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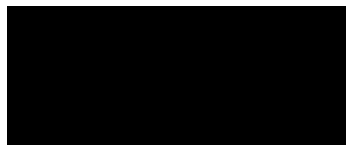
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Master thesis

Determinants of Financial Inclusion in Emerging Europe and Asia

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Management Summary

Financial inclusion is said to reduce poverty and inequality and support economic growth. This makes financial inclusion a prominent enabler of several of the Sustainable Development Goals defined by the United Nations. At its core, the concept envisages that all segments of society have access to and make use of a wide range of financial services and products. Many countries have understood the importance of financial inclusion and have implemented policies and developed frameworks to support inclusion in recent years. However, about 1.7 billion adults globally were still considered as unbanked in 2017. The factors that determine inclusion at the micro-level have been subject to many studies in the recent past and are already well understood. At the macroeconomic level however, the factors that determine financial inclusion remain less well explored.

The purpose of this thesis is to unveil the determinants of financial inclusion in Eastern Europe and Central Asia (EECA) in order to shed light on the different levels of success of the EECA countries in their efforts to increase financial inclusion. Using a binary output model, financial inclusion indicators, such as account ownership and savings, are linked with macroeconomic variable that were found in the literature to support financial development. The selected inclusion indicators, socioeconomic as well as macroeconomic variables are observed for the years 2011, 2014 and 2017 and the resulting panel data is then quantitatively analyzed using the probit regression model.

Financial openness, trade openness, inflation, GDP per capita and borrower's rights protection are all significant determinants of financial inclusion. However, the effect of these variables differs between account ownership and savings. While all macroeconomic variables studied in this thesis are positive and significant determinants for account ownership, only trade openness and GDP per capita positively influence savings. Financial openness, inflation and borrower's rights protection have a negative effect on savings. Financial openness and inflation have the largest effect on account while trade openness is most relevant for savings.

The results indicate that governments and policy makers in the EECA region can play an important role in increasing the level of financial inclusion. Dedicated policies influencing the relevant socio- and macroeconomic variables could be implemented to support each of the respective financial inclusion indicator.

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Abbreviations

AFI	=	Alliance for Financial Inclusion
ECA	=	Europe and Central Asia
EECA	=	Eastern Europe and Central Asia
EDU	=	Education
FD	=	Financial Development
FI	=	Financial Institutions
FINO	=	Financial openness
FM	=	Financial Markets
GDP	=	Gross Domestic Product
IMF	=	International Monetary Fund
INFL	=	Inflation
INCq	=	Income quintile
LR	=	Likelihood ratio
SDG	=	Sustainable Development Goals
SLR	=	Strength of Legal Rights
Std.Dev	=	Standard Deviation
TRO	=	Trade openness

1. Introduction

The following chapter introduces the problem statement and outlines the research question and limitations of this thesis. The chapter will close by giving an overview of the structure of this thesis.

1.1 Motivation

Inclusion is a key aspect of human life. No one wants to feel excluded, not welcomed or not valued. Inclusion is not only a key endeavor for society, companies or businesses, but also markets, products and services should aim to be inclusive. Financial markets for instance are still not fully inclusive. This not only poses a problem for the economy but also, more importantly, for the individuals being excluded from the system. It is widely recognized that financial inclusion can help to reduce poverty, to increase equality, and to achieve organic and sustainable economic growth. Therefore, it must be an economic goal to enable a financial marketplace, which is fully inclusive. But what drives financial inclusion? Which socio- and macroeconomic factors increase inclusion and which factor is the most important? The aim of this thesis is to learn more about what determines financial inclusion.

1.2 Problem Statement

Well-functioning and thriving economies are built on the foundation of a stable, reliable, and efficient financial system. This foundation allows the participants to mobilize savings to make productive investments, offers them efficient and safe payment systems and provides them with insurance services that lower exposures to risk and hardship. Yet many financial systems are not fully inclusive, leaving millions of people and small businesses unbanked. It is believed that providing access to and improving the use of financial services for these individuals can increase their involvement in the economy, reduce their vulnerability and even lift them out of poverty. At the same time, it is widely recognized that an inclusive financial system can act as driver for economic growth. As a growing theme in the financial development space, financial inclusion has received considerable attention in the last years. Governments and policy makers have already been trying to increase individuals' access to and use of formal financial services with considerable success. Since the inception of the Global Findex database as a structured

