruption through the deliberate diversion of funds to the informal sector.

FinTech also contributes to reducing the gender gap and thus strengthens financial inclusion. (Ozili, 2022c; Chen et al., 2021; Sahay et al., 2020). Women in developing countries in particular face many obstacles when it comes to accessing financial services. These can include low literacy and numeracy skills, lack of documentation, different levels of risk aversion, family responsibilities, or social attitudes. FinTech solutions seem to be particularly well adapted to the restrictions, as they make interfaces consumer-friendly, reduce fears and barriers, and do not require physical presence (Sahay et al., 2020). Chen, Doerr, Frost, Gambarcota, and Shin (2021) also shows that the gender gap for new digital financial products that complement traditional financial services is 50% smaller than for products that replace them. This suggests that women may be more willing to use fintech products that are coupled with existing financial services.

FinTech solutions also offer the opportunity to reduce market frictions and information asymmetries and the resulting agency conflicts between lenders and borrowers (Feyen et al., 2021; Frost, 2020; Mhlanga, 2020; Beck, 2020; Amstad, 2019). A classic phenomenon of imperfect information in competitive credit markets is credit rationing. FinTech solutions improve access to credit for such groups, especially for those who lack collateral and credit history. Based on big data analytics and consumer data, FinTech companies are gathering information that could be used to improve risk assessment and reduce the need for collateral as an indicator of creditworthiness in lending (Feyen et al., 2021; Mhlanga, 2020). The last point is supported by Berg, Burg,

Gombović, and Puri (2018), who show that the digital footprint provides a better way to screen borrowers. Similarly, Bartlett, Morse, Stanton, and Wallace (2019) show that fintech algorithms discriminate up to 40% less than face-to-face lenders when granting loans. This type of technology can help close the credit gap for people who cannot get a loan due to their lack of credit history (Allen, Gu, & Jagtiani, 2020). Closely related to the reduction of information asymmetries through FinTech is the reduction of transaction costs, which also contributes to financial inclusion (Ozili, 2022c). Transaction costs can be reduced both ex-ante (e.g., initiation, information procurement, and agreement costs) and ex-post (e.g., settlement, adjustment, and control costs).

In addition to transaction costs, FinTech also reduces company-specific costs, such as fixed and marginal costs for the provision of financial services (Feyen et al., 2020, Beck, 2020; Barajas et al., 2020). These include, in particular, fixed costs such as the provision of a physical infrastructure with a branch, front and back office, etc. FinTech companies can also reduce marginal costs through technology-supported automation and "straight-through processes" resulting from the expanded use of data and AI-based processes. For example, Philippon (2019) shows that the use of robo-advisors reduces fixed costs, which improves the financial inclusion of less affluent households. The use of FinTech solutions and digital platforms reduces the costs and risks of customer acquisition (Feyen et al., 2021). Overall, cost reduction means that previously excluded customers with small and few transactions are now economically viable, in contrast to transactions via traditional banking channels (Beck, 2020).

Another way in which FinTech can drive financial inclusion is by individualizing the financial services offered (Ozili, 2022c). For example, traditional core banking systems and marketing channels are characterized by their focus on standardized products and do not offer a fully consumer-centric approach. Customized financial services that consider the individual circumstances of a borrower in different countries and regions of the world have so far required highly qualified and expensive experts (Feyen et al., 2021). In contrast, FinTech solutions reduce the set-up costs for customized financial services by leveraging their technologies. The increasing availability of data and computing power makes it possible to better assess risks to tailor individual financial services to the needs of the consumer (Feyen et al., 2021).

Under the premise that services, products, and applications offered by FinTech are easy to understand and that it is a convenient platform to carry out basic financial transactions, further inclusion effects arise. For example, users can help inform and convince like-minded people in the formal and informal sectors to use FinTech services (Ozili, 2018). As a result, this leads to a positive network effect and thus promotes financial inclusion.

Positive relationships can also be identified between FinTech and the SDGs. For example, Pauliukevičienė and Stankevičienė (2021) present a statistically positive correlation between FinTech and four of the 17 SDGs. At the same time, it can be concluded that a favorable political, economic, social, and technological FinTech environment results in better achievement of the SDGs. Farahani et al. (2021) argue that FinTech channels such as blockchain, mobile money accounts, and digital finance apps can achieve three of the 17 SDGs.

Furthermore, the contribution of FinTech to the Sustainable Development Goals can be direct or indirect (Arner et al., 2020). The full potential of FinTech to support the SDGs can be realized through a progressive approach to developing the underlying infrastructure and further supporting digital financial transformation. Specifically, this means that FinTech has three central roles in achieving the SDGs (Arner et al., 2020):

(i) FinTech aims to improve the allocation of existing financial resources to support sustainable development. This is done through business models, incentives, policies, and regulations to redirect financial resources globally and in individual countries to provide SDG-related finance.

(ii) Expansion of resources in the financial system in general, which in turn can support the SDGs. This is done through financial inclusion and financial sector development, which together increase the amount of financial resources available globally and in developing countries in particular.

(iii) Use FinTech to directly achieve the SDGs. This can be done by using new technologies and regulatory technologies to develop better financial and regulatory systems to achieve policy goals.

Ozili (2022c) comes to similar conclusions, explaining the increasing demand for digital technologies in financial services by, among other things, the need to ensure that the Sustainable Development Goals can only be achieved with the help of existing digital technologies. It is expected that the use of digital technologies in the financial sector can help to achieve some or all of the 17 SDGs. Better access to finance for poor people, small businesses, and large companies through FinTech is responsible for this. Digital financial services such as online loans or the instant purchase of securities enable poor people and small companies to use available credit and investment products. By increasing consumption and investment spending in this way, extreme poverty, extreme

hunger, and income inequality can be reduced (Ozili, 2023). At the same time, there is an opportunity to use credit to finance and purchase quality education and to support productive economic activities that lead to more economic growth.

