Zurich University of Applied Sciences
ZHAW

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Measurement of financial inclusion variation across ECA countries over 2014-2017

Bachelor Thesis

Bachelor of Science (BSc) in Business Administration
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Author:
Schwegler Aizhan
[redacted]

Supervisor:
Dr. Maria Clara Rueda Maurer

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Management Summary

The topic of financial inclusion is highly discussed among academics and practitioners because it is believed to promote economic and financial growth, reduce poverty, income inequality and improve social inclusion. Hence, it has become a primary agenda for many countries to stimulate higher financial inclusion. However, despite of its importance, many countries in ECA region are still behind in achieving their goals of deepening access to their financial system. Moreover, the advances in financial inclusion in ECA region were not consistent across member countries between 2014-2017.

While earlier research has tended to focus on defining financial inclusion, its barriers and measuring its impact, few studies have investigated the reverse impact in ECA countries, i.e., what factors and to what extent impact its variation among countries. Therefore, the focus of this bachelor paper was to explain the variation in recent advances in financial inclusion across ECA countries. The objective is to understand which factors might explain the variation in the uneven growth of financial inclusion in ECA countries during 2014-2017.

To analyze reasons contributing to the variations of financial inclusion, the paper used primarily quantitative methodology. In the first step, a financial inclusion index (FII) was calculated to arrive at a standardized metric for each of 48 countries over 2014-2017. This index integrates three important dimensions: access, quality, and usage of financial services. In the next step, the analysis used macroeconomic, socioeconomic, technological, and institutional variables to conduct analysis of descriptive statistics, correlation with financial inclusion index, and multiple regression analysis.

Results of the analyses indicated that there is a strong positive correlation between the FII and GNI per capita, human development index, and internet usage. In contrast, inflation rate is negatively correlated with the FII. However, there is a relatively weak negative correlation of the FII and GDP growth rate. Additionally, such factors as unemployment, population growth and mobile phone use exhibit a weak positive association with the FII. Finally, the results of cross-country regression analysis indicated that macroeconomic and socioeconomic factors contribute significantly into variation of financial inclusion. Whereas institutional factors have only moderate effect and

technological factors demonstrated the lowest impact on the advances of financial inclusion.

In conclusion, the variation in financial inclusion can be explained to a greater extent by macroeconomic and socioeconomic factors, and to some extent by institutional characteristics and to a lesser extent by technological factors. The significance of this findings suggests the possible direction of policies implementation such as improving institutional governance, shaping better social inclusion, and increasing standards of living.

Based on the conclusions, possible recommendations for future research would be to understand the impact of digital technology and literacy on the access to financial services.

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List of Abbreviations

BRIC	Brazil, Russia, India and China
ECA	Europe and Central Asia
FII	Financial Inclusion Index
GDP	Gross Domestic Product
GNI	Gross National Income
GPFI	Global Partnership for Financial Inclusion
HDI	Human Development Index
HPI	Human Poverty Index
UNDP	United Nations Development Program
WDI	World Development Indicators

1. Introduction

This chapter introduces the definition and topic of financial inclusion. First, the background and the situation in analyzing the financial inclusion are presented. Next, the section describes the research question and the objective. Finally, an overview of the direction of the thesis paper is provided.

1.1. Background and situation

Financial inclusion means having access to and use of basic and affordable financial services and products for individuals and businesses. Financial services are services, such as opening savings account, making or receiving payments, and receiving credit. Access to financial services might help reduce poverty and inequality by enabling people to invest in their future and smooth their consumption to ensure balanced spending and saving, and to manage financial risks (Demirguc-Kunt, Klapper & Singer, 2017). This is especially important for people with low income, people below the poverty line or socially disadvantaged groups, when access to basic financial services helps to make transaction more efficiently and safely, and possibly allows them to climb out of poverty, by investing in education and business (Demirguc-Kunt et al., 2017). According to the World Bank (2019), individuals with better access to the financial system have more opportunities to meet basic financial needs, such as retirement savings or education. Therefore, financial inclusion is crucial for reducing poverty and income inequality.

Financial inclusion might also be important for economic growth and financial development. There are a number of studies that support a possiblly positive impact of financial inclusion on economic growth (Van, Vo, Nguyen & Vo, 2021; Beck, Demirguc-Kunt & Honohan, 2009; Park & Mercado, 2018). In addition, empirical research reveals a number of positive effects supporting the view that the growth of inclusive financial systems is a significant component of development progress (Kabakova & Plaksenkov, 2018).

In addition, there are many factors that correlate with financial inclusion. For example, a study by Allen, Demirguc-Kunt, Klapper and Peria (2016) investigates the correlation of factors underpinning financial inclusion across 123 countries and over 100,000

individuals. The results indicate a positive association of financial inclusion with political situation, favorable policies and secure legal rights, enabling greater financial inclusion. Another example is the research on global perspective conducted by Sha'ban, Girardone and Sarkisyan (2020) that indicates financial inclusion is positively correlated with GDP growth, employment, bank competition, human development, government integrity and internet usage. The analysis by Park and Mercado (2018) confirms their findings by indicating that the higher output rate in the countries co-varies with increasing financial inclusion.

It follows that an increasing number of studies and statistical datasets provide insights into defining, analyzing and measuring financial inclusion. The importance of financial inclusion is recognized by a large number of countries, given the recent developments and growth in account ownership. According to the Global Findex (Demirguc-Kunt et al., 2018), account ownership rose globally from 62% in 2014 to 69% in 2017. However, according to this database, development of account ownership was uneven in countries in Europe and Central Asia (ECA) between 2014 and 2017. In particular, Armenia, Georgia, the Kyrgyz Republic, and Tajikistan saw significant increases in account ownership, from 15 to more than 20 percentage points for the given period (World Bank, 2019). At the same time, in other ECA countries such as Azerbaijan and Uzbekistan, the overall account ownership increased only slightly or remained unchanged in the same period (World Bank, 2019).

Therefore, understanding variations in financial inclusion among ECA countries might help policymakers and businesses to adopt new methods for expanding financial inclusion or adjust existing strategies. For example, digitizing payments could reduce the number of unbanked adults (i.e., individuals without a bank account) by lowering costs, resulting in better affordability (Demirguc-Kunt et al., 2018).

1.2. Research question

Despite the number of studies illustrating the importance of financial inclusion, research on the underlying reasons as to why there is a difference in the changes of financial inclusion across member countries within the ECA region over 2014-2017 remains somewhat limited.

This thesis aims to contribute to the existing research on financial inclusion, by investigating factors influencing variations in uneven growth of financial inclusion across ECA countries in the period of 2014-2017.

The empirical results of this paper may provide valuable direction for future research for academics and practitioners, with regard to implementing effective strategies on increasing financial inclusion.

1.3. Objective and research aim

The aim of this paper is to understand the variations in financial inclusion trends across ECA countries in the period 2014-2017 and empirically identify factors explaining these variations.

While some countries demonstrated significant changes in financial inclusion over the period 2014-2017, there are those economies that did not show significant changes. By deriving with own measure of financial inclusion based on the existing methodology and using available data, the paper tests various country-level parameters on the financial inclusion variation. These parameters incorporate human development index-, macroeconomic-, socioeconomic-, and technological factors. The paper focuses on 48 countries within the ECA region which exhibit varying levels of economic development and income levels.

1.4. Overview of the work

In order to answer the research question and to conduct analysis, the paper is organized as follows. Chapter two provides an overview of the theoretical background and empirical research with regard to measuring financial inclusion. Chapter three presents detailed methods for investigating, selecting and calculating the available data. The data selection identifies timespan, indicators and countries that are used for the study. In chapter four, the outcome and calculation are presented with empirical results, where in addition an interpretation of the results is conducted. Finally, chapter five aims to provide a conclusion, possible recommendations for policy implications and future directions of work.

2. Theoretical Framework

This chapter presents a review of relevant literature on theoretical background of financial inclusion, its definition, barriers and importance for economies and society. Additionally, previous research methodology on how various measurements of financial inclusion is discussed.

2.1. Defining financial inclusion

The concept of financial inclusion is a relatively new phenomenon that first emerged at the end of the 20th century (Kabakova & Plaksenkov, 2018). Leyshon and Thrift were among the first to use in their study the concept of financial exclusion in 1994. They described the term of financial exclusion as the problem of access to regulated financial services which is also associated with rising levels of poverty and disadvantage. In their later studies, Leyshon and Thrift (1995) proposed a new term of financial access which refers to "those processes that serve to prevent certain social groups and individuals from gaining access to the financial system" (p.314). The concept of financial inclusion continued to evolve in a growing body of works even afterwards. In this thesis paper the term of financial inclusion and financial access are used interchangeably.

Later studies and policy makers continued to explore the concept and attempted to identify the meaning of financial inclusion from various angles. Some studies define the concept of financial inclusion as part of a social inclusion context. As Gloukoviezoff (2007) stated that being able to access and use a wide range of financial products and services is now necessary "to lead a normal social life" (p.224). Similar to that, Sahay et al. (2015) defined it as the access to and use of formal financial services by households and firms. According to them, there is a broader underlying meaning behind financial inclusion which involves "improvement of people's livelihoods, reduction of poverty and advancement of economic development" (p.4). In addition, Kabakova and Plaksenkov (2018) define common characteristics of financial inclusion which are present in many studies: uniform, availability of financial services, regular usage, good quality of service, and potential for increased welfare.

2.2. Country and regional perspective

There are a number of studies specifically devoted to country and regional analysis. Special interest is devoted to developing and underdeveloped countries where the question of growth and access to financial systems are an acute issue. For example, a case study of M-Pesa conducted in Kenya provided valuable insights for many entrepreneurs and practitioners on the possible achievements of growing financial access (Ouma, Adongo & Were, 2017; Cook & McKay, 2015). Other studies like the one by Rojas-Suarez (2010), focused on specific groups of countries such as Emerging Powers (e.g., four BRIC countries).

In the context of ECA perspective, an economic update prepared by the World Bank (2019) provided an overview and perspective of potential growth in financial inclusion in ECA region. Using the Global Findex data collected through surveys, the study by the World Bank (2019) summarized important insights with regard to the account ownership trends in the region. In 2017 there were 116 million unbanked adults in ECA countries (World Bank, 2019). Additionally, the World Bank paper (2019) highlighted uneven growth in account ownership in ECA countries over the period 2011-2017. Using Global Findex indicators, the paper emphasized that over the same period inequality in account ownership continued to be high with regard to gender, income and other dimensions. Finally, the update recognized the trend in digital payments and suggested their importance as a potential opportunity in expanding financial inclusion. Additionally, Demirguc et al. (2017) provided examples of such an increase in digital innovation in financial services in countries such as Russia and Turkey.