tool to measure financial inclusion in 2011, global access to financial services has increased by 18 percentage points to 69 percent in 2017 (Demirgüç-Kunt, Klapper, Singer, Singer, Ansar & Hess, 2018). Despite this upward trend, bringing the unbanked onto the financial system remains a key topic on the agenda of many countries, as well as being regarded as one of the key enablers to several of the seventeen Sustainable Development Goals. Despite this longstanding attention and recent success, the 2017 Global Findex database revealed that around 1.7 billion adults still do not have a bank account at a financial institution or a mobile money provider, hence, remain unbanked. Account ownership is almost universal in the developed world and among high-income countries. This implies that the majority of unbanked adults live in the developing world. In Europe and Central Asia (ECA) for example, the developing countries of Eastern Europe and Central Asia (EECA) confirm this proposition as the majority of the 116 million unbanked adults of Europe and Central Asia live in this EECA region. Even within the EECA region, there are still substantial differences between the levels of inclusion and in the recent advances thereof. Between 2014 and 2017, Armenia, Georgia, the Kyrgyz Republic, Moldova, and Tajikistan have all shown significant increases in account ownership, while their neighbors, Azerbaijan and Uzbekistan have only seen small improvements. While the different levels of success between the EECA countries are well documented, the underlying determinants are less clear. There has been much research studying the determinants on a micro-level such as gender, education and income. Yet the macroeconomic and institutional factors that can support financial inclusion remain less explored, particularly for the EECA countries.

1.3 Research Question

EECA countries understand the importance of financial inclusion and have tried to increase bank account ownership and use over the past decade with varying success. Understanding the determinants of financial inclusion is therefore crucial. Yet a gap in understanding has existed about which macroeconomic variables support financial inclusion and can explain the different levels of success among the EECA countries. Building on financial development theory, this master thesis aims to answer the following central research questions:

- i) What are the macroeconomic variables that are facilitating financial sector development?

- ii) Which of these variables can explain the different level of success of Eastern Europe and Central Asia countries in increasing financial inclusion and to what extent do these factors influence inclusion?

This thesis focuses on the period between 2011 and 2017 and studies the effects in the 13 countries of Eastern Europe and Central Asia which is a subset of the Europe and Central Asia¹ region. Table 1 provides an overview of the countries considered for this thesis:

Table 1. Countries covered by this thesis

Eastern Europe and Central Asia	South Caucasus	Central Asia	Russia	Turkey	Eastern Europe
	Armenia Azerbaijan Georgia	Kazakhstan Tajikistan Turkmenistan Kyrgyz Republic Uzbekistan	Russia	Turkey	Belarus Moldavia Ukraine

1.4 Limitations

The objective of this thesis is to explore macroeconomic determinants of financial inclusion in Emerging Europe and Asia. For the purpose of this thesis, Emerging Europe and Asia is defined as Eastern Europe and Central Asia. Due to the availability of data, only the years 2011, 2014 and 2017 are considered which is harmonized with the publication of the Global Findex Database reports. While for the theoretical framework and literature review a global view has been taken, the empirical part is focused only on the thirteen EECA countries. This study makes exclusive use of the probit estimation model as an econometric tool.

1.5 Structure

Following this introductory section, the theoretical framework of financial development and financial inclusion is explained. This second section also provides an overview of the

¹ <https://www.worldbank.org/en/region/eca>

macroeconomic variables found in the literature that support financial development. Following an overview of the current state of financial inclusion in Eastern Europe and Central Asia in section 3, the methodology for the data collection and econometric analysis is outlined in section 4. The results are presented and discussed in section 5 and the thesis is concluded in section 6 suggesting areas worthwhile for further research.

2. Theoretical Framework

In this chapter, the theoretical concepts of financial development and financial inclusion are examined, and their measurement outlined. A detailed overview of macroeconomic factors supporting financial development is presented, followed by the relevant characteristics of financial inclusion. The chapter closes explaining why financial inclusion is important.

2.1 Role of the Financial Sector

The financial system plays a critical role for society at large, serving individuals, households, businesses, governments, and other institutions. It includes many different types of institutions: banks, insurance companies, mutual funds, stock and bond markets as well as the legal and regulatory frameworks that permit transactions. A well-functioning financial system has a pivotal purpose: channeling billions of dollars per year from savers to people with investment opportunities (Mishkin, 2004). It also offers products to people and businesses with a broad range of financial needs. These needs range from savings, payment, credit, or the requirement to manage risk (Demirgüç-Kunt & Klapper, 2013, p. 279). Various studies have examined the role of the financial system and have outlined its importance for an economy along the key functions of a financial system. Levine (2005, p. 6) developed a comprehensive view on what the key functions of a financial system are: (i) producing and processing information about possible investment opportunities and allocating capital based on these assessments; (ii) monitoring individuals and firms and exerting corporate governance after providing finance (or “allocating capital” as per Čihák, Demirgüç-Kunt, Feyen & Levine, 2012, p. 5); (iii) facilitating trading, diversification, and management of risk; (iv) mobilizing and pooling savings; and (v) easing the exchange of goods, services, and financial instruments. Each of these functions can influence saving and investment decisions, and the efficiency with which capital is allocated can in sum lead to economic growth. In addition, financial systems should also provide functions for the benefit of the overall economy by (i) promoting financial and economic resilience and (ii) providing effective markets, which means enabling consistent access to a broad set of investment opportunities at fair, accurate and transparent market prices. But financial markets and institutions around the world differ substantially in how well they provide these key services, and this effects how well developed they are. According to the IMF Financial