The UN also sees promising opportunities such as fintech solutions that promote sustainability. These range from channeling personal savings into long-term investment instruments such as government bonds to the use of blockchain and tokenization to support the development of renewable energy (UN, 2018). In this light, the UN established a Task Force on Digital Finance in November 2018. Strategies are being developed here to promote financial technologies to advance the SDGs. The aim is to use the opportunity of digitalization to direct capital flows to important tasks related to the SDGs. From biodiversity to connecting rural economies to global market opportunities that have so far remained largely untouched by the fintech revolution (UN, 2018). The UN Capital Development Fund (2022) also sees digital finance (FinTech) as an opportunity to overcome certain challenges by providing better governance tools, financial education, and pay-as-you-go solutions for water and energy. This will help to achieve certain sustainable development goals, such as better health information, quality education, and more sustainable cities and communities. Specifically, FinTech supports the achievement of 12 of the 17 SDGs (UN Capital Development Fund, 2022).

The World Bank also sees digital financial services supported by FinTech's as having the potential to contribute to the SDGs (Pazarbasioglu et al., 2020). This is made possible by reducing costs by maximizing economies of scale, increasing the speed, security, and transparency of transactions, and offering tailor-made financial services. Digital payments have a major role to play in achieving the SDGs, as they have a positive impact on six of the 17 SDGs (Pazarbasioglu et al., 2020).

In addition, so-called Big FinTech players such as Amazon, Alibaba, Meta, Apple, etc. also have an impact on the SDGs. also have an impact on the SDGs. These are the result of a combination of complex business models, the use of innovative digital technologies, and diversification into financial services. Big FinTech players are influencing sustainable development through increasing financialization. This refers to processes of social change that, due to the increasing importance of credit and capital markets, also extend to spheres beyond the financial system, which in turn have an impact on the SDGs (Foster et al., 2021). Overall, three levels of influence of Big FinTech players on the SDGs can be identified Foster et al., 2021):

(i) through direct service offerings

(ii) through integrated services, operations, infrastructure, and processes

(iii) through the business model and the value chain (vertical and horizontal integration) including cumulative and systemic effects

4.4 Financial Inclusion

Financial inclusion is not explicitly mentioned in the UN's SDGs, but global access to financial services and products nevertheless plays a central role in achieving and supporting the financing of the SDGs (Arner et al., 2020, Sahay et al., 2020; Klapper, El-Zoghbi, & Hess, 2016). One way in which financial inclusion can contribute to sustainable development is by ensuring access to and the provision of basic financial services based on sustainability principles. These can include lower transaction costs, continuous access to formal finance in good times and bad, accessible savings opportunities at all times, no minimum amount of savings required, and lending to creditworthy individuals so that the lender can use the repaid loan to lend to other economic agents (Ozili, 2022b). In this way, financial inclusion can indirectly contribute to improving the level of social inclusion in many societies, reducing poverty levels to a desired minimum, and generating further socio-economic improvements (Oizli, 2020).

Alper, Haoyong, and Yifan (2021) show that financial inclusion in general and access to credit in particular play a key role in achieving the United Nations SDGs. This is achieved by stretching the cost of consumption, spreading the cost of investment over time, enabling control over one's household finances, and incentivizing investment, innovation, and entrepreneurial activities through easier access to credit. As a result, poverty and hunger can be reduced, good health and well-being achieved, education promoted, gender inequality reduced, clean water and energy provided, full employment and innovation encouraged. Consequently, Alper, Haoyong, and Yifan (2021) argue that a direct link can be established between access to formal finance and the achievement of the first nine SDGs, provided that all parts of society, especially the poor and vulnerable, have access to credit.

Arner et al. (2020) also argue that financial inclusion is the basis for success in all SDGs and should therefore be considered a central goal in the search for balanced sustainable development. Financial inclusion and the

associated facilitation of savings reduce the vulnerability of individuals to shocks. At the same time, regular saving enables investment in education, health, and business. The efficiency of daily life is also increased when bills are paid electronically without having to interrupt work. In addition, financial inclusion enables the socialization and diversification of people's financial risks through the financial system. Increasing financial resources to support economic activity also promotes economic growth. The specific impact of financial inclusion on all 17 SDGs varies. For example, 11 SDGs are indirectly influenced, and six SDGs are directly influenced. Consequently, for Arner et al. (2020), financial inclusion and sustainability are two sides of the same coin, which is aligned with the 2030 Agenda and the SDGs.

In addition, the Global Partnership for Financial Inclusion (GPFI) is committed to advancing financial inclusion worldwide with its G20 2020 Financial Inclusion Action Plan (GPFI, 2020). This is to be achieved by improving the quality of access to and use of sustainable financial services and thus expanding opportunities for marginalized households and companies. At the same time, financial inclusion should ensure financial resilience and limit the fragility of households to create sustainable and inclusive growth. This is seen as an important prerequisite for the realization of the 2030 Agenda for Sustainable Development, including the implementation of the SDGs. According to the GPFI and the World Bank, seven of the 17 SDGs will be achieved in this indirect way (World Bank, 2022; GPFI, 2020).

4.5 Conceptual Framework

Based on the arguments presented above and with the help of the argumentative deductive methodological approach, the following interrelated conclusions can be drawn. There are diverse theoretical and empirical relationships between all four objects of investigation, which can only be considered together and have positive effects on each other. A silo mentality or a bilateral approach falls short of a comprehensive understanding of the effects, so a broad holistic framework is necessary. Initial approaches to summarizing individual objects of investigation in one framework can be found in Ozili (2022b), Hasan, Le, and Hoque (2021), and Chowa, Ansong, and Despard (2014). However, not all four phenomena examined here are integrated, but only individual parts of them.