One of the examples from ECA countries with significant growth in financial inclusion over the period 2014-2017 was Kazakhstan. A study by Asian Development Bank Institute (ADBI) (Kapparov, 2018) examined the financial system and inclusion rate in Kazakhstan. The economy and financial sector in Kazakhstan is very much dependent on the oil exports (World Bank, 2019). According to the World Bank (2019), as a commodity exporter, Kazakhstan may face many risks, including depreciation of the local currency and inflation. This negative correlation might impact financial inclusion in the country. According to ADBI (Kapparov, 2018), government agencies and the National Bank of Kazakhstan are advised to improve their efficiency in addressing this issue.

2.3. Barriers to financial inclusion

Financial exclusion is distinguished between voluntary and involuntary exclusion. According to Sarma (2012), financial exclusion can be a result of problems with access, conditions, prices, or self-exclusion as a response to negative perceptions. The World Bank (2014) defines voluntary exclusion as a condition where respondents choose not to use financial services for various reasons. Either because they have no need for them, or due to cultural or religious reasons or lack of trust.

In contrast, involuntary exclusion occurs due to insufficient income, a high-risk profile or due to discrimination, market failures, price barriers and imperfections (World Bank, 2014). This was already the focus of study by Gloukoviezoff (2007) where it was analyzed how various aspects of barriers impact financial inclusion. In his view, the difficulties in obtaining financial services are linked mainly to access and use. Beck et al. (2009) added to this by stating that one of the reasons is that poor clients experience prejudice from financial service providers. First, poor consumers are believed to have no collateral or stable streams of income to borrow against. Second, as Beck et al. (2009) suggested, it is costly to deal with insignificantly small transactions for financial intermediaries.

While Gloukoviezoff (2007) and Beck et al. (2009) analyzed various economic-related barriers, a great number of studies, especially in recent decade, focus on gender-related barriers. For example, Sahay et al. (2015) emphasized that the reduction of gender gap in access to financial sector tends to have positive effects on income equality. In addition, closing the gender gap, according to Sahay et al. (2015), should in fact improve growth without impeding banking sector stability.

Another important obstacle for expanding financial inclusion is financial illiteracy among population. Xu and Zia (2012) closely examined the relationship of literacy and theorized that high income countries tend to have higher level of financial literacy which is reflected in a sophisticated financial behavior of the population. This suggests that middle to low-income countries, where most of the population shows lower financial literacy level, are in a disadvantaged position.

As an example, lack of financial literacy is recognized as a critical problem in Kazakhstan. According to an article by Loginova and Musirov (2019), financial inclusion is a highly discussed topic among entrepreneurs and the government of Kazakhstan. Especially, banks and entrepreneurs voice their concerns, and are willing to combine their forces to tackle the issue. There seems to be unequivocal opinion that one of the main obstacles in deepening financial inclusion remains low financial literacy. This lack of education creates a number of risk-related problems for financial institutions, including indebtedness and insolvency of consumers. Additionally, digital illiteracy among consumers remains an issue which tends to impede the development of the financial system and infrastructure (Loginova & Musirov, 2019). Therefore, there is some degree of interest from private companies which try to take an approach on their own by creating training and educational platforms. However, as Loginova and Musirov (2019) stated, there seems to be a strong consensus on the lack of overarching strategy for improving the population's financial literacy.

The situation with financial literacy in Kazakhstan is also highlighted in the paper by Kapparov (2018) where various programs and policies on improving financial literacy in Kazakhstan were analyzed. According to the study, these programs are more aimed at private sectors and state agencies, rather than at promoting education among population.

2.4. Importance of financial inclusion

As can be seen by a number of literature, financial inclusion has been a center of continuous attention since the end of 20th century till nowadays. It must be noted that the reason for its importance lies in deep macroeconomic and socioeconomic effects as well as improved financial stability. Many studies have analyzed and examined its effect on economic growth, reduction of income gaps, poverty (Honohan 2008) and other positive macroeconomic aspects. In addition, Demirguc-Kunt et al. (2017) have evaluated various empirical evidence that, among other things, show that financial inclusion can help population to conduct everyday payments and transactions efficiently. Moreover, as Demirguc-Kunt et al. (2017) continue, financial inclusion might help reduce poverty and inequality by enabling people to invest in the future and smooth their consumption.

In his work, Ozili (2020) takes an overview of the recent developments in financial inclusion and the critical success factors such as financial innovation, financial literacy, and financial technology. His findings suggest that the financial inclusion is influenced by the level of financial innovation, poverty reduction, the stability of the financial sector, the state of the economy, financial literacy, and regulatory frameworks. All these factors differ across countries.

An analysis by Park and Mercado (2015) looked at the influencing factors on financial inclusion in developing Asia. Their results suggest a strong correlation on the level of financial inclusion by such factors as demographic characteristics, good governance and high institutional quality, financial access and poverty rates.

A study by Ahamed and Malick (2019) takes a different approach and argues that there is a strong link between financial inclusion and bank stability. They suggest that through financial inclusion, banks can benefit from cheap retail deposits and thereby reduce their reliance on volatile money market funding. The positive association between inclusive financial sector and bank stability is especially distinct with those banks that have greater customer deposit base. Danisman and Tarazi (2020) support their views and provide empirical analysis of the financial stability of European financial system. Their findings imply that the positive link between greater financial access and financial stability is also beneficial for disadvantaged groups of population.

2.5. Digital financial services

A growing body of research focuses on the potential development of digital financial services and its impact on financial inclusion, given that the number of fintech companies is increasing. In addition, in recent empirical studies the analyses are increasingly using technological aspect or digital payments as a factor influencing financial inclusion (Kabakova & Plaksenkov, 2018; Sha'ban et al., 2020; Danisman & Tarazi, 2020). As the World Bank suggests (2019), there is an opportunity to expand financial inclusion and increase account ownership due to a growing number of unbanked adults that have mobile phones, which might make it easier to adopt digital financial products.

The number of people making or receiving payments is increasing. For example, in ECA most of the population pays bills, sends money to relatives, receives salaries or government transfers (World Bank, 2019). According to the World Bank (2019), developing countries in ECA have indicated an increase in the share of adults making or receiving digital payments from 46% to 60% since 2014 until 2017. With few exceptions, most of ECA countries demonstrated significant growth in the use of digital payments (World Bank, 2019). Such trend suggests a potential for increase in account ownership.

The increase in digital payments can be explained due to an increase in the use of mobile phones and the internet. According to findings by Sha'ban et al. (2020) there is a strong association between internet usage and financial inclusion in low-income countries. Additionally, 29% of adults globally use internet to pay bills or make payments online (World Bank, 2019). This suggests that technological advancements play an important role in increasing the access to financial services and motivating consumers to open and use accounts.

The benefit of technology application can be seen for financial institutions as well. A study by Danisman and Tarazi (2020) have identified a link between digital payments and bank risk-taking. They observed that access to financial services through more accounts and digital payments reduces the risk of default, leverage risk and portfolio risk for banks. As they suggest, more inclusion of disadvantaged population segments into account ownership and use of digital payments enable financial institutions to conduct better customer screening and better information processing. Demirguc-Kunt et al. (2017) agree to these findings and add that this could also imply that digital payment history might benefit both supply and demand side of financial system, suggesting that this way account ownership can even improve.

2.6. Opposing views

In addition to the positive impact by the financial inclusion there is research that also focus on controversial issues surrounding financial inclusion. For example, Beck et al. (2009) take a different perspective on the issue of financial inclusion, arguing that not all government attempts to expand financial inclusion might be effective and – at times – might even be counterproductive. They critically evaluate the provided empirical analysis

on measurements and determinants of financial inclusion and assess the role of government in advancing financial inclusion. Beck et al. (2009) suggested that even the most efficient financial system can face limitations, as was the case in the example of the subprime crisis when regulatory policies damaged financial system by overly relaxed policies.

Sahay et al. (2015) in addition to that, suggested that financial expansion by way of extending bank credits to more individuals and businesses may have a detrimental effect on the quality of loan portfolios. Consequently, this undermines the stability of the banking system, especially in cases of weak banking supervision. Thus, the effectiveness and high quality of regulatory oversight plays an important role in promoting and increasing access to financial system.

In addition, Ozili (2020) highlights important controversies and risks related to excessive financial inclusion. According to him, such issues are inactive users of financial services, lack of cooperation by banks, macro-financial stability, and systemic risk. By analyzing a great amount of empirical evidence, Ozili (2020) argues that extreme financial inclusion might lead to systemic risks by exposing the financial system to "risky individuals" (p. 12).

Mader (2017) provides additional opposing views on the effects of financial inclusion. Criticizing the arguments of advocates for more inclusion, Mader (2017) argues that there is insufficient evidence that clearly demonstrates the positive effects raised by financial inclusion. In addition, according to him, there seems to be a strong assumption among proponents that poor people directly benefit from financial inclusion. This argument follows by stating that there is a prevailing belief that financial inclusion is the only and most essential driver of pro-poor inclusion, for which solid evidence is lacking. Finally, he suggests that the correlation between financial inclusion and increasing income inequality has rather reverse effect (i.e., financial inclusion is the result of the improved income equality and not vice versa) and therefore socio-economic development should be the primary focus before programs for expanding financial inclusion are started.

2.7. Measuring financial inclusion

Earlier studies by Kempson and Whyley (1999) were one of the first to attempt to measure financial exclusion using surveys and focus groups. Later, when financial inclusion has become a subject of growing interest among researchers, policy makers and other financial stakeholders (Allen et al., 2016), the increased availability of data allowed to perform deeper analysis and conduct refined measurements of financial inclusion.

Recent studies provided an ample number of measurements and various approaches to conduct empirical analysis and measurement of the inclusiveness, given the available quantitative and qualitative data. Quite frequently however, these methods are not standardized (Park & Mercado, 2018) and there is no clear consensus on the measurement methods for financial inclusion. The approach to measurement can take various forms due to the fact that the financial sector plays a multidimensional role (Honohan, 2008) in the process of economic growth.

On the one hand, some studies focus on single metrics, such as the proportion of adults that have an account at a financial institution. For example, earlier studies by Rojas-Suarez (2010) and Honohan (2008) applied composite measures and constructed a financial access metric that estimates the fraction of the adult population in each economy with access to formal financial intermediaries. These studies both empirically show that economic volatility, weak rule of law, higher income inequality and social underdevelopment and regulatory constraints significantly lower financial inclusion (Rojas-Suarez, 2010; Honohan, 2008). A study by Allen et al. (2016) focuses on a single metric, bank account ownership, and three dimensions of account owning, using and the frequency of account use.