Development Index in 2017², Switzerland has the most financially developed economy (index score of 0.95) while Turkey, for example – which is the highest ranked country of the EECA region – ranked 35th (index score of 0.53). Other EECA countries such as the Kyrgyz Republic or Turkmenistan were located at the very end of the ranking (index score of 0.12). This reveals not only the massive disparity between the most and the least financially developed countries worldwide, but also shows that different maturity levels exist within the same geographic region, in this case, the EECA region. A well developed, efficient, reliable, and resilient financial system should be a priority for any economy. An efficient marketplace reduces information cost, contracting and transaction costs and at its highest efficiency levels, investors receive the highest risk-adjusted returns on their investments and borrowers minimize the costs of raising capital. However, financial markets are often imperfect. Inefficient markets increase the possibility that a financial system may prevent individuals from benefiting from the system's advantages. These – often less privileged – individuals are referred to as unbanked or financially excluded people. Financial inclusion, generally referred to as the process of increasing access and use of formal financial services for all individuals aims to onboard individuals to the financial sector.

2.2 Finance and growth nexus

Economists differ in their views on role of the financial system in economic growth. One side of the literature exemplified by Nobel Laureate Robert Lucas dismisses finance as a determinant for economic growth. The view of this school of thought is that finance responds to changing demands from the real sector but does not cause growth (Robinson, 1952; Lucas, 1988; Arcand, Berkes & Panizza, 2012). The other side supports the view that finance is an engine of growth (Schumpeter, 1912; Gurley & Shaw, 1955; McKinnon, 1973; Bencivenga & Smith, 1991; King & Levine, 1993; Levine, Loayza & Beck, 2000). In recent years, the view of the proponents for the existence of the finance-growth relationship has gained wider acceptance driven primarily by the seminal contributions of Goldsmith (1969) and King and Levine (1993). Building on the work of Goldsmith (1969), and using cross-country data, King and Levine were able to show strong positive

² See Financial Development Index Database under <https://data.imf.org/?sk=F8032E80-B36C-43B1-AC26-493C5B1CD33B>

relationship between each of the financial development indicators used in their study (DEPTH³, BANK⁴, PRIVY⁵) and the three growth indicators (1) average rate of real per capita GDP growth, (2) average rate of growth in the capital stock per person, and (3) total productivity growth. However, while King and Levine were able to show that finance predicts growth, they did not deal with the question of causality, nor did they focus on any actors other than banks (Levine, 2005, p. 892). Given the theoretical debate about whether larger, more liquid equity markets influence economic growth positively or negatively, enlarging the scope of research to assess the relationship between stock market development and economic growth seemed logical. Levine and Zervos (1998) found in their study that the level of stock market liquidity and the initial level of banking development are positively and significantly correlated with future rates of economic growth. In addition, the authors also found that stock market size (measured by market capitalization divided by GDP) was not robustly correlated with growth (Levine 2005). In a study conducted by Beck (2011), several channels were explored through which a financial system could positively influence economic growth rates: some with the tendency to grow and some with the tendency to slow down the economy. The mechanism observed was that allocating capital to more productive use, smoothening the demand of individual firms and households and thereby reduce search costs. This allowed more firms and households to borrow for potentially high-return investments resulting in increased overall growth. On the other hand, the expansion of an already large financial sector could also restrain growth by misallocating capital to projects with too low profitability (Cournède & Denk, 2015). In a seminal paper, Rajan and Zingales (1998) showed that industries that depend more on external financing grew faster in countries with higher levels of financial development. It is important to note that this effect is relative because it is gauged by differences-in-differences – the difference between a high-dependence and low-dependence industry in a well-developed financial system compared to in a less developed financial system. The allocation of credit through a financial system works as a channel between the financial and real sector and can be used to finance working capital

³ DEPTH is a measure of the size of financial intermediaries. It equals liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries) divided by GDP.