The starting point of a holistic framework is financial literacy with its three dimensions (i) Knowledge, (ii) Behavior, and (iii) Attitudes. The reason for this is that the argumentative deductive analysis has shown that without financial literacy, no positive relationship between financial inclusion, FinTech, and the SDGs or well-being can be achieved. Financial literacy therefore promotes the use and application of FinTech, contributes to financial inclusion, and supports the achievement of the SDGs. Furthermore, the argumentation leads to the conclusion that FinTech and financial inclusion have a positive impact on the achievement of the SDGs, both individually and together. At the same time, there is also a direct positive relationship between the two subjects of the study, in that FinTech promotes financial inclusion. Bringing these relationships together in a holistic framework result in the following Figure 8, which is based on the functional perspective for better applicability and due to the breadth of the term FinTech. This means that, according to Korynski (2019), FinTech is integrated into the framework via its functions of digital financing, investment, money, payment, insurance, and advice.

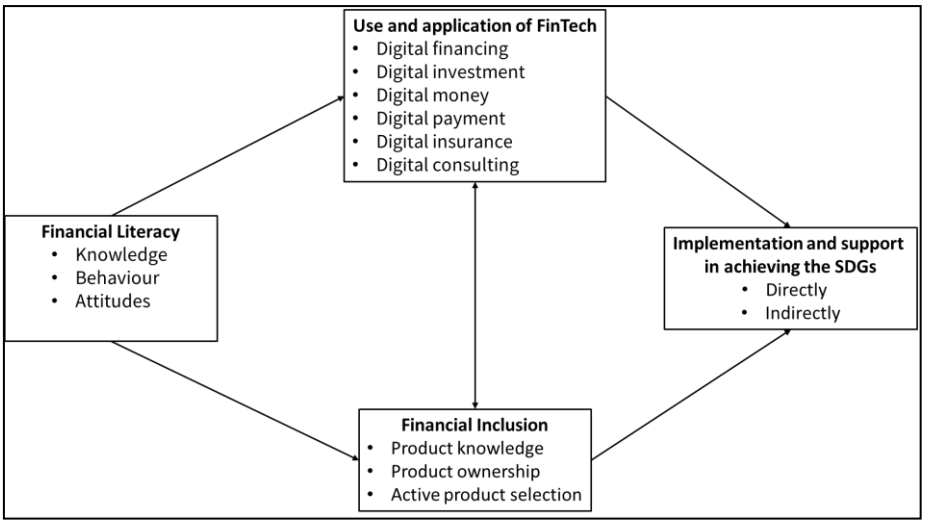

Figure 8. Holistic framework of financial literacy, FinTech, financial inclusion, and SDGs

Source: own presentation.

This framework can also be used to derive policy recommendations. Political decision-makers should take a holistic view of all four points and start promoting and expanding financial education. Individual countries in the EU, such as Austria or Ireland, have already begun to do this and have designed or implemented national strategies for financial education. Within a strategy concept, there should be a focus on the better use and availability of FinTech functions, as these are the instruments to drive financial inclusion. This in turn directly or indirectly promotes the achievement of the SDGs. At the same time, the connection between FinTech and the SDGs must also be anchored, as the sustainability goals cannot be achieved without sustainable and fundamental financing. A strategy designed in this way is then a possible addition to national strategies for sustainability or for achieving the 2030 Agenda by identifying ways and instruments of financing.

Another advantage of the holistic framework is that it can be used to develop model-theoretical relationships. For example, the relationship presented could be modeled using different functions, e.g., by using a human capital function for financial literacy, a utility function for FinTech, an indicator function for financial inclusion, and a welfare function for the SDGs. By combining these individual functions into a common strategy function and maximizing it, policy makers can optimize the welfare of society as measured by the achievement of the SDGs. A simple illustration could look like this:

$$W(I,F,E) = x * I + y * F + z * E \ \text{-> } max!$$

where:

W: Welfare function

I: Financial inclusion function

F: Use of FinTech function

E: Financial literacy function

x: Weighting of financial inclusion

y: Weighting the use of FinTech

z: Weighting of financial literacy

The function expresses the fact that the welfare of a society is dependent on financial inclusion, the use of fintech, and financial education. Higher financial inclusion and higher use of fintech increase the benefit, while higher financial literacy has an indirect effect in that it can positively influence both financial inclusion and the use of fintech. The weightings *x, y*, and *z* indicate how strongly the individual factors are included in the utility function. Reasons for the different weighting may be that:

(i) Fintech components such as online banking, digital wallets and robo-advisors may have a greater weighting in a welfare function as they play a greater role in urban, technology-enabled economies, while financial inclusion and education may have more weight in rural or underdeveloped regions.

(ii) Fintech may have a greater weighting as its reach and influence can be extended through technological connectivity and scalability. At the same time, financial education may also have a greater weighting, as it forms the basis for the responsible use of FinTech services.

(iii) Financial inclusion and education can have a direct impact on the financial stability of a population as they improve the understanding and utilization of financial services. Therefore, they could have a higher weighting in a welfare function.

(iv) Financial inclusion can have a greater weighting as it is directly linked to reducing poverty and inequality by facilitating access to financial services for all population groups.

(v) The weighting of factors may vary by country. In low-income countries, for example, financial education could be prioritized more, while in developed countries fintech could play a greater role.

An optimal weighting ratio ultimately depends on the specific goals and priorities of a particular welfare function. At the same time, it is important to consider that a society can work towards achieving the SDGs but not optimize its well-being because, for example, its economy has a competitive advantage based on resources/technologies from an “old economy”.

5. Conclusion

So far, financial literacy, financial inclusion, FinTech, and the UN Sustainable Development Goals (SDGs) have only been examined in pairs or individually. There has therefore been no consideration of all four points with their relationships and effects on each other. With the help of the deductive argumentative approach, an attempt

was made to take a coherent look at all four points. The aim was to develop a holistic framework for achieving the SDGs with the help of financial literacy, financial inclusion, and FinTech.