On the other hand, later studies focus on composite indices of financial inclusion, capturing its multidimensional and complex nature. For example, studies by Park and Mercado (2015) and Amidzic, Massara and Mialou (2014) looked at several measurement methods where composite variables are constructed from several indicators: supply and demand side, access and usage dimensions, demographic, and geographic outreach. Other studies such as the one by Sarma (2008) use an approach of constructing the indicators by simple computation and aggregating each index across the dimensions of access,

availability, and usage. In her later studies, Sarma (2015) used dimensional weights set at arbitrary values. The similar complex approach was conducted by Camara and Tuesta (2014) where weights of the index are obtained from applying a two-stage principal component analysis. In the first stage they estimated three sub-indices – usage, access and barriers – which define their financial inclusion measure. In addition, policy makers such as G20 Financial Inclusion Indicators[1] (Global Partnership for Financial Inclusion [GPFI], 2016) as well as Amidzic et al. (2014) suggested that the practical approach to measuring financial inclusion should incorporate three main dimensions which are outreach, usage and quality of financial services. The computation conducted by Park and Mercado (2018) derived an aggregate index which is a weighted linear combination of various indicators by applying principal component analysis.

It must be noted that the financial inclusion index (FII) that is applied in various studies can be used to compare the level of financial inclusion across different economies and to observe the progress of the economies with respect to financial inclusion over time (Sarma, 2012). Therefore, the FII is a comprehensive measure that includes several aspects (dimensions) of financial inclusion and is describe as a single number (Sarma, 2008).

Another strand of literature focused on using various combination of factors on country level. A study by Kabakova and Plaksenkov (2018) took an ecosystem approach and used country-level features such as socio-demographic-, economic-, political-, and technological factors that impact financial inclusion. Whereas the study by Sha'ban et al. (2020) expanded the impact factors into five categories at the country level: macroeconomic-, socioeconomic-, and technological factors, banking system and institutional environment.

Therefore, based on the above-mentioned discussion, the chosen approach in this paper is to investigate factors that can help explain the variation of financial inclusion through the optimal combination of its dimension in relation to various factors. The paper applies a multidimensional approach in defining a financial inclusion index and its correlation

[1] The Global Partnership for Financial Inclusion (GPFI) developed the indicators, which were endorsed by G20 leaders in 2012.

with various macroeconomic factors that are present in each economy. The approach focuses on the ease of access, usage, and the quality of financial services. The dimensions and used variables are defined in Appendix A.

3. Methodology and Data

This chapter provides information on the financial inclusion measurement methodology applied to answer the research question. The corresponding data and its sources are provided in appendices.

3.1. Financial inclusion index

To investigate the effect of the various factors on the variation of financial inclusion across member countries, in the first step the analysis constructs an index of financial inclusion applicable specifically for this study. The construction closely follows the methodology defined in studies by Sarma (2012), Sha'ban et al. (2020), Honohan (2008), and Park and Mercado (2015). Specifically, the index of financial inclusion applied in this study should satisfy conditions as stated in the study by Sarma (2008): the index should include as many qualitative aspects of financial inclusion as possible, should be simple to compute and should be comparable across countries. The derived values are between 0 and 1 where zero indicates lowest financial inclusion and 1 indicates complete financial inclusion.

The calculation of the index considers certain indicators of financial inclusion. According to "G20 financial inclusion indicators" (GPFI, 2016) financial inclusion is measured in three dimensions:

- access to financial services
- usage of financial services
- quality of the products and the service delivery

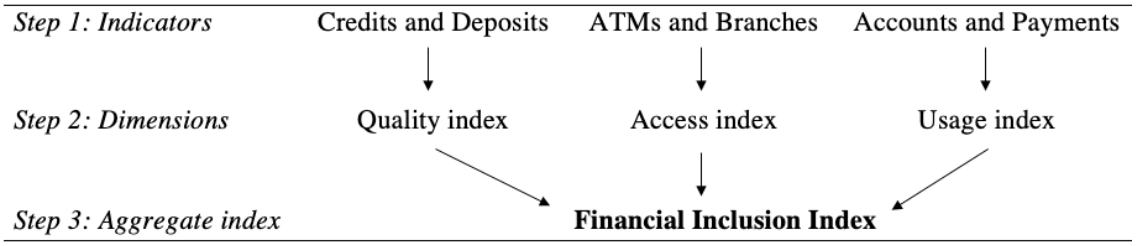
The *access* dimension refers to the physical ability to easily reach financial service or product. The *usage* dimension measures the use of financial services. According to Amidzic et al. (2014) the *quality* dimension measures the extent to which financial services address the needs of the consumers.

To ensure the consistency with the recommendation of the GPFI as well as with other research (Park & Mercado, 2015; Sarma, 2008; Honohan, 2008) the calculation in this paper applies the same approach. As *access* dimension, data on bank branches and ATMs is used. As *usage* dimension, the analysis uses data on account ownership (adults with accounts in %) and sent or received payments. As *quality* dimension data on savings and

borrowing accounts is used. For the latter dimension, the analysis uses data on credits and deposits as a quality indicator, since these show the financial behavior and general capability of the population as well as the barriers of receiving credits from financial institutions (GPFI, 2016).

The construction of the financial inclusion index is summarized in **Table 1**

Table 1 Calculating the financial inclusion index – graphical presentation



Note: The table illustrates the construction of the financial inclusion index applied in this study.

In the next step of the computation process, the study derives the composite index by aggregating intermediate indicators present in the specified dimensions. The multi-dimensional approach is generally realized following a three-step process that consists of:

1) normalization of variables
2) determination of dimensional sub-indices using arithmetic mean
3) aggregation of sub-indices using geometric mean

The approach is similar to that used by UNDP for constructing indices such as the Human Development Index (HDI) and the Human Poverty Index (HPI) (Sarma, 2008; Amidzic et al., 2014).

Therefore, at first the analysis performs normalization of each six indicators of financial inclusion using statistical normalization (Equation 1) to arrive at a common scale ranging from 0 to 1:

$$I_{c,d} = \frac{i_{c,d} - Min\ (I_i)}{Max\ (I_i) - Min\ (I_i)} \qquad \text{Equation (1)}$$

Where

$I_{c,d}$ = the value of financial inclusion index for country *c* and for dimension *d*

$i_{c,d}$ = the value of financial inclusion indicator for dimension *d* of country *c*

$Min\ (I_i)$ = minimum value for indicator *i* over the sample period for all sample countries

$Max\ (I_i)$ = maximum value for indicator *i* over the sample period for all sample countries

The minimum and maximum values are set in order to transform the indicators expressed in different units into indices between 0 and 1. This interval acts as "the natural zeros" and "aspirational targets" respectively. As Sha'ban et al. (2020) suggest, this way, the normalized value represents the indicator's deviation from the minimum and maximum limits across the observed sample.

In the second step, the calculated indicators are used to calculate three dimensional indices – usage index, access index, and quality index. Each dimensional index is calculated by taking the arithmetic mean of the two corresponding indicators. In the final third step, the three-dimensional indices are combined into the composite financial inclusion index using the geometric mean as indicated in Equation (2):

$$Financial\ inclusion\ index = (Usage\ index \times Acces\ index \times Quality\ index)^{1/3}$$

Equation (2)

Final results of the calculated financial inclusion index per country and the ranking of countries according to this index are presented in Appendix B.

3.2. Data selection

In order to investigate the correlation of financial inclusion with independent variables, the current study compiles a cross-country dataset for the period of 2014-2017 using several sources. An observation set consists of 48 countries of ECA region. Due to lack of data on some of the countries, the observation number may vary in some of the regression model calculations. Appendix C lists all the countries included in the analysis.

For the composite of the financial inclusion index the data is constructed from various sources: for the composites of *usage* and *quality* indicators, the data is drawn from the

Global Financial Inclusion Database; for the *access* indicators the data is drawn from the World Bank Development Database (WDI). The extracted data contains the average change of the indicators over the period between 2014 – 2017.

For independent variables (i.e., regressors), the analysis uses a number of factors, the description and sources to which are present in Appendix A. These factors are split into groups of macroeconomic, technological, human development and institutional environment and are taken from various sources for the sample of 48 countries. This data on factors is taken as an average change over the observed period between 2014 – 2017. The groups with aggregated independent variables are presented in the **Table 2** where Model 1 includes all the factors in order to demonstrate the effect and significance of the analysis.

Table 2 Composite of country-level factors clustered into groups

All factors (Model 1)	**Macroeconomic factors (Model 2)**	**Socioeconomic factors (Model 3)**	**Technological factors (Model 4)**	**Institutional factors (Model 5)**
• GDP growth rate • GNI per capita • Unemployment • Population growth rate • Inflation • HDI • Mobile users subscriptions • Internet users • Government effectiveness • Regulatory quality • Rule of law	• GDP growth rate • GNI per capita • Unemployment • Population growth rate • Inflation	• GDP growth rate • Unemployment • Population growth rate • Inflation • HDI	• Unemployment • Population growth rate • Inflation • Mobile users subscriptions • Internet users	• Unemployment • Population growth rate • Inflation • Government effectiveness • Regulatory quality • Rule of law

The justification for the chosen groups of factors is that the information split by group helps to better understand the effect on the change of financial inclusion. In addition, the grouping represents a useful instrument for the evaluation of possible directions for policy making.

Institutional factors tend to have a great impact on financial inclusion (Ahamed and Malick, 2019). Financial system might be better strengthened through such institutional characteristics like better rule of law or government effectiveness. As Ahamed and Malick (2019) argue such factors might limit the extent to which financial intermediaries might engage in correlated risk-taking activities.

Macroeconomic factors are used in a great amount of literature and therefore represent a good measure to track the progress of financial access on a country level.

Socioeconomic factors are indicators of whether standards of living and better quality of life impacted the population and induced consumers to open and use more accounts.

Finally, the choice for applying *technological factor* is due to the fact that over the recent decade new technological incumbents entered the market of financial services (Kabakova & Plaksenkov, 2018). According to Sahay et al. (2015) many countries are actively implementing innovative approaches. For example, mobile payment platforms are used to achieve a more efficient way of financial inclusion.

3.3. Analysis methodology

In the first step, the analysis provides a summary of data and the current trend with regard to financial inclusion and country-level indicators.

The descriptive statistics provide an outline of features of the used variables as well as computed financial inclusion index. This is followed by dividing the observed countries according to the income groups as defined in the Global Findex Database – high income, upper middle income, and lower middle income. The cross-sectional analysis examines average dimensions and the financial inclusion index across countries divided into income groups.

In the second step, the analysis presents a correlation matrix and regression analysis.

The correlation matrix and correlation heatmap visualize the association between financial inclusion and the selected country-level factors, where the computed financial inclusion index is used as the dependent variable. Additionally, the correlation matrix shows multicollinearity problem such as high correlation of GNI per capita variable.