⁴ BANK equals the ratio of bank credit divided by bank credit plus central bank domestic assets.

⁵ PRIVY is the total credit to private enterprises divided by GDP.

requirements (increasing production) or investment in profitable investment projects (enhancing productivity) (Guru & Yadav, 2019). Long term sustainable economic growth depends on the ability to raise the rates of human capital, to use resulting productive assets more effectively and to ensure the access of those assets to the population. Financial intermediaries do support this investment process by mobilizing household and foreign savings for the investments by the firms, ensuring that the funds are allocated to the most productive use and by spreading the risk through differentiation (Afshar, 2013, p. 438). Levine (2005) concluded that a growing body of empirical analyses demonstrated a strong positive link between a functioning financial system and economic development. However also remarked on some of the peculiarities when modeling finance and growth, and outlined the contrarian view that finance-follows-growth. Additional research on the co-evolution of finance and growth is needed. In a literature review on several studies on financial inclusion and growth, Mader (2018) concluded that the finance-growth nexus is mainly an assumption and that a causal connection remains unclear. Yet even he asserts that if there would be one, that it is economic development that drives both financial development and inclusion respectively.

2.3 Financial Development

Financial systems are not perfect. It requires considerable effort and cost for individuals to research information about potential investments. Individuals are also confronted with contracting costs (i.e. for writing, interpreting, and enforcing contracts) and the costs occurring when transacting a good or service or dealing with a financial instrument (Čihák et al., 2012). These imperfections hamper the execution of the key functions of a financial sector and are detrimental to economic growth. Motivated by profits, people created institutions (such as banks and insurance companies), financial markets (i.e. stock, bond and derivatives markets) along with a broad variety of financial products to reduce the effects of these market imperfections. This led to reducing the costs of acquiring information, enforcing contracts, and reducing transaction costs (Čihák et al., 2012). According to Čihák et al. (2012) on the conceptual level, financial development occurs when financial markets, institutions and instruments mitigate the effects of imperfect information, limited enforcement, and transactions costs. For example, the creation of credit repositories was intended to improve acquisition and distribution of information about potential borrowers, improving the allocation of resources with positive effects on

economic development. Another example: economies with effective legal and regulatory systems have facilitated the development of equity and bond markets that allow investors to hold more diversified portfolios than they could have without efficient securities markets. This greater risk diversification can facilitate the flow of capital to more promising investments. As outlined earlier in section 2.2, financial sector development plays an important role in economic development. It promotes economic growth through capital accumulation and technological progress by increasing the savings rate, mobilizing and pooling savings, producing information about investments, facilitating and encouraging the inflows of foreign capital, as well as optimizing the allocation of capital (World Bank⁶). The common consensus is that countries with better-developed financial systems tend to grow faster, and a large body of evidence suggests that this effect is causal. In many economies, small and medium sized enterprises (SME) are the backbone of the economy, and the development of the financial sector can increase their growth by providing them access to finance. Financial sector development goes beyond just having financial intermediaries and infrastructures in place. It entails having robust policies for regulating and supervising all of the important entities. The financial crisis of 2008 has illustrated the potentially disastrous consequences of weak financial sector policies for financial development and their impact on economic outcomes. Financial development happens when the key functions of a financial system are improved and its frictions and imperfections reduced, making the financial sector overall more efficient, reducing information costs, contracting costs (writing, interpretation and enforcement) transaction costs and also expanding financial access (Guru & Yadav, 2019). Financial frictions have been found to constitute a poverty trap, at least in the short term, indicating the necessity of policies to reduce those frictions (see Barajas, Beck, Belhaj & Ben Naceur, 2020 for a review of the literature). Countries with better-developed financial systems tend to enjoy a sustained period of growth, and studies confirm the causal link between the two: financial development is not simply a result of economic growth; it is also the driver of that growth. Development of a financial system may be defined as the development of the size, efficiency, stability and access of financial markets and financial institutions. Eventually, the constellation of financial institutions and markets facilitates the provision of financial services (Svirydzhenka, 2016).