Financial literacy is a combination of knowledge, behavior, and attitudes to make individual financial decisions. Better financial literacy thus promotes the development of healthy, open, and competitive financial markets. This supports financial stability and leads to a strengthening of financial consumer protection. Financial inclusion is a term that has emerged from various forms of combating global financial poverty. Financial inclusion is the access of individuals and companies to useful and affordable financial products and services that meet their needs and are offered responsibly and sustainably. Financial inclusion is operationalized through the indicators of product knowledge, product ownership, active product choice, trust, and reliance on family/friends. The term FinTech is made up of the words "financial" and "technology" and means the integration of technology into the offerings of financial services companies to improve their use and provision for consumers. Many different perspectives have a technology-oriented focus or a functional-oriented focus or a combination of both. FinTech is also characterized by a high degree of ubiquity and diffusion, e.g., in other sectors such as insurance, real estate, and wealth management. The Sustainable Development Goals were adopted by the United Nations (UN) General Assembly in 2015 as part of the "2030 Agenda for Sustainable Development". At the heart of this are the 17 SDGs. Both can be understood as a "roadmap" for people and the planet to ensure sustainable social and economic progress worldwide. Its aim is not only to eradicate extreme poverty but also to integrate the three dimensions of sustainable development (economic, social, and environmental) in a balanced way into a comprehensive global vision.

There are complex theoretical and empirical relationships between all four objects of investigation, which have positive effects on each other and can be considered together. Previous silo thinking or a bilateral approach falls short of a comprehensive understanding of the effects. The starting point for a holistic view is financial literacy because, without this, no positive relationship between financial inclusion, FinTech, and the SDGs or well-being can be achieved. Financial literacy therefore promotes the use and application of fintech, contributes to financial inclusion, and supports the achievement of the SDGs. Furthermore, fintech and financial inclusion have a positive influence on the achievement of the SDGs, both individually and together. At the same time, there is also a positive relationship between the two subjects of the study in that fintech promotes financial inclusion.

This holistic framework can also be used to derive policy recommendations. Decision-makers should take a holistic view of all four points and start promoting and expanding financial education. Individual countries in the EU, such as Austria or Ireland, have already begun to do this and have designed or implemented national strategies for financial education to achieve sustainable goals or the SDGs.

References

Allen, F., Gu, X., & Jagtiani, J. (2020). A survey of fintech research and policy discussion. FRB of Philadelphia *Working Paper No. 20-21*. https://doi.org/10.21799/frbp.wp.2020.21

Alper, K., Haoyong, Z., & Yifan, Z. (2021). Achieving the United Nations' sustainable development goals through financial inclusion: A systematic literature review of access to finance across the globe. *International Review of Financial Analysis, 77*, 101833. https://doi.org/10.1016/ j.irfa.2021.101833

Amstad, M. (2019). Regulating Fintech: Objectives, Principles, and Practices. *ADBI Working Paper 1016*. https://doi.org/10.2139/ssrn.3541003

Ansong, D., Okumu, M., & Koomson, I. (2023). Financial Capability in Africa: Innovation Through Evidence, Practice, and Policy. *Global Social Welfare, 10*, 1-7. https://doi.org/10.1007/s40609-022-00256-5

Arner, D. W., Barberis, J. N. & Buckley, R. P. (2015). The evolution of fintech: A new post-crisis paradigm? *University of Hong Kong Faculty of Law Research Paper, No. 2015/047*, UNSW Law Research Paper, No. 2016-62. https://doi.org/10.2139/ssrn.2676553

Arner, D. W., Buckley, R. P., Zetzsche, D. A., & Veidt, R. (2020). Sustainability, FinTech and Financial Inclusion. *European Business Organization Law Review, 21*, 7-35. https://doi.org/10.1007/s40804-020-00183-y

Atkinson, A., & Messy, F. (2013). Promoting Financial Inclusion through Financial Education: OECD/INFE Evidence, Policies and Practice. *OECD Working Papers on Finance, Insurance and Private Pensions, No. 34*. Paris: OECD Publishing. https://doi.org/10.1787/5k3xz6m88smp-en

Atkinson, A., & Messy. F. A. (2012). Measuring financial literacy: Results of the OECD/International Network on Financial Education (INFE) pilot study. *OECD Working Papers on Finance, Insurance and Private Pensions 15*. https://doi.org/10.1787/20797117

Barajas, A., Beck, T., Belhaj, M. & Naceu, S. B. (2020). Financial inclusion: What have we learned so far? What do we have to learn? *IMF Working Papers, No. 2020/157*. https://doi.org/10.5089/9781513553009.001

Bartlett, R., Morse, A., Stanton, R., & Wallace, N. (2019). Consumer-lending discrimination in the era of fintech. *NBER Working Paper No. 25943*, National Bureau of Economic Research. https://doi.org/10.3386/w25943

Beck, T. (2020). Fintech and Financial Inclusion: Opportunities and Pitfalls. *ADBI Working Paper 1165*. Retrieved from https://www.adb.org/sites/default/files/publication/623276/adbi-wp1165.pdf

Berg, T., Burg, V., Gombović, A., & Puri, M. (2018). On the rise of fintechs - credit scoring using digital footprints. *FDIC CFR Working Paper Series 2018-04*, Federal Deposit Insurance Corporation. https://doi.org/10.3386/w24551

Bire, A. R., Sauw, H. M., & Maria (2019). The effect of financial literacy towards financial inclusion through financial training. *International Journal of Social Sciences and Humanities, 3*(1), 186-192. https://doi.org/10.29332/ijssh.v3n1.280

BIS. (2020). Payment aspects of financial inclusion in the fintech era. *CPMI Papers No 191*. Retrieved from https://www.bis.org/cpmi/publ/d191.pdf

Chemmanur, T. J., Imerman, M. B., Rajaiya, H., & Yu, Q. (2020). Recent developments in the FinTech industry. *Journal of Financial Management, Markets and Institutions, 8*(1), 2040002-1–2040002-31. https://doi.org/10.1142/S2282717X20400022

Chen, S., Doerr, S., Frost, J., Gambarcota, L., & Shin, H. S. (2021). The fintech gender gap. *BIS Working Papers, No. 931*.