The regression graphs provide an analysis on the strength of variation in the financial inclusion index, depending on individual factors. This analysis is followed by a regression output table of grouped factors and a summary of regression statistics; both of which provide information on causal relationship between financial inclusion index and the grouped factors. The regression analysis with grouped factors is used to examine the percentage of variability in the financial inclusion index that can be explained by macroeconomic-, socioeconomic-, technological-, and institutional factors. The presented regression estimates table uses various variables in the models (specified in **Table 2**) in order to achieve sound results and at the same time to avoid multicollinearity issues among regressors. Therefore, the analysis adds alternatively HDI variables, mobile phone users and Internet users, government efficiency, regulatory quality and rule of law, and in some models excludes GDP growth rate and GNI per capita, due to their high correlation with other variables. Additionally, despite the high intercorrelation among institutional factors, these variables are still used in one model due to their significance and similarity. Therefore, the analysis assumes that factors of government effectiveness, regulatory quality and rule of law are representatives of one factor characteristic: the institutional factor.

4. Empirical Results

This chapter presents the empirical results for the applied methodology described in the previous chapter. First, descriptive statistics provides a summary on variables and on the resulting financial inclusion index. Second, the regression analysis is examined. Finally, a section with the interpretation of the results provides an analysis of the findings and a link to prior empirical studies.

4.1. Summary of descriptive statistics

Results of the descriptive statistics are presented in the **Table 3**. The data shows a relatively high variation in the level of financial inclusion across the sample countries, specifically in the usage of financial services, where the minimum of 0.25 accounts opened and payments conducted are in Azerbaijan, Kyrgyzstan and Tajikistan and the maximum is 0.99 – Denmark, Norway, and Sweden. The mean of the aggregated financial inclusion index is 0.14, which is relatively low compared to the maximum of 0.79 (Luxembourg).

Table 3 Descriptive statistics

	Mean	Standard Deviation	Minimum	Maximum	Observations
FII	0.48	0.14	0.19	0.79	48
Access	0.31	0.14	0.11	0.65	47
Usage	0.71	0.25	0.25	1.00	48
Quality	0.54	0.13	0.23	0.81	48
GDP growth	3.72	1.87	0.15	8.15	48
GNI per capita	31476.67	18165.89	3610.00	72650.00	48
Unemployment	9.21	5.92	2.89	30.34	46
Population growth	0.32	0.92	-1.69	2.47	48
Inflation	3.90	4.86	-1.57	22.08	48
Mobile subscriptions	121.79	19.07	75.92	166.47	47
Internet	74.38	16.52	21.25	97.36	48
HDI	0.84	0.08	0.65	0.95	47
Government Effectiveness	0.59	0.87	-1.21	2.06	48
Regulatory Quality	0.64	0.92	-2.00	2.05	48
Rule of Law	0.49	1.01	-1.49	2.03	48

Note: the table reports descriptive statistics for variables used in the analysis for the sample of 48 countries over the period 2014-2017. Due to limited data availability on some of the observed countries, the number of observations vary.

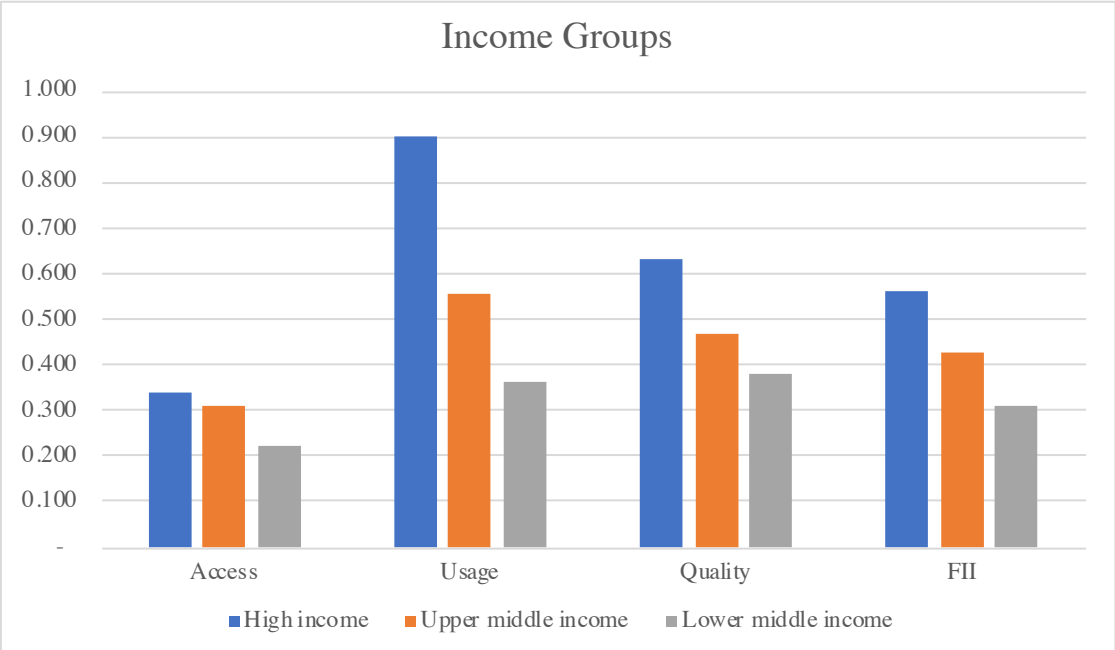
Table 4 and **Figure 1** report the statistics on financial inclusion index and three dimensions, distinguishing between high, upper-middle, and lower-middle income countries. As estimated, the data indicate that high income countries are more financially inclusive across all the indicators, with the most significant difference observed in the usage index – i.e., accounts opened and conducting payments.

Table 4 Income Groups

	High income	Upper middle income	Lower middle income
Access	0.338	0.310	0.221
Usage	0.901	0.557	0.362
Quality	0.632	0.469	0.382
FII	0.564	0.425	0.309

Note: the table presents the comparison of financial inclusion and composite indices between the sub-samples of high, upper middle income, and lower middle-income countries. (FII – financial inclusion index)

Figure 1 Country income groups split by dimensions of financial inclusion

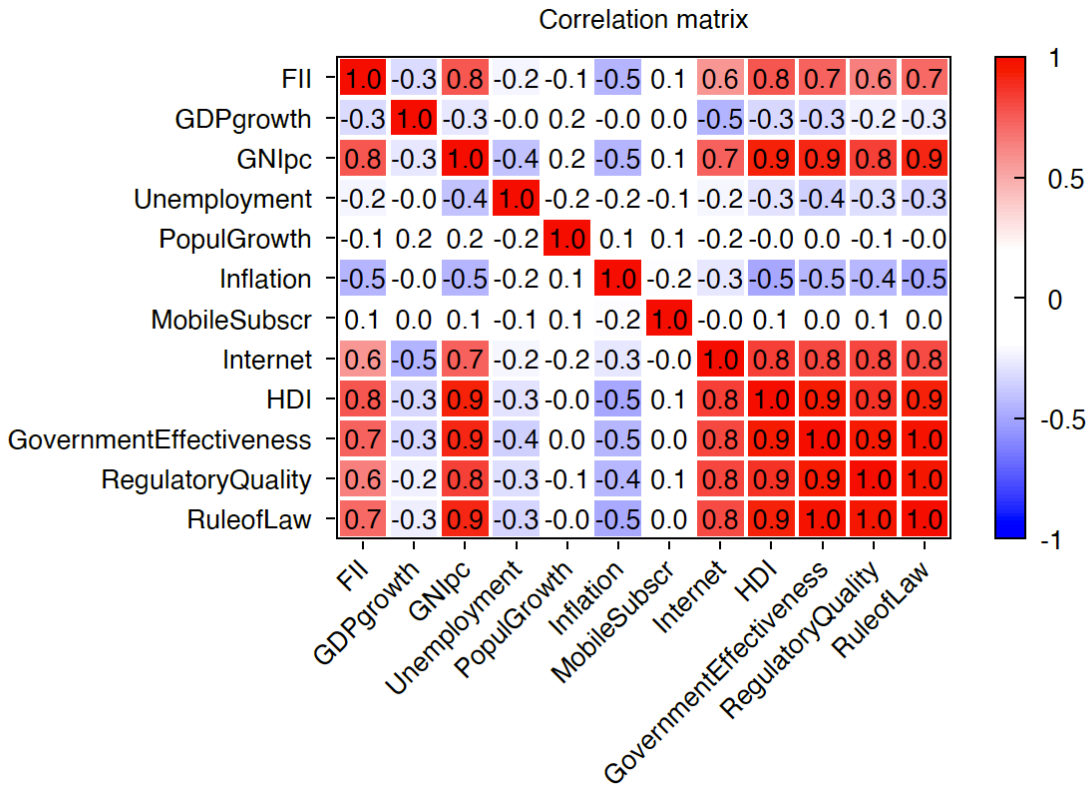


Note: the chart illustrates the variation in mean across financial inclusion index and composite dimensions.

4.2. Correlation matrix and regression analysis

The results of the correlation matrix are reported in the **Table 5** and on a heatmap in **Figure 2**. The results show that there is a strong positive correlation between financial inclusion index and such variables as GNI per capita, internet users, HDI, government effectiveness, regulatory quality, and rule of law. However, the matrix also reveals that there is a marginal negative correlation between financial inclusion index and GDP growth.