⁶ <https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/financial-development>

2.3.1 Measurement of Financial Development

A country's level of financial development can be defined as the extent to which the functions of the financial sector are being carried out (Barajas et al., 2020). So far, the role of the financial system and the concept of financial development has been introduced. But what is important to understand is how well financial systems perform their key functions. If they perform these functions poorly, it may be to the disadvantage of economic growth or might even destabilize the economy. If, for example, financial institutions create complex financial instruments and sell them to unsophisticated investors, they might boost the bonuses of the financial engineers and executives associated with marketing the new instruments, while simultaneously distorting the allocation of society's savings and impeding economic prosperity (Cihak et al., 2012). It has proven to be difficult to measure financial development due to its comprehensive nature and multidimensionality. Empirical work was generally based on standard quantitative indicators available over long time series for a broad range of countries. For instance, the ratio of financial institutions' assets to Gross Domestic Product (GDP), the ratio of liquid liabilities to GDP, and the ratio of deposits to GDP. The empirical literature predominantly used two measures of financial depth to approximate financial development: the ratio of private credit to GDP and, to a lesser extent, by stock market capitalization, also as a ratio to GDP. However, one must consider that financial systems around the globe have evolved over time and have become multifaceted. The present diversity of financial systems implies that it is necessary to look at multiple indicators to measure financial development. In 2012, Cihak et al. (2012) launched the Global Financial Development Database (GFDD)⁷ which combined several financial databases into one comprehensive set of financial data on the country level. On the back of this database, they further developed a conceptual approach that consists of four characteristics of each financial markets and institutions to measure and benchmark financial systems. This framework identified four sets of proxy variables which characterize a well-functioning financial system: (i) the size of financial markets and institutions (referred to as financial depth), (ii) the degree to which individuals have access to and use institutions and markets (access), (iii) the efficiency of the institutions and markets in providing financial services (efficiency), and (iv) the stability of financial

⁷ <https://databank.worldbank.org/reports.aspx?source=global-financial-development>

institutions and markets (stability). Table 2 provides an overview of these variables and their assignment to the respective categories identified through a principal component analysis.

Table 2. 4x2 matrix of financial system characteristics

	Financial Institutions	Financial Markets
Depth	Private sector credit to GDP [¥] Financial institutions' assets to GDP [¥] M2 to GDP Deposits to GDP Gross value-added of the financial sector to GDP	Stock market cap plus outstanding domestic private debt securities to GDP Private debt securities to GDP [¥] Public debt securities to GDP [¥] International debt securities to GDP [¥] Stock market cap to GDP [¥] Stocks traded to GDP [¥]
Access	Accounts per thousand adults (commercial banks) Branches per 100'000 adults (commercial banks) [¥] % of people with a bank account % of firms with line of credit (all firms) % of firms with line of credit (small firms)	Percent of market cap outside of top 10 largest companies [¥] Percent of value traded outside of top 10 traded companies Government bond yields (3 month and 10 years) Ratio of domestic to total debt securities Ratio of private to total debt securities (domestic) Ratio of new corporate bond issues to top GDP
Efficiency	Net interest margin [¥] Lending-deposits spread [¥] Non-interest income to total income [¥] Overhead costs (in % of total assets) [¥] Profitability (return on assets, return on equity) [¥] Boone indicator (or Herfindahl or H-statistics)	Turnover ratio (turnover/capitalization) for stock market [¥] Price synchronicity (co-movement) Private information trading Price impact Liquidity/transaction costs Quoted bid-ask spread for govt. bonds Turnover of bonds on securities exchange Settlement efficiency
Stability	Z-score (or distance to default) Capital adequacy ratios Asset quality ratios Liquidity ratios Other (net foreign exchange position to capital etc.)	Volatility of stock price index, sovereign bond index Skewness of the index Vulnerability to earnings manipulation PE ratio Duration Ratio of short-term to total bonds Correlation with major bond returns (DE, US)

Note: Examples of indicators are given for each box. Indicators marked with [¥] are also used by Svirydzenka (2016) for the FD index computation. For a complete list of indicators refer to Svirydzenka (2016, p. 8).

Source: Čihák et al. (2012)

Extending the conceptual framework and its indicators shown in Table 2, Svirydzenka (2016) introduced a new broad index to assess financial development. Besides supplementing the GFDD with additional financial data (i.e. debt securities, corporate

debt), they aggregated the various information into individual indices along the 4x2 dimensions of Table 2, all summarized in one overall measure of financial development – the FD Index. In 2017 for example, Turkey was the country with the highest FD score (index of 0.53) among the EECA countries, yet it was still well behind most Western European countries. Table 3 provides an overview of EECA countries FD ratings compared with selected European countries. Shown are the Financial Development index (FD), the aggregate index of Financial Institutions (FI) and Financial Markets (FM) as well as their respective indices along the dimension of access, depth and efficiency (denoted by adding _A, _D and _E respectively for both FI and FM).