Chowa, G., Ansong, D., & Despard, M. (2014). Financial Capabilities: Multilevel Modeling of the Impact of Internal and External Capabilities of Rural Households. *Social Work Research, 38*(1), 19-35. https://doi.org/10.1093/swr/svu002

Cude, B. J. (2021). Defining financial literacy. In G. Nicolini, & B. J. Cude (Eds.), *The Routledge Handbook of Financial Literacy* (pp. 5-17). Routledge. https://doi.org/10.4324/9781003025221-3

Davies, P. (2015). Towards a framework for financial literacy in the context of democracy. *Journal of Curriculum Studies, 47*(2), 300-316. https://doi.org/10.1080/00220272.2014.934717

Demirgüç-Kunt, A., Klapper, L., Singer, D., Saniya, A., & Hess, J. (2018). *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. Washington, DC, World Bank. https://doi.org/10.1596/978-1-4648-1259-0

Destatis (n.d.). *Monitoring of the 2030 Agenda by the Federal Statistical Office.* Retrieved from https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Nachhaltigkeitsindikatoren/Internationale-Nachhaltigkeit/entstehung-entwicklung.html?__blob=publicationFile

Durach, C. F., Kembro, J., & Wieland, A. (2017). A New Paradigm for Systematic Literature Reviews in Supply Chain Management. *Journal of Supply Chain Management, 53*(4), 67-85. https://doi.org/10.1111/jscm.12145

Elsinger, H., Fessler P., Feyrer, J., Richter, K., Silgoner, M., & Timel, A. (2018). Digitalization in financial services and household finance: fintech, financial literacy and financial stability. *Oestereichische Nationalbank Financial Stability Report, 35*, 50-58.

European Central Bank. (2020). *ESCB/European banking supervision response to the European Commission's public consultation on a new digital finance strategy for Europe/FinTech action plan*. Retrieved from https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.esbceuropeanbankingsupervisionresponsetoeuropeancommissionpublicconsultationdigitalfinancestrategyeuropefintechactionplan2020~b2e6cd0dc4.en.pdf

European Commission, (2021). *Report on the results of the feasibility assessment for the development of a financial competence framework in the EU.* Retrieved from https://commission.europa.eu/system/files/2021-04/210408-report-financial-competence-framework_en.pdf

Fanta, A., & Mutsonziwa, K. (2021). Financial Literacy as a Driver of Financial Inclusion in Kenya and Tanzania. *Journal of Risk and Financial Management, 14*(11), 561. https://doi.org/10.3390/jrfm14110561

Farahani, M., Esfahani, A., Moghaddam, M., & Ramezani, A. (2022). The Impact of Fintech and Artificial Intelligence on COVID 19 and Sustainable Development Goals. *International Journal of Innovation in Management, Economics and Social Sciences, 2*(3), 14-31. https://doi.org/10.52547/ijimes.2.3.14

Feyen, E., Frost, J., Gambacorta, L., Natarajan, H., & Saal, M. (2021). Fintech and the digital transformation of financial services: implications for market structure and public policy. *BIS Working Papers, No. 117*. Retrieved from https://www.bis.org/publ/bppdf/bispap117.pdf

Foster, K. et al. (2021). BigFintechs and Their Impacts on Sustainable Development. *The Dialogue on Global Finance Digital Finance Governance Project*. https://doi.org/10.2139/ssrn.3871385

Frost, J. (2020). The economic forces driving fintech adoption across countries. *BIS Working Papers No. 838*, Bank for International Settlements. https://doi.org/10.2139/ssrn.3515326

G20 Financial Inclusion Experts Group. (2010). *Innovative Financial Inclusion Principles and Report on Innovative Financial Inclusion from the Access through Innovation Sub-Group of the G20 Financial Inclusion Experts Group 25 May, 2010*. Retrieved from https://www.gpfi.org/sites/gpfi/files/documents/Principles%20and%20Report%20on%20Innovative%20Financial%20Inclusion_0.pdf

Geraldes, H. S. A., Gama, A. P. M., & Augusto, M. (2022). Reaching Financial Inclusion: Necessary and Sufficient Conditions. *Social Indicators Research, 162*, 599-617. https://doi.org/10.1007/s11205-021-02850-0

GPFI. (2016). *G20 High-Level Principles for Digital Financial Inclusion*. Retrieved from https://www.gpfi.org/sites/gpfi/files/G20%20High%20Level%20Principles%20for%20Digital%20Financial%20Inclusion.pdf

GPFI. (2020). *G20 2020 Financial Inclusion Action Plan*. Retrieved from https://www.gpfi.org/sites/gpfi/files/sites/default/files/G20%202020%20Financial%20Inclusion%20Action%20Plan.pdf

Grohmann, A. & Menkhoff, L. (2017). Financial education promotes financial inclusion in poor and rich countries. *DIW Weekly Report - German Institute for Economic Research (DIW), 84*(41), 905-913. Retrieved from https://www.diw.de/documents/publikationen/73/diw_01.c.566647.de/17-41-3.pdf

Grohmann, A. & Menkhoff, L. (2020). The Relationship between Financial Literacy and Financial Inclusion. *DIW Discussion Papers No. 1914.* https://doi.org/10.2139/ssrn.3735809

Grohmann, A., Klühs, T., & Menkhoff, L. (2017). Does Financial Literacy Improve Financial Inclusion? Cross Country Evidence. *DIW Berlin Discussion Paper No. 1682*. https://doi.org/10.2139/ssrn.3034178

Hasan, M., Le, T., & Hoque, A. (2021). How does financial literacy impact on inclusive finance? *Financial Innovation, 7*, 40. https://doi.org/10.1186/s40854-021-00259-9

Haupt, M. (2021). Measuring Financial Literacy, The role of knowledge, skills, and attitudes. In G. Nicolini, & B. J. Cude (Eds.), *The Routledge Handbook of Financial Literacy* (pp. 79-95). Routledge. https://doi.org/10.4324/9781003025221-9