Figure 2 Heatmap of correlation matrix



Note: the graph indicates correlation among variables as well as between the financial inclusion index and independent variables

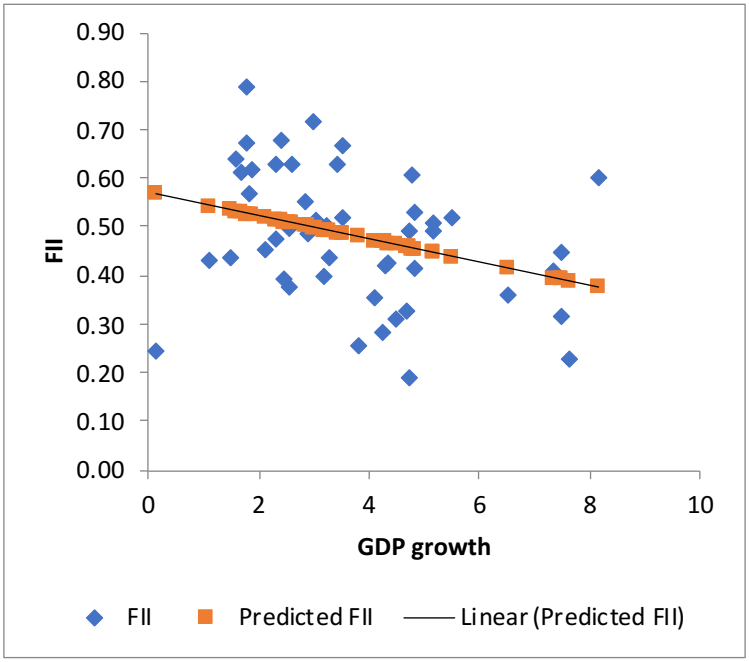
Table 5 Correlation matrix

	FII	*GDP growth*	*GNI per capita*	*Unemployment*	*Population growth*	*Inflation*	*Mobile subscriptions*	*Internet*	*HDI*	*Government Effectiveness*	*Regulatory Quality*	*Rule of Law*
FII	1											
GDP growth	-0.324	1										
GNI per capita	0.765	-0.282	1									
Unemployment	-0.234	-0.005	-0.411	1								
Population growth	-0.075	0.161	0.183	-0.158	1							
Inflation	-0.457	-0.008	-0.456	-0.158	0.103	1						
Mobile subscriptions	0.075	0.033	0.061	-0.075	0.068	-0.201	1					
Internet	0.563	-0.460	0.730	-0.226	-0.155	-0.280	-0.045	1				
HDI	0.766	-0.334	0.920	-0.296	-0.037	-0.503	0.104	0.832	1			
Government Effective	0.727	-0.336	0.905	-0.363	0.010	-0.452	0.050	0.809	0.935	1		
Regulatory Quality	0.635	-0.248	0.830	-0.310	-0.086	-0.448	0.057	0.810	0.869	0.941	1	
Rule of Law	0.707	-0.253	0.905	-0.343	-0.025	-0.494	0.020	0.797	0.921	0.975	0.956	1

Note: the table reports main correlations for the variables used in the present analysis. Definitions of the variables are provided in Appendix A. (FII – financial inclusion index).

In **Figure 3** the scatter plot indicates the marginal negative correlation between GDP growth rate and the financial inclusion index. In addition, only 10.5% of variation in financial inclusion index can be attributed to the change in GDP growth rate. This is supported with relatively high statistical significance of the p-value. The countries on the graphs are indicated with blue dots.

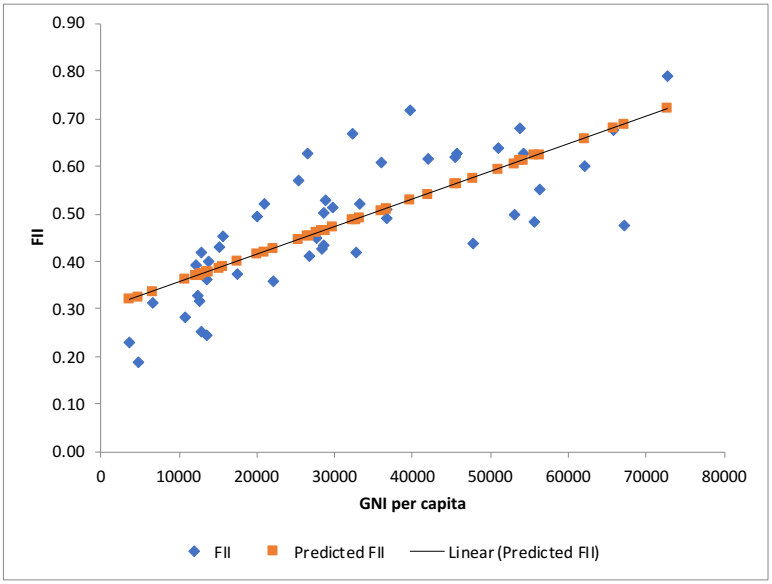
Figure 3 Financial inclusion index and GDP growth rate



Regression Statistics	
Multiple R	0.324
R Square	0.105
Adjusted R Square	0.085
Standard Error	0.132
Observations	48
Coefficients	
Intercept	0.569
GDP growth	-0.024
P-value	0.025

Below, **Figure 4** demonstrates strong positive correlation of financial inclusion index and GNI per capita. With high statistical significance (p-value), 58.5% of variability in financial inclusion is linked to the variability in income per capita. As expected, an increased purchasing power of a population in an economy may lead to the increased need for access to financial services and products.

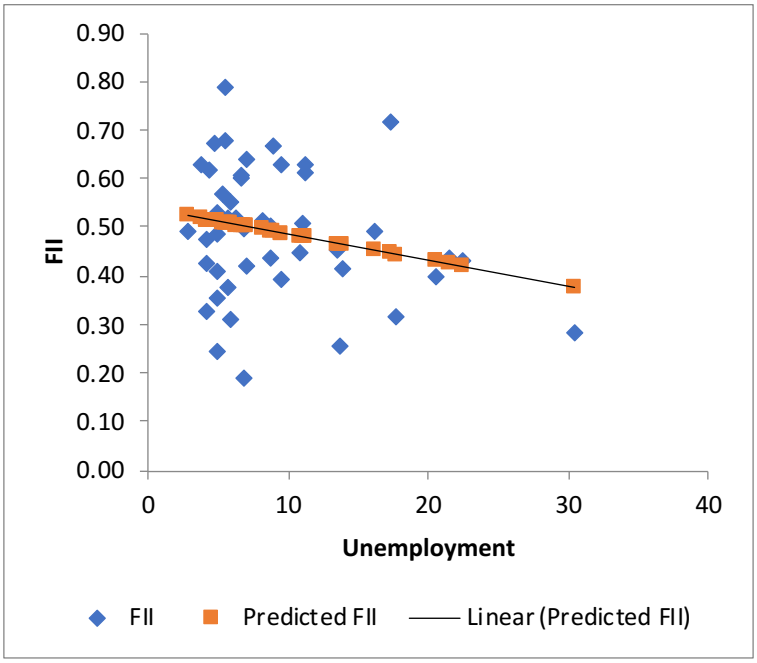
Figure 4 Financial inclusion index and GNI per capita



Regression Statistics	
Multiple R	0.765
R Square	0.585
Adjusted R Square	0.576
Standard Error	0.090
Observations	48
Coefficients	
Intercept	0.298
GNI per capita	0.000
P-value	0.000

Figure 5 presents the relationship between financial inclusion index and the unemployment rate. While there is negative relationship between the variables, the significance and the strength of correlation can be neglected. Moreover, the p-value suggests that there is not enough evidence to conclude that the factor of unemployment explains the variation in financial inclusion.

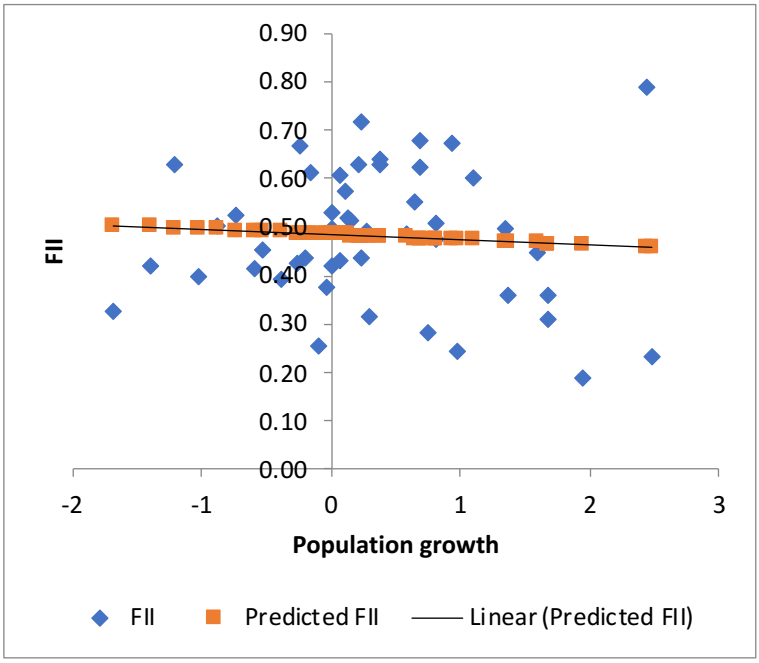
Figure 5 Financial inclusion index and Unemployment



Regression Statistics	
Multiple R	0.234
R Square	0.055
Adjusted R Square	0.033
Standard Error	0.132
Observations	46
Coefficients	
Intercept	0.538
Unemployment	-0.005
P-value	0.118

Next, **Figure 6** illustrates weak and almost no relationship between the population growth and the financial inclusion index. In addition, the low percentage of the variability ($r^2 = 0.006$) suggest that population growth does not contribute to change in the level of financial inclusion. However, the statistical significance of the relationship is very small, implying that the plot cannot explain the variation in response to the change in population growth.

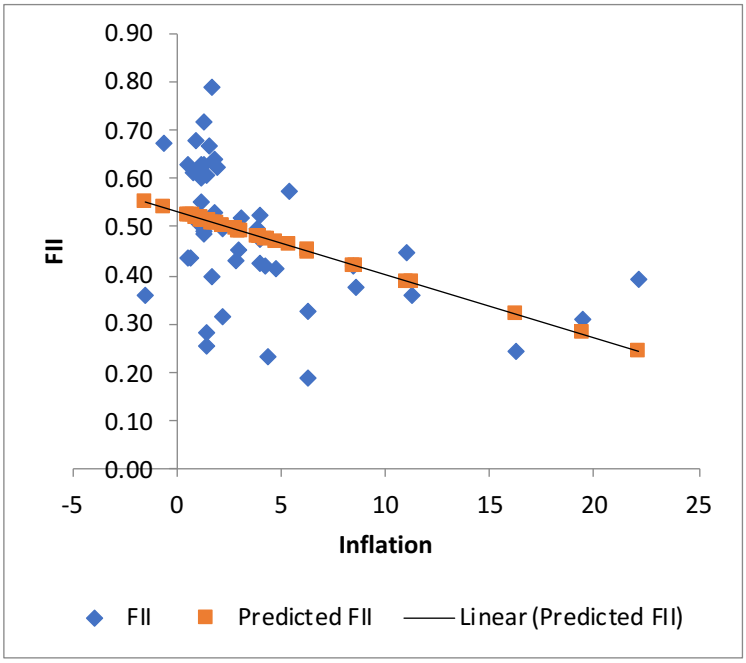
Figure 6 Financial inclusion index and Population growth



Regression Statistics	
Multiple R	0.075
R Square	0.006
Adjusted R Square	-0.016
Standard Error	0.139
Observations	48
Coefficients	
Intercept	0.484
Population growth	-0.011
P-value	0.614

Figure 7 presents a negative relationship between the financial inclusion index and inflation. However, the percentage of explained variation in the financial inclusion index is only 20.9% with a high statistical significance of the p-value. This evidence confirms the expectation that high and volatile inflation rates could cause adverse effects on the level of financial inclusion (Sha'ban et al. 2020).