Table 3. Financial Development Index, 2017, EECA and EU selection

	EECA													EU selection		
	ARM	AZE	BLR	GEO	KAZ	KGZ	MOL	RUS	TJK	TUR	TKR	URK	UZB	GER	BEL	CHE
FD	0.24	0.20	0.17	0.30	0.31	0.12	0.21	0.47	0.09	0.53	0.12	0.21	0.21	0.71	0.67	0.95
FI_A	0.55	0.27	0.26	0.72	0.37	0.24	0.47	0.83	0.12	0.57	0.00	0.45	0.54	0.65	0.78	0.91
FI_D	0.11	0.06	0.08	0.14	0.17	0.05	0.08	0.18	0.04	0.19	0.00	0.11	0.01	0.62	0.63	0.98
FI_E	0.67	0.64	0.66	0.72	0.45	0.36	0.67	0.56	0.36	0.62	0.71	0.47	0.50	0.67	0.78	0.75
FI	0.46	0.32	0.32	0.55	0.34	0.22	0.41	0.57	0.17	0.48	0.20	0.36	0.37	0.70	0.79	0.97
FM_A	0.04	0.02	0.01	0.03	0.52	0.02	0.00	0.47	0.00	0.36	0.00	0.00	0.00	0.62	0.44	0.99
FM_D	0.03	0.18	0.01	0.07	0.26	0.01	0.01	0.32	0.01	0.34	0.07	0.08	0.13	0.71	0.76	0.99
FM_E	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.28	0.00	1.00	0.00	0.05	0.00	0.76	0.34	0.66
FM	0.02	0.07	0.01	0.04	0.27	0.01	0.00	0.36	0.00	0.56	0.03	0.05	0.05	0.70	0.53	0.89

Note: ARM=Armenia, AZE=Azerbaijan, BLR=Belarus, KAZ=Kazakhstan, KGZ=Kyrgyz Rep., MOL=Moldova, RUS=Russia, TUR=Turkey, TKR=Turkmenistan, TJK=Tajikistan, URK=Ukraine, UZB=Uzbekistan, GER=Germany, BEL=Belgium, CHE=Switzerland.

Source: Financial Development Index, IMF

2.3.2 Factors affecting Financial Development

There exists an extensive body of literature which investigated the impact and effects of financial development on the economy, growth in particular. However literature on what matters for financial development is scarce, and understanding the driving factors behind financial development is a key issue. Among the most studied factors are institutions and the legal origin and regulatory environment (La Porta, Lopez, Shleifer & Vishny, 1999; Huang, 2010; Almarzoqi, Ben Naceur & Kotak, 2015; Allen, Demirgüç-Kunt, Klapper &

Martinez 2016). La Porta, Lopez, Shleifer & Vishny (1997) found that financial development is stronger in economies with a strong legal and regulatory environment, and where the property and creditor's rights are better protected and enforced. The political environment has also received substantial attention in the literature. It has been argued that financial development is constrained in economies where a narrow elite or interest group exerts significant pressure on the shape of policies and reforms (Almarzoqi et al., 2015). A more specific political factor was examined by Girma & Shortland (2008) who showed that democracy characteristics and regime stability promote financial development. In addition to democratic institutions, Huang (2010) considered geographical characteristics (latitude, access to the sea and distance from large markets) as contributing factors in the development of financial markets. Rajan and Zingales (2003) hypothesized that the opening of the economy to international trade and finance may weaken the political influence of the domestic elite or special interest groups which could lead to an increase in financial development. They concluded that financial sector development would be limited when the economy is open to only trade or capital. Consequently, an economy's financial sector needs simultaneous opening of trade and capital borders for development to happen. Using a global sample, they showed that financial development and trade openness are positively correlated when cross border flows are high. This finding also emphasizes the importance of institutions to form a counterpart against influential groups pursuing an agenda that might be obstructive to financial development. Chinn & Ito (2002, 2005) showed that financial openness (measured by capital account liberalization) had a positive effect on financial development. They have introduced an index measuring a country's degree of capital account openness (the "Chinn-Ito index"). Financial and trade openness have further been found significant determinants of banking sector development. Of the different macroeconomic factors such as inflation, income level (in terms of GDP per capita), savings rate or interest rate levels, inflation has received the most attention in recent literature, even though the results have been mixed (Huang, 2010; Nwala & Fodio, 2019). Higher inflation reduces real returns and makes investment and saving less attractive (Almarzoqi et al., 2015). There exists empirical evidence that lower levels of inflation aids financial development (Boyd, Levine & Smith, 2001; Rousseau & Wachtel 2002). Or rather, economies with high inflation rates are prone to have smaller, less active, and inefficient financial institutions and equity markets. Rousseau and Wachtel also addition found that the finance-growth nexus breaks apart in economies with inflation rates over