Hikida R. & Perry J. (2019). FinTech Trends in the United States: Implications for Household Finance. *Public Policy Review, 16*(4), 1-32. Retrieved from https://www.mof.go.jp/english/pri/publication/pp_review/ppr16_04_03.pdf

Hinson, R., Lensink, R., & Mueller, A. (2019). Transforming agribusiness in developing countries: SDGs and the role of FinTech. *Current Opinion in Environmental Sustainability, 41*, 1-9. https://doi.org/10.1016/j.cosust.2019.07.002

Hochstein, M. (2015). *Fintech (the Word, That Is) Evolves.* American Banker (Oct. 5, 2015). Retrieved from http://www.americanbanker.com/bankthink/fintech-the-word-that-is-evolves-1077098-1.html

Jünger, M., & Mietzner, M. (2019). *Banking Goes Digital: The Adoption of FinTech Services by German Households*. https://doi.org/10.1016/j.frl.2019.08.008

Keating, D. P., Demidenko, M. I., & Kelly, D. (2019). Cognitive and Neurocognitive Development in Adolescence. *Reference Module in Neuroscience and Biobehavioral Psychology.* Elsevier. https://doi.org/10.1016/B978-0-12-809324-5.23636-5

Kerényi, Á., & Molnár, J. (2017). The Impact of the Fintech Phenomenon - Radical Change Occurs in the Financial Sector? *Financial and Economic Review, 16*(3), 32-50. https://doi.org/10.25201/FER.16.3.3250

Klapper, L., El-Zoghbi, M., & Hess, J. (2016). *Achieving the Sustainable Development Goals The Role of Financial Inclusion.* Retrieved from

https://www.cgap.org/sites/default/files/researches/documents/Working-Paper-Achieving-Sustainable-Development-Goals-Apr-2016_0.pdf

Korynski, P. (2019). *The Contribution of the Fintech Sector to Financial Inclusion and Health: A Review of Opportunities and Challenges.* Microfinance Center. Retrieved from https://mfc.org.pl/wp-content/uploads/2020/03/SUMMARY-PAPER_FINTECH-CASE-STUDY_FEB2020.pdf

Kumari, D. A. T., & Ferdous A. S. M. (2019). The Mediating Effect Of Financial Inclusion On Financial Literacy And Women's Economic Empowerment: A Study Among Rural Poor Women In Sri Lanka. *International Journal of Scientific & Technology Research, 8*(12), 719-729.

Lontchi, C. B., Yang, B., & Su, Y. (2022). The Mediating Effect of Financial Literacy and the Moderating Role of Social Capital in the Relationship between Financial Inclusion and Sustainable Development in Cameroon. *Sustainability, 14*(22), 15093. https://doi.org/10.3390/su142215093

Lusardi, A. (2019). Financial literacy and the need for financial education: evidence and implications. *Swiss Journal of Economics and Statistics, 155*, 1. https://doi.org/10.1186/s41937-019-0027-5

Lusardi, A., & Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. Journal of Economic Literature, 52(1), 5-44. https://doi.org/10.1257/jel.52.1.5

Martens, J., & Obenland, W. (2017). *The 2030 Agenda Global Sustainable Development Goals.* Global Policy Forum. Retrieved from https://archive.globalpolicy.org/images/pdfs/GPFEurope/Agenda_2030_ online.pdf

Mhlanga, D. (2020). Industry 4.0 in Finance: The Impact of Artificial Intelligence (AI) on Digital Financial Inclusion. *International Journal of Financial Studies, 8*(3), 1-14. https://doi.org/10.3390/ijfs8030045

Mirchandani, A., Gupta, N., & Ndiweni, E. (2020). Understanding the Fintech Wave: A Search for a Theoretical Explanation. *International Journal of Economics and Financial Issues, 10*(5), 331-343. https://doi.org/10.32479/ijefi.10296

Moenjak, T., Kongprajya, A., & Monchaitrakul, C. (2020). FinTech, Financial Literacy, and Consumer Saving and Borrowing: The Case of Thailand. *ADBI Working Paper 1100*. Retrieved from https://www.adb.org/publications/fintechfinancial-literacy-consumer-saving-borrowing-thailand

Morgan, P. J. (2021). Fintech, financial literacy, and financial education. In G. Nicolini, & B. J. Cude (Eds.), *The Routledge Handbook of Financial Literacy* (pp. 239-258). Routledge. https://doi.org/10.4324/9781003025221-21

Morgan, P. J., & Trinh, L. Q. (2019). Fintech and Financial Literacy in the Lao PDR. *ADBI Working Paper 933,* Asian Development Bank Institute. https://doi.org/10.2139/ssrn.3398235

Morgan, P. J., & Trinh, L. Q. (2020). Fintech and Financial Literacy in Viet Nam. *ADBI Working Paper 1154,* Asian Development Bank Institute. Retrieved from https://www.adb.org/sites/default/files/publication/616781/adbi-wp1154.pdf

Nathan, R. J., Setiawan, B., & Quynh, M. N. (2022). Fintech and Financial Health in Vietnam during the COVID-19 Pandemic: In-Depth Descriptive Analysis. *Journal of Risk and Financial Management, 15*(3), 125. https://doi.org/10.3390/jrfm15030125

Nathmann, M. (2019). *FinTech: Challenges in the regulation of digital business models based on designs from the securities sector*. Nomos.