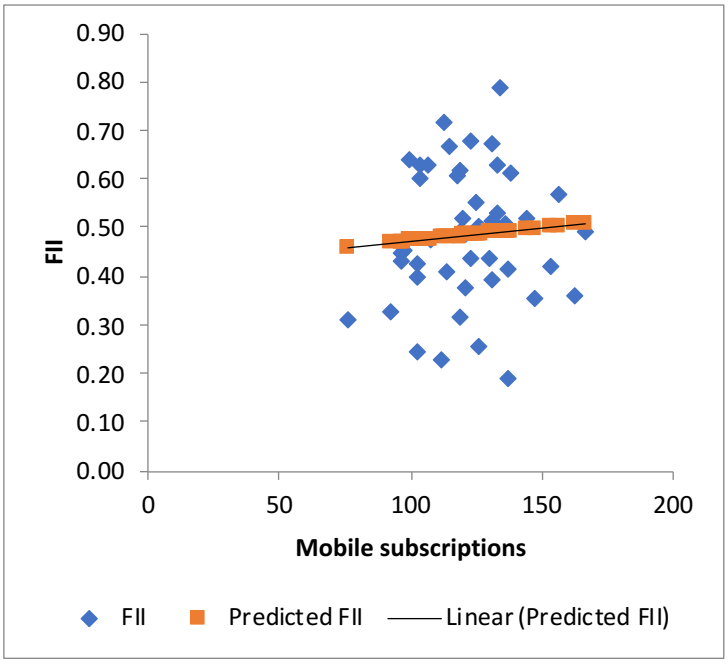
Figure 7 Financial inclusion index and Inflation



Regression Statistics	
Multiple R	0.457
R Square	0.209
Adjusted R Square	0.191
Standard Error	0.124
Observations	48
Coefficients	
Intercept	0.531
Inflation	-0.013
P-value	0.001

In **Figure 8** the relationship between financial inclusion index and the mobile subscriptions is somewhat positive, however it is statistically insignificant. Only 0.6% of variability in financial inclusion index can be explained by mobile cellular telephone subscriptions. At the same time, the p-value > 0.05 indicates that the regression model is not statistically significant enough and requires more data.

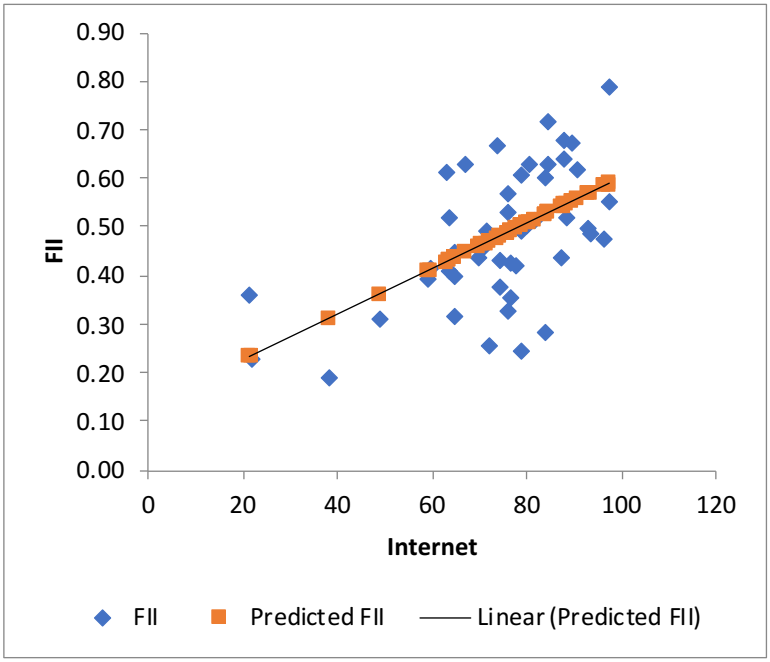
Figure 8 Financial inclusion index and Mobile subscriptions



Regression Statistics	
Multiple R	0.075
R Square	0.006
Adjusted R Square	-0.017
Standard Error	0.137
Observations	47
Coefficients	
Intercept	0.420
Mobile subscriptions	0.001
P-value	0.619

The presented graph and results of the positive correlation with internet usage in **Figure 9** are more reliably significant compared to the mobile phone subscriptions. Here, 31.7% of variation in financial access can be explained by variation in internet usage, suggesting high statistical significance of the model.

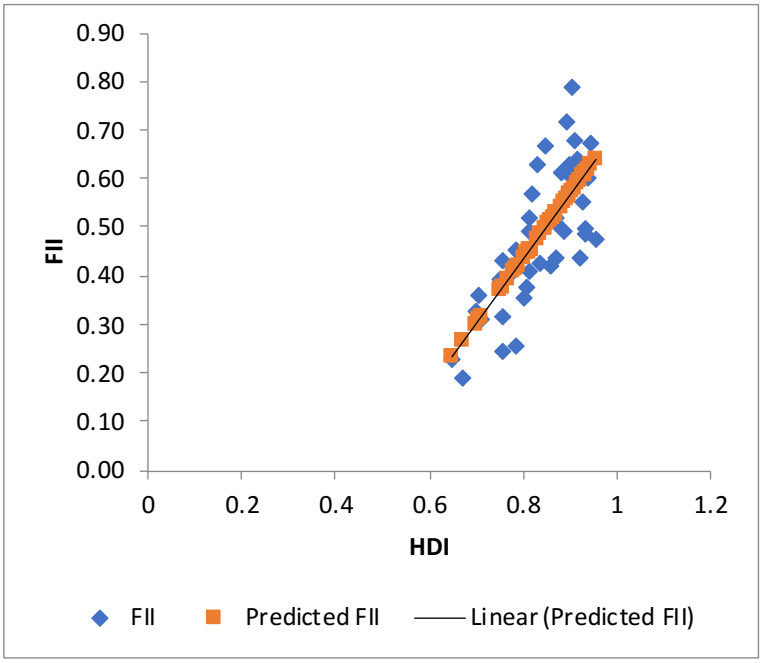
Figure 9 Financial inclusion index and Internet users



Regression Statistics	
Multiple R	0.563
R Square	0.317
Adjusted R Square	0.302
Standard Error	0.115
Observations	48
Coefficients	
Intercept	0.132
Internet	0.005
P-value	0.000

The reported results in **Figure 10** suggest that the HDI is positively associated with financial inclusion. Therefore, it is possible that the improvement in health, education and standards of living are closely linked to the increase in access to financial services. Hence, the 58.8% of variability in financial inclusion index is explained by the variability in HDI with high statistical significance (p-value < 0.05).

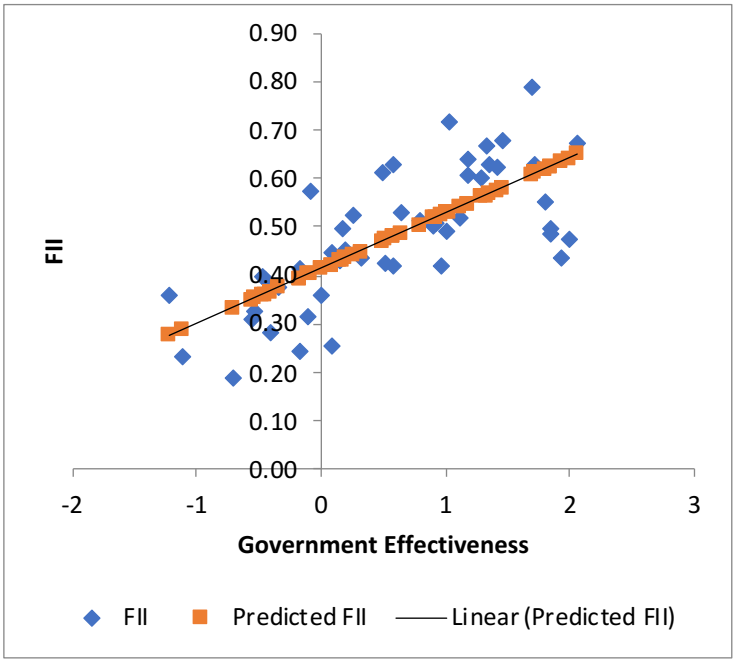
Figure 10 Financial inclusion index and HDI



Regression Statistics	
Multiple R	0.766
R Square	0.588
Adjusted R Square	0.578
Standard Error	0.088
Observations	47
Coefficients	
Intercept	-0.630
HDI	1.331
P-value	0.000

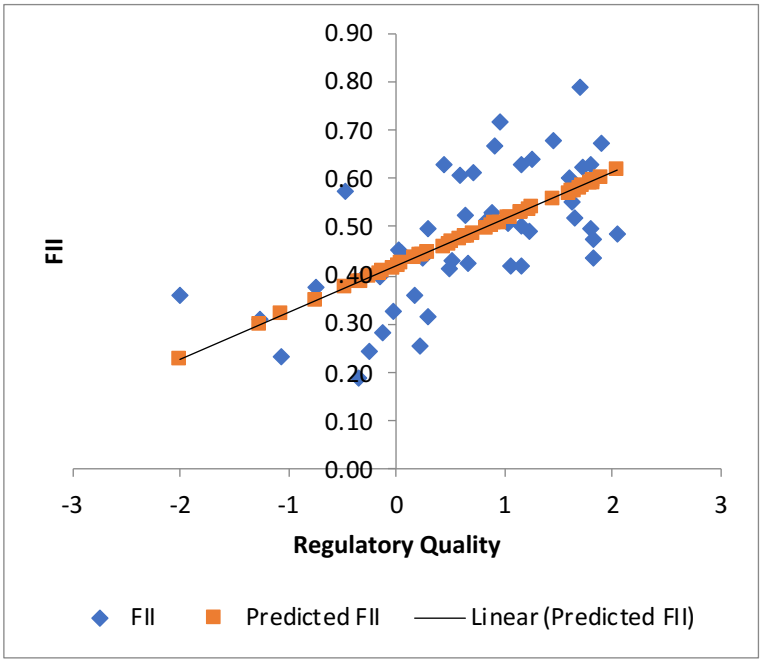
Finally, the indicators of government effectiveness, regulatory quality and the rule of law are more reliably and positively associated with financial access (**Figure 11**, **Figure 12** and **Figure 13**). Indeed, the robust and significant percentage (40%-52%) of variation in financial inclusion is linked to the variation in these three factors individually.