Nightingale, A. (2009). A guide to systematic literature reviews. *Surgery (Oxford), 27*(9), 381-384. https://doi.org/10.1016/j.mpsur.2009.07.005

OECD. (2005). *Improving Financial Literacy: Analysis of Issues and Policies.* https://doi.org/10.1787/9789264012578-en

OECD. (2013). *Financial literacy and inclusion: Results of OECD/INFE survey across countries and by gender.* Retrieved from https://www.oecd.org/daf/fin/financial-education/TrustFund2013_OECD_INFE_Fin_Lit_and_Incl_Survey Results_by_Country_and_Gender.pdf

OECD. (2015). *National Strategies for Financial Education: OECD/INFE Policy Handbook*. Retrieved from https://www.oecd.org/daf/fin/financial-education/National-Strategies-Financial-Education-Policy-Handbook.pdf

OECD. (2016). *OECD/INFE International Survey of Adult Financial Literacy Competencies.* Retrieved from https://www.oecd.org/finance/OECD-INFE-International-Survey-of-Adult-Financial-Literacy-Competencies.pdf

OECD. (2018a). *Financial inclusion and consumer empowerment in Southeast Asia*. Retrieved from https://www.oecd.org/finance/Financial-inclusion-and-consumer-empowerment-in-Southeast-Asia.pdf

OECD. (2018b). *Financial Markets, Insurance and Private Pensions: Digitalization and Finance*. Retrieved from https://www.oecd.org/finance/private-pensions/Financial-markets-insurance-pensions-digitalisation-and-finance.pdf

OECD. (2018c). *G20/OECD INFE Policy Guidance on Digitalization and Financial Literacy.* Retrieved from https://www.oecd.org/finance/G20-OECD-INFE-Policy-Guidance-Digitalisation-Financial-Literacy-2018.pdf

OECD. (2020a). *OECD/INFE 2020 International Survey of Adult Financial Literacy.* Retrieved from https://www.oecd.org/financial/education/oecd-infe-2020-international-survey-of-adult-financial-literacy.pdf

OECD. (2020b). *Recommendation of the Council on Financial Literacy.* OECD/LEGAL/0461. Retrieved from https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0461

OECD. (2021). *A national financial literacy strategy for Austria.* Retrieved from https://www.oecd.org/daf/fin/financial-education/A-national-financial-literacy-strategy-for-austria.pdf

OECD. (2022). *OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion 2022*. Retrieved from https://www.oecd.org/financial/education/2022-INFE-Toolkit-Measuring-Finlit-Financial-Inclusion.pdf

Ozili, K. P. (2021). Financial inclusion: globally important determinants. *Financial Internet Quarterly, 17*(4), 1-11. https://doi.org/10.2478/fiqf-2021-0023

Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review, 18*(4), 329-340. https://doi.org/10.1016/j.bir.2017.12.003

Ozili, P. K. (2020). Financial inclusion research around the world: A review. *MPRA Paper 101809*, University Library of Munich. https://doi.org/10.2139/ssrn.3515515

Ozili, P. K. (2022a). Financial inclusion and sustainable development: An empirical association. *Journal of Money and Business*. https://doi.org/10.1108/JMB-03-2022-0019

Ozili, P. K. (2022b). Financial Inclusion, Sustainability and Sustainable Development. *CSEF, 110*. https://doi.org/10.2139/ssrn.4185735

Ozili, P. K. (2022c). The future of financial inclusion. *MPRA Paper No. 115770*, University Library of Munich. Retrieved from https://mpra.ub.uni-muenchen.de/115770

Ozili, P. K. (2022d). Digital financial inclusion. *MPRA Paper No. 113789*, University Library of Munich. Retrieved from https://mpra.ub.uni-muenchen.de/113789/

Pandey, A., Kiran, R., & Sharma, R. K. (2022). Investigating the Impact of Financial Inclusion Drivers, Financial Literacy and Financial Initiatives in Fostering Sustainable Growth in North India. *Sustainability, 14*(17), 11061. https://doi.org/10.3390/su141711061

Pauliukevičienė, G., & Stankevičienė, J. (2021). Assessing statistical link between FinTech PEST environment and achievement of SDGs. *Public and Municipal Finance, 10*(1), 47-66. https://doi.org/10.21511/pmf.10(1).2021.05

Pazarbasioglu, C. et al. (2020). *Digital Financial Services.* Retrieved from https://pubdocs.worldbank.org/en/230281588169110691/Digital-Financial-Services.pdf

Philippon, T. (2019). On Fintech and Financial Inclusion. *NBER Working Paper No. 26330*. https://doi.org/10.3386/w26330

Ratecka, P. (2020). FinTech - definition, taxonomy and historical approach. *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie / The Malopolska School of Economics in Tarnow Research Papers Collection, 45*(1), 53-67. https://doi.org/10.25944/znmwse. 2020.01.5367

Rupeika-Apoga, R., & Thalassinos, E. (2020). Ideas for a Regulatory Definition of FinTech. *International Journal of Economics & Business Administration, VIII*(2), 136-154. https://doi.org/10.35808/ijeba/448

Sachs, J. D. et al. (2022). From Crisis to Sustainable Development: The SDGs as Roadmap to 2030 and Beyond.

Sustainable Development Report 2022. Cambridge University Press. https://doi.org/10.1017/9781009210058

Sahay, R. et al. (2020). The Promise of Fintech: Financial Inclusion in the Post COVID-19 Era. *Departmental Paper No. 20/09, International Monetary Fund*. Retrieved from https://www.imf.org/-/media/Files/Publications/DP/ 2020/English/PFFIEA.ashx

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Understanding research philosophies and approaches. Research Methods for Business Students* (8th ed.). Pearson Education.

Schindler, J. (2017). FinTech and Financial Innovation: Drivers and Depth. *Board of Governors of the Federal Reserve System (U.S.) Finance and Economics Discussion Series 2017-081*. https://doi.org/10.17016/FEDS.2017.081

Setiawan, B. et al. (2021). User Innovativeness and Fintech Adoption in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity, 7*(3), 188. https://doi.org/10.3390/joitmc7030188

Štrukelj, E. (2018). Writing a Systematic Literature Review. *JEPS Bulletin.* Retrieved from https://blog.efpsa.org/2018 /01/03/writing-a-systematic-literature-review

Sujlana, P., & Kiran, C. (2018). A Study on Status of Financial Inclusion in India. *International Journal of Management Studies, 5*(2(3)), 96-103. https://doi.org/10.18843/ijms/v5i2(3)/12

Thakor, A. V. (2019). Fintech and banking: What do we know? *Journal of Financial Intermediation, 41*(C), 100833-100858. https://doi.org/10.1016/j.jfi.2019.100833

The World Bank. (2022). *Financial Inclusion - Financial inclusion is a key enabler to reducing poverty and boosting prosperity*. Retrieved from https://www.worldbank.org/en/topic/financialinclusion/overview

Treu, J. (2021). Fintech Phenomenon: Perspectives, Reasons for Existence, Opportunities and Risk, and Ideas for Future Research. *IUBH Discussion Papers -Business & Management, No. 5/2021*, IU International University. Retrieved from https://www.econstor.eu/bitstream/10419/235487/1/176117 4606.pdf

Treu, J. (2022a). The Fintech Sensation - What is it about? *Journal of International Business and Management, 5*(1), 1-19. https://doi.org/10.37227/JIBM-2021-11-2094

Treu, J. (2022b). FinTech, General Purpose Technology and Welfare. *IU Discussion Papers - Business & Management, No. 5* (June 2022), IU International University. Retrieved from https://www.econstor.eu/bitstream/ 10419/261353/1/1807742083.pdf

Treu, J. (2023a). Economic aspects of financial inclusion through FinTech. In J. Mali et al. (Eds.), *The Breakthrough of the Social* (pp. 243-261). Tirant lo blanch.

Treu, J. (2023b). Financial inclusion and fintech - A solution approach from an economic perspective. In K. Sen et al. (Eds.), *Social Work and Social Transformation between Exclusion and Inclusion* (pp. 107-136). Springer VS.

Treu, J., Ells V., Buono, G., & Winkler, P. (2021). The rising of Fintech - How the tech revolution in financial services represents a paradigm shift. *Journal of International Business and Management, 4*(5), 1-8. https://doi.org/ 10.37227/JIBM-2021-03-718

TU Berlin. (2019). *Systematic Literature Review.* Retrieved from https://www.dbwm.tu-berlin.de/menue/ fuer_for_forschende_lehrende/methode_systematic_literature_review/

Turvey, B. E. (2012). *Criminal Profiling An Introduction to Behavioral Evidence Analysis: The Imperatives of Scientific Methodology and a Behavioral Science Education* (4th ed.). Academic Press.

UN (n.d.). *The Sustainable Development Agenda*. Retrieved from https://www.un.org/sustainabledevelopment/development-agenda/

UN Capital Development Fund. (2019). *UNCDF Global Strategy Leaving No One Behind in the Digital Era.* Retrieved from https://www.uncdf.org/Download/AdminFileWithFilename?id=18269&cultureId=127&filename=12-13-2022ide-strategy-2022pdf

UN Capital Development Fund. (2022). *Digital Finance and the SDGs.* Retrieved from https://www.uncdf.org/mm4p/ dfs-and-the-sdgs

UN Secretary General's Task Force on Digital Financing of the Sustainable Development Goals. (2020). *People's Money: Harnessing Digitalization to Finance a Sustainable Future*. Summary Report. Retrieved

from https://www.un.org/sites/un2.un.org/files/2020/08/df_task_force_summary_ report_-_aug_ 2020.pdf

UN. (2015a). *Transforming our world: the 2030 Agenda for Sustainable Development.* Retrieved from https://sdgs.un.org/publications/transforming-our-world-2030-agendasustainable-development-17981.

UN. (2015b). *Addis Ababa Action Agenda of the Third International Conference on Financing for Development* (Addis Ababa Action Agenda). Retrieved from https://sustainabledevelopment.un.org/content/documents/2051AAAA_Outcome.pdf

UN. (2018). *Task Force on Digital Financing of Sustainable Development Goals*. Retrieved from https://www.un.org/sg/en/content/sg/personnel-appointments/2018-11-29/task-force-digital-financing-sustainable-development/

UN. (2022). *Sustainable Development Goals Progress Chart 2022.* Retrieved from https://unstats.un.org/sdgs/report/2022/Progress-Chart-2022.pdf

UN. (2023). *SDG Logo and Guidelines*. Retrieved from https://www.undp.org/myanmar/sdg-logo-and-guidelines

Venet, B. (2019). *Fintech and Financial Inclusion. A research Agenda for Financial Inclusion and Microfinance.* https://doi.org/10.4337/9781788114226.00024

VentureScanner (2021). *Venture Scanner Sector Maps.* Retrieved from https://www.venturescanner.com/2021/08/06/ q3-2021-venture-scanner-sector-maps/

Vergara, C. C., & Agudo, L. F. (2021). Fintech and Sustainability: Do They Affect Each Other? *Sustainability, 13*(13), 7012. https://doi.org/10.3390/su13137012

Wilde, T., & Hess, T. (2006). *Method spectrum of business informatics: Overview and portfolio formation*. No. 2/2006, working report, Institute for Information Systems and New Media, Faculty of Business Administration, Ludwig-Maximilians-Universität. Retrieved from https://www.dmm.bwl.uni-muenchen.de/download/epub/ ab_2006_02.pdf

Williamson, K. et al. (2002). *Research Methods for Students, Academics and Professionals* (2nd ed.). Chandos Publishing. https://doi.org/10.1533/9781780634203

Yoshino, N., Morgan, P. J., & Long, T. Q. (2020). Financial Literacy and Fintech Adoption in Japan. *ADBI Working Paper 1095*, Asian Development Bank Institute. Retrieved from https://www.adb.org/sites/default/files/publication/574806/adbi-wp1095.pdf

Zhao, W. et al. (2022). Achieving the Sustainable Development Goals in the post-pandemic era. *Humanities and Social Sciences Communications, 9*, 258. https://doi.org/10.1057/s41599-022-01283-5

Note

Note 1. Both terms are used synonymously in this article.