Figure 11 Financial inclusion index and Government effectiveness



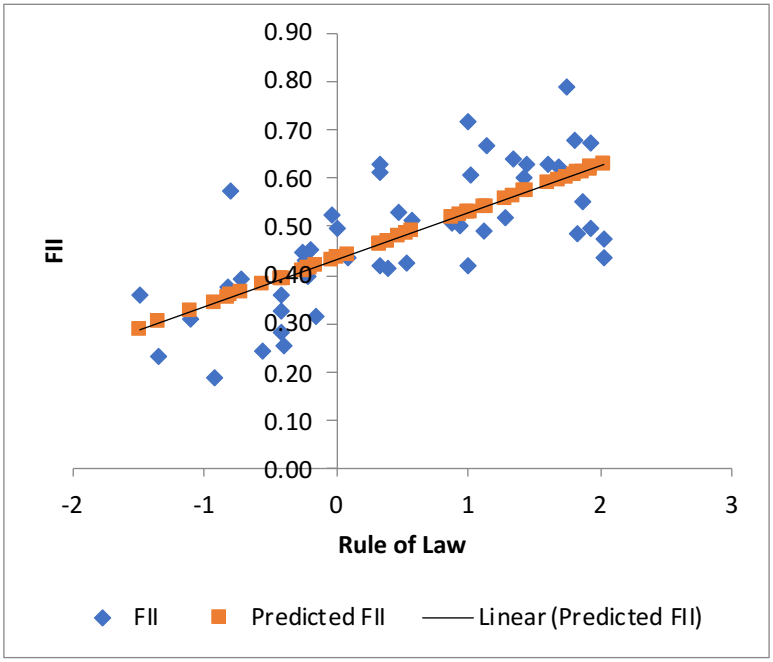
Regression Statistics	
Multiple R	0.727
R Square	0.529
Adjusted R Square	0.519
Standard Error	0.096
Observations	48
Coefficients	
Intercept	0.413
Gov. Effectiveness	0.115
P-value	0.000

Figure 12 Financial inclusion index and Regulatory quality



Regression Statistics	
Multiple R	0.635
R Square	0.403
Adjusted R Square	0.390
Standard Error	0.108
Observations	48
Coefficients	
Intercept	0.419
Regulatory Quality	0.095
P-value	0.000

Figure 13 Financial inclusion index and Rule of law



Regression Statistics	
Multiple R	0.707
R Square	0.500
Adjusted R Square	0.490
Standard Error	0.098
Observations	48
Coefficients	
Intercept	0.433
Rule of Law	0.097
P-value	0.000

In the next step of the analysis, the independent variables are split into groups: macroeconomic, socioeconomic, technological, and institutional factors (the composition of the subgroups are presented in the methodology in **Table 2**). The results of the correlation of subgroups with financial inclusion index are presented in **Table 7** and **Table 6**. The analysis hypothesizes that the variation in financial inclusion index can be

explained by the variation in these groups of factors. According to the summary in **Table 6**, the R-Square suggests that the 61.1% of variability in financial inclusion index can be explained by the variability in macroeconomic factors. Whereas the variation in technological factors explains only 42.1% of variation in financial inclusion. Socioeconomic and institutional factors also demonstrate impact on the variability in financial inclusion index – 57% and 55.4%, respectively.

Table 6 Summary output of regression statistics.

	All factors	Macroeconomic factors	Socioeconomic factors	Technological factors	Institutional factors
Multiple R	0.806	0.782	0.755	0.649	0.744
R Square	0.649	0.611	0.570	0.421	0.554
Adjusted R Square	0.533	0.563	0.515	0.346	0.485
Standard Error	0.090	0.089	0.092	0.107	0.096
Observations	45	46	45	45	46
p-value, statistical significance	0.00005806	0.00000023	0.00000231	0.00050989	0.00001079

Note: the table reports a summary of regression statistics of estimating the relation between the financial inclusion index (dependent variable) and country-level characteristics. P-value is below 0.05 which indicates high statistical significance of the presented correlation across all the subgroups. Due to limited data availability on some of the observed countries, the number of observations vary.

Next**, Table 7** reports the regression results of estimating the relation between financial inclusion and country-level factors, where the dependent variable is the financial inclusion index. The independent variables are macroeconomic, socioeconomic, technological, and institutional factors. Model (1) includes all the factors. Model (2) measures only macroeconomic determinants. Models (3), (4) and (5) measure socioeconomic, technological and institutional factors, respectively. Factors are alternatively changed in the model in order to avoid multicollinearity issue[2].

[2] Additional explanation on multicollinearity limitation is provided in the chapter on Methodology, on page 18.

Table 7 Regression analysis on financial inclusion index

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
GDP growth rate	-0.003036	-0.006369	-0.007267		
	(0.009287)	(0.007863)	(0.008130)		
GNI per capita	0.000006465**	0.000005705**			
	(0.000002819)	(0.000001267)			
Unemployment	0.002360	0.0008131	0.0008916	-0.001478	-0.001240
	(0.003365)	(0.002870)	(0.003226)	(0.003651)	(0.002966)
Population growth	-0.03207	-0.02841	-0.001335	0.01051	-0.01203
	(0.02197)	(0.01849)	(0.01758)	(0.01994)	(0.01854)
Inflation	-0.003459	-0.002395	-0.003546	-0.01042**	-0.006017
	(0.004312)	(0.003994)	(0.004170)	(0.004131)	(0.004403)
Mobile phone users	0.0004003			0.00003634	
	(0.0008591)			(0.0008908)	
Internet users	-0.001992			0.003664**	
	(0.002106)			(0.001671)	
HDI	0.1844		1.195**		
	(0.6911)		(0.3036)		
Government efficiency	0.08014				0.1523*
	(0.08954)				(0.07635)
Regulatory quality	-0.08323				-0.1047
	(0.06751)				(0.06329)
Rule of law	-0.009332				0.03611
	(0.08800)				(0.07867)
const	0.2533	0.3355**	-0.4837	0.2614	0.4816**
	(0.5050)	(0.08450)	(0.2923)	(0.1929)	(0.05696)
Observations n	45	46	45	45	46
Adj. R2**	0.5326	0.5629	0.5148	0.3464	0.4849
lnL	51.32	49.35	46.72	40.02	46.16

Standard errors in parentheses
** indicates significance at the 10 percent level*
*** indicates significance at the 5 percent level*

4.3. Discussion of results

The financial inclusion index used in this study indicates several considerations. First, the multidimensional index is based on the method applied by Honohan (2008), Sarma (2008), and Park and Mercado (2015), as well as in the similar calculation of various indices implemented by UNDP. Second, the derived financial inclusion index is

consistent with those indices computed in prior empirical research by Sarma (2008) and Park and Mercado (2015). This is demonstrated by the country ranking according to the financial inclusion index presented in Appendix B. Third, when splitting observations into income groups according to the derived financial inclusion index, there is a pattern similar to that discussed in works by Honohan (2008), Sarma (2008) and Allen et al. (2016). Finally, the simple calculation of the financial inclusion index allowed to provide a close approximation of the complex reality and to achieve valuable insights.

The correlation analysis emphasized important findings. The reported results suggest a negative correlation between financial inclusion and the GDP growth rate. This evidence is in contradiction to previous results of empirical studies such as the analysis by Van et al. (2021). However, the focus of those previous studies was mainly on the correlation with GDP per capita instead of the GDP growth rate. One of the possible explanations for the deviations could be that the GDP growth rate has no significant effect on the level of financial inclusion in the ECA region over the observed period. Another possible explanation could be that changes in economic cycle could have counter-cyclical effect on financial inclusion. It is possible that during the observed time frame the economic cycle was in a downturn, whereas the demand for financial services was increasing. Alternatively, the negative correlation could also be explained by the "catch-up effect" which is a phenomenon wherein poor countries tend to grow at a faster rate than rich countries (Mankiw & Taylor, 2018). Thus, the weak relationship of the variables can be explained by the mix of the high- and low- income economies in the observation.

The findings of strong positive correlation with GNI per capita are consistent with the similar study by Park and Mercado (2015), and Honohan (2008). This implies that income per capita might represent a main driver for the changes in financial inclusion in the observed 48 countries. As Park and Mercado (2015) claim, this indicates significant evidence that the population with insufficient income is at risk of being excluded from financial services.

The same consistency with Park's and Mercado's (2015) results was observed in results of correlation with rule of law, despite the fact that their sample had a different composition. In addition, government effectiveness and regulatory quality appear to have a statistically significant relationship with financial inclusion. This suggests that the

institutional environment can contribute to the variation of inclusiveness of financial system in ECA countries.

The results on the negative correlation between inflation rate and financial inclusion confirm the expectation that the high volatility in inflation rates have an adverse effect on the increase in access to financial services. This evidence is consistent with the findings of Rojas-Suarez (2010), and it might help to explain the variations in financial inclusion.

The results of the correlation with the HDI show the highest magnitude of effect and a positive association with financial inclusion. This is in line with the findings of Sha'ban et al. (2020) and Rojas-Suarez (2010) and also affirms the validity of the measurement. As expected, consumers with improved standards of living, financial education, and broader access to social services "develop a stronger "financial culture" (Rojas-Suarez, 2010, p.16). Therefore, it may be inferred that the socioeconomic environment reveals a wide variation in financial inclusion across ECA countries.

The results on internet usage indicate a strong positive correlation with financial inclusion, suggesting that 31.7% of variation in financial inclusion can be explained by internet usage. This evidence is in line with findings of Fanta and Makina (2019). Despite their study being conducted on a larger number of observations, it still can be extrapolated for the results of the current study.

The cross-country regression analysis identified a weak relationship of unemployment, population growth and mobile subscriptions with the financial inclusion index. Moreover, the determined p-value for these three variables (p-value > 0.05) indicated that there is insufficient evidence to explain the variation in financial inclusion. The analysis of mobile phone subscription corresponds with findings of Fanta and Makina (2019), where they established that this factor might have no influence on the usage of financial services[3]. With regard to population growth – the low significance effect can be explained by the limited time series and rather should be studied across longer timespan.

[3] The analysis of Fanta and Makina (2019) was conducted on 168 countries.

Finally, the weak association between unemployment and financial inclusion is also confirmed in the analogous study by Sha'ban et al. (2020), although their number of observations is larger. This finding can be explained by the fact that unemployed adults are still motivated to participate in the financial system, possibly by borrowing funds or opening savings account.

In the final step, the investigation reported results of the cross-country regression analysis of financial inclusion index with grouped factors in **Table *6*** and **Table 7**. The evidence in **Table *6*** revealed that the extent of cross-country variations in financial inclusion can be attributed mainly to macroeconomic and socioeconomic factors with 61.1% and 57%, respectively. Institutional factors can explain the differences in cross-country financial inclusion, however to a lesser degree, with 55.4%. Finally, technological factors resulted in only 42.1% of explained variation in financial inclusion.

Table 7 presented results of the regression model analysis where, among other factors in Model (1) and Model (2), the coefficient of GNI per capita has a positive and statistically significant effect. Evidently, the level of income of a population is positively associated with financial inclusion, which was also suggested in findings of a similar study by Sha'ban et al. (2020). The Model (3) confirms the statistical significance of HDI as a social and economic development factor that is positively correlated with financial inclusion. Technological specification in Model (4) emphasizes the positive relationship and statistical significance of internet usage. As expected, the coefficient of inflation has a negative relationship and is statistically significant. Finally, Model (5) indicates the positive association and statistical significance of government efficiency with financial inclusion.

The importance of the findings also suggests that individual factors should be considered jointly in a group, in order to refine statistical model. Moreover, multidimensional financial inclusion depends on a set of various conditions and aspects which ideally, should all be included in the analysis. The analysis of the cross-country regression with grouped factors suggests that all the determinants were consistent with prior similar empirical studies such as the one by Sha'ban et al. (2020) and Rojas-Suarez (2010), even though their sample size and the composite of observations somewhat differs.

5. Conclusion and Outlook

5.1. Conclusion

An inclusive financial system is essential for the welfare of individuals and households. Many studies conducted by academics and practitioners have identified a positive and important role of financial inclusion for a country's development and growth. In the period 2014-2017 there was a significant advancement in financial inclusion globally and across ECA countries. A number of studies focus on investigating which factors boost a change in inclusive financial system and to what degree. However, the topic of the underpinning factors contributing to the progress of financial inclusion in ECA countries is not yet well understood. Therefore, this bachelor thesis analyzed the variation in the change of financial inclusion across 48 countries of ECA region over the period 2014-2017. The central aim of the paper is to explain which factors and to what extent impact the change in financial inclusion.

In order to investigate this, first, the study constructed the financial inclusion index based on data of 48 countries over the period 2014-2017. The computation of the index is based on models applied in prior empirical research. The motivation for computing a multidimensional index is to integrate information of various dimensions of an inclusive financial system such as accessibility, quality, and usage into a single standardized measure (Sarma, 2008) per country across all the examined countries. Subsequently, the analysis correlated the derived financial inclusion index with selected country-level factors. Finally, the analysis correlated the financial inclusion index with factors clustered into groups: macroeconomic, socioeconomic, technological, and institutional factors.

In the first step of the investigation, the results of the regression analysis indicated that the variation of financial inclusion can be explained by a number of country-level factors. The illustrated results imply that the extent of the impact on the financial inclusion variation also varies. A higher GNI per capita, better institutional governance and HDI significantly contribute to the positive changes in the level of financial inclusion. In contrast, results of the analysis on population growth and technological factors indicated a lesser degree of influence on the financial inclusion in ECA countries; however, still suggesting some degree of influence.

In the next step, the analysis investigated the impact on the variation in financial inclusion by groups of factors. The findings indicate that macroeconomic and socioeconomic characteristics significantly influence the level of financial inclusion. This evidence suggests the importance of considering the level of income per capita, human development, health, education, and standard of living when developing policies to increase financial inclusion.

The significance of the above-mentioned findings suggests a number of policy-making considerations. First, with regard to HDI and income per capita, it should be considered devising policies and actions to increase the standard of living and to improve access for lower income populations to financial services.

Second, high institutional quality implies an increased trust in government integrity and in financial regulatory oversight, thereby encouraging the population to hold their savings in bank accounts (Galiani, Gertler & Ahumada, 2020). Therefore, the actions of authorities should also focus on strengthening governance and regulatory supervision. In addition, as Sahay et al. (2015) suggested, the focus on setting up improved financial supervision could help improve consumer protection against consumer unfriendly practices for provisioning of financial services, as well as avoiding excessive risk taking as occurred during the 2008 financial crisis.

In addition to opening accounts, the importance of *regular usage* of financial services must also be emphasized. Regular use of financial services is mainly reflected in making and receiving payments which in recent years have advanced, owing to digital payments. Even though the findings reported somewhat insignificant correlations between financial inclusion and technological factors, mobile phone and internet usage might still affect usage of financial services. A number of prior studies have identified the significance of technology as a driver in increasing financial inclusion (Fanta & Makina, 2019; Park & Mercado, 2015; Sha'ban et al., 2020). Policymakers should work closely with businesses and financial institutions in designing better digital access to financial services, which includes expanding technology infrastructure and telecommunication.

5.2. Limitations and future directions

The major limitation of the paper is that it focuses on analyzing ECA countries, where there is a great mix of high- and low-income countries which potentially skews results. The most important question for low-income countries is not how much financial assets the population segments below the poverty line have, but rather their access to financial services in general (Honohan, 2008). Therefore, a comprehensive study exclusively on low-income countries suggests itself. This is especially the case where institutional and technological characteristics differ significantly across ECA economies, as well as among low-income countries.

Another limitation of the study is that the set of parameters does not take into account variables such as gender, low-income population or disadvantaged groups. Additionally, for the considered variables the assumption is taken that the access level to mobile phone or internet is almost proportionate across observed countries. The same assumption is applied for credit and deposit variables, where the credit and deposit systems are assumed to be on a similar level across member countries. Ultimately, some of the countries, such as Turkmenistan, Tajikistan and Kosovo were lacking data in several dimensions as well as at the level of independent variables. Therefore, future, extended studies on this or similar topics need to consider the identified limitations.

With regard to additional future research, one of the interesting issues that could be researched is the role of small and medium sized but highly technological financial services companies – so called fintechs – offering their services to the population of a set of given countries. An analysis of the role of fintech companies might provide additional insights about which population segments have more and better access to financial services, whether there are any barriers for consumers in comparison to established financial institutions and if there are any risks to a financial system posed by said fintech companies. The study could use successful practices from countries with higher financial inclusion in order to understand strategies applied and lessons learned.

Additionally, it is possible that financial illiteracy in middle- and low-income countries still prevents the increase in financial inclusion and therefore, it could be suggested to

research effective implementation of financial education policies from higher income countries.

Finally, a global recession caused by COVID-19 pandemic impacted the economic growth in ECA region as well. According to the World Bank (2019) outlook, the regional growth was expected to continue gaining traction in 2020-21. However, due to the pandemic, the growth expectations might need some reconsideration. Financial exclusion might increase due to the limited movement possibilities of populations, due to pandemic related travel restrictions, as well as negative impacts to small and medium size businesses due to slowed economic activity. In this regard, it may be worth studying an impact of COVID-19 on the financial inclusion in ECA countries and what role can digital technology play in promoting more contactless payments.

6. References

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7. Appendices

7.1. Appendix A

Table 8 Definitions of variables and data sources

Variable	Definition	Source
Bank branches (Access)	Commercial bank branches per 100,000 adults	International Monetary Fund, Financial Access Survey Database: World Development Indicators.
ATMs (Access)	Automated teller machines per 100,000 adults	International Monetary Fund, Financial Access Survey Database: World Development Indicators.
Accounts (Use)	Population 15 years old and above to total population with an account in a financial institution (in %)	Database: Global Financial Inclusion
Payments (Use)	Percentage of population 15 years old and above to total population that made or received digital payments in the past year.	Database: Global Financial Inclusion
Credits (Quality)	Borrowed from a financial institution (% age 15+)	Database: Global Financial Inclusion
Deposits (Quality)	Deposit in the past year (% with a financial institution account, age 15+)	Database: Global Financial Inclusion
GDP growth rate	Annual percentage growth rate of gross domestic product at market prices based on constant local currency	Data from database: World Development Indicators

GNI per capita	GNI per capita expressed in current international dollars converted by purchasing power parity (PPP) conversion factor.	Data from database: World Development Indicators
Unemployment	Total unemployment (% of total labor force) (national estimate)	Data from database: World Development Indicators
Population growth	Population growth (annual %)	Data from database: World Development Indicators
Inflation	Inflation, GDP deflator (annual %)	Data from database: World Development Indicators
Mobile phones use	Mobile cellular subscriptions per 100 people	Data from database: World Development Indicators
Internet use	Individuals using the Internet (% of population).	Data from database: World Development Indicators
HDI	Human development index	UNDP Human development report 2015; UNDP Human development indices and indicators, Statistical report 2018
Government effectiveness	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the	Data from database: Worldwide Governance Indicators

	government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	
Regulatory quality	Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	Data from database: Worldwide Governance Indicators
Rule of law	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	Data from database: Worldwide Governance Indicators

7.2. Appendix B

Table 9 Country ranking by financial inclusion index (FII)

Rank	Country	FII	Rank	Country	FII
1	Luxembourg	0.79	25	Netherlands	0.48
2	Spain	0.72	26	Norway	0.48
3	Austria	0.68	27	Serbia	0.45
4	Switzerland	0.67	28	Turkey	0.45
5	Portugal	0.67	29	Finland	0.44
6	Belgium	0.64	30	Greece	0.44
7	Croatia	0.63	31	Macedonia, FYR	0.43
8	France	0.63	32	Hungary	0.43
9	Germany	0.63	33	Lithuania	0.42
10	United Kingdom	0.62	34	Georgia	0.42
11	Italy	0.61	35	Romania	0.41
12	Slovenia	0.61	36	Bosnia and Herzegovina	0.40
13	Ireland	0.60	37	Ukraine	0.39
14	Russian Federation	0.57	38	Belarus	0.38
15	Denmark	0.55	39	Turkmenistan	0.36
16	Poland	0.53	40	Kazakhstan	0.36
17	Bulgaria	0.52	41	Moldova	0.33
18	Estonia	0.52	42	Armenia	0.32
19	Slovak Republic	0.51	43	Uzbekistan	0.31
20	Cyprus	0.51	44	Kosovo	0.28
21	Latvia	0.50	45	Albania	0.25
22	Sweden	0.50	46	Azerbaijan	0.25
23	Montenegro	0.49	47	Tajikistan	0.23
24	Czech Republic	0.49	48	Kyrgyz Republic	0.19

Author's calculation

7.3. Appendix C

Table 10 List of countries used in the analysis

Albania	Latvia
Armenia	Lithuania
Austria	Luxembourg
Azerbaijan	Moldova
Belarus	Montenegro
Belgium	Netherlands
Bosnia and Herzegovina	Macedonia, FYR
Bulgaria	Norway
Croatia	Poland
Cyprus	Portugal
Czech Republic	Romania
Denmark	Russian Federation
Estonia	Serbia
Finland	Slovak Republic
France	Slovenia
Georgia	Spain
Germany	Sweden
Greece	Switzerland
Hungary	Tajikistan
Ireland	Turkey
Italy	Turkmenistan
Kazakhstan	Ukraine
Kosovo	United Kingdom
Kyrgyz Republic	Uzbekistan