13 percent. Yet Nwala & Fodio (2019) found that inflation significantly explains the financial development in Nigeria among other factors such as money supply, interest rate and financial openness. In a recent study by Aggarwal, Demirgüç-Kunt & Martinez (2006) a significant positive influence of remittances on financial development was shown. Seetanah, Padachi, Hosany & Seetanah (2010) investigated the determinants on financial development in Mauritius using a time series analysis for the period of 1970-2008. The results of their study showed that trade openness, financial liberalization, level of institutional quality, investment rate per capita and financial literacy rates are important factors for financial development. However, they found that inflation adversely influenced development in the short and in the long run. Aluko and Ajayi (2018) examined the determinants of banking sector development in sub-Saharan Africa using a panel of 25 countries from 1997 to 2014. They built a model along the different development theories such as endowment theory, law and finance theory, simultaneous openness hypothesis, the McKinnon-Shaw hypothesis, the demand-following hypothesis, and inflation and finance theory. They found that simultaneous openness to trade and capital does positively influence banking sector development, hence also financial sector development. Depending on the chosen banking sector development indicator, their results varied with regards to the effect of law, inflation, trade openness or religion.

Table 4 provides an overview of macroeconomic factors that are said to support financial development. The signs in the expected influence column indicate the direction in which the literature expected each factor may to affect development. The selected macroeconomic variables considered for the empirical part of this paper will be discussed in detail in section 4.2.3.

Table 4. Macroeconomic factors influencing financial development

Variable	Expected Influence	Reference
Institutional quality	Positive (+)	Huang (2010) Almarzoqi et al. (2015) Allen et al. (2016)
Political environment	Positive (+)	La Porta et al. (1997) Almarzoqi et al. (2015)
Legal and regulatory environment	Positive (+)	La Porta et al. (1999) Girma & Shortland (2008)
Trade openness	Positive (+)	Rajan & Zingales (2003) Seetanah et al. (2010)
Financial openness	Positive (+)	Chinn & Ito (2002, 2005) Law & Habibullah (2009) Seetanah et al. (2010)
Inflation	Mainly negative (-)	Aggarwal et al. (2006) Seetanah et al. (2010) Nwala & Fodio (2019) Boyd et al. (2001) Boyd et al. (2001)
Income level	Positive (+)	Rousseau & Wachtel (2002) Huang (2010)
Interest rate	Positive (+)	Nwala & Fodio (2019)
Savings rate	Positive (+)	Huang (2010)
Remittances	Positive (+)	Aggarwal et al. (2006)
Geographical characteristics	Mixed (+ / -)	Huang (2010)
Democracy	Positive (+)	Girma & Shortland (2008)
Religion	Negative (-)	Huang (2010)

Source: Own research, tabular view is based on Aluko & Ajayi (2018).

2.4 Financial Inclusion

Even though economies have a financial system that serves a vital purpose for that economy's development, by offering savings, payment, credit, and risk management services, not every financial system is fully inclusive. Even well-developed financial systems have not necessarily succeeded in being completely inclusive and certain segments of the population still remain outside the formal financial system (Sarma, 2008). In 2017, globally about 1.7 billion adults above 15 years of age were reported to not have

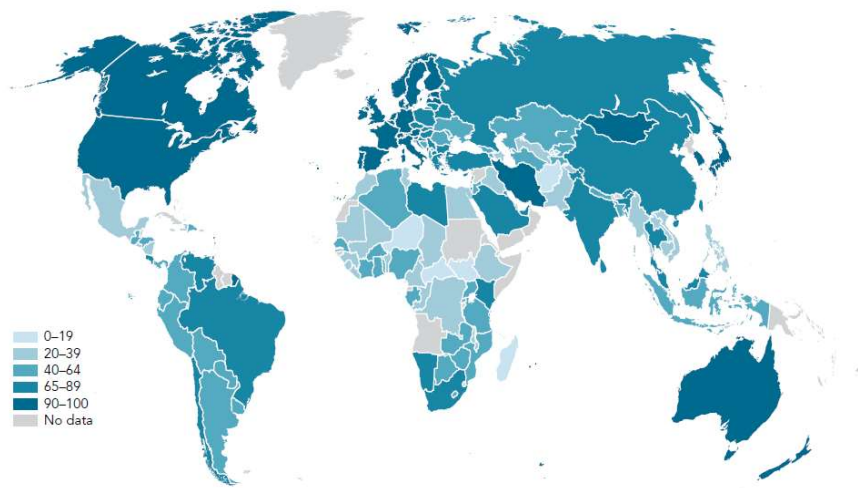
access to and make use of formal financial services and products (Demirgüç-Kunt et al., 2018). Because account ownership is almost universal in high-income economies, virtually all of these unbanked adults live in the developing world (Demirgüç-Kunt & Klapper, 2012; Demirgüç-Kunt et al., 2017). This means that 31 percent of the world's population above 15 years of age do not have an account at a financial institution or with a mobile money provider which can be used to receive and make payments, nor do they have the ability to store and save money. They also may lack in other areas of inclusion (such as access to credit or the use of insurance) hence the possibility to improve personal well-being and reduce poverty may be detained (Sahay et al., 2015). Financial inclusion is a multifaceted concept. It goes beyond the access to and use of payment and savings accounts to incorporate the availability of credit, insurance, and pension products as well as access to securities markets without price or nonprice barriers. This allows adults to invest in their education or the education of their children, save for retirement, invest in business opportunities and better manage financial risks using formal insurance products (Sahay et al., 2015; Demirgüç-Kunt et al., 2017). Among the many definitions of financial inclusion, Atkinson and Messy (2013) provide an encompassing definition on financial inclusion:

“[...] the process of promoting affordable, timely and adequate access to a wide range of regulated financial products and services and broadening their use by all segments of society through the implementation of tailored existing and innovative approaches including financial awareness and education with a view to promote financial well-being as well as economic and social inclusion [...].”

In the past years, financial inclusion has received increasing attention from policy makers who have adopted explicit policies to boost financial inclusion (World Bank, 2014). However active involvement of policy makers and governments to promote the extension of formal financial services to underrepresented groups was not always the case. Before the concept of financial inclusion was adapted, microfinance – the provision of small, short-term, high interest loans to low-income or unemployed groups who would otherwise not have access to financing – emerged in the 1970s, and was the subject of growing interest in the following years. In the last decade though, microfinance has received several critiques due to its high interest rates and fixation on credit over financial services. Even its impact on poverty reduction has been questioned (Mader, 2018). Since then, the concept of financial inclusion has emerged, offering very distinct differences to

its predecessor. In microfinance, governments were primarily focused on deregulation and paving the way for the financial sector to grow. Under financial inclusion the role of the government changed substantially. Governments now went to actively promote financial inclusion by creating environments that enable a broad range of financial service providers by reshaping policy and the legal and regulatory environment (Mader 2018). This strategic shift was necessary. In 2011, around 2.7 billion adults were reported as being excluded from the formal financial system. Since then, financial inclusion across the globe is on the rise. The Global Findex database showed that since 2011, 1.2 billion adults have obtained an account at a financial institution or through a mobile money provider, with 515 million of these adults having obtained their accounts since 2014. (Demirgüç-Kunt et al., 2018). According to Global Findex data, 69 percent of adults had an account in 2017, representing an increase of 7 percent since 2014 and 18 percent since 2011. One prominent reason for the recent increase was the introduction of “mobile money” in the past years that has enabled millions of people to receive money or pay bills via their mobile phone. Figure 1 shows the percentages of adults around the world having an account.

Figure 1. Adults (age 15+) with an account, in %, 2017



Source: Demirgüç-Kunt et al. (2018)

Financial inclusion is said to be prominently positioned as an enabler of several developmental goals in the 2030 Sustainable Development Goals (SDGs) where it is

represented as a target in eight of the seventeen goals⁸. The World Bank Group considers financial inclusion so fundamental to universal well-being that it has launched a global goal to reach universal financial access by 2020. Yet there are critics who say that the agenda of the SDGs is not ambitious enough, since financial inclusion is not included as a stand-alone goal. They argue that this misses an opportunity to explicitly find ways to meet the financial need of the poor (Fu, Queralt & Romano, 2017).

2.4.1 Measuring Financial Inclusion

A complex and multidimensional concept such as financial inclusion requires an encompassing set of data which provides insights on the current level of inclusion and shed light on the areas that need further attention. Until recently, the measurement primarily focused on density indicators such as the number of bank branches or automated teller machines (ATMs) per capita. The data were compiled by surveying financial providers and provided a good understanding on the use of financial services. However, little information was available to illuminate the global reach of the financial sector, meaning the extent of financial inclusion and to which degree poor, woman and other segments were excluded from the financial sector (Demirgüç-Kunt & Klapper, 2012). In 2011, the World Bank has launched the Global Financial Inclusion (Global Findex) database to provide systematic indicators of the use of different financial services (Demirgüç-Kunt & Klapper, 2012). These indicators are drawn from nationally representative surveys⁹ of more than 150'000 adults above 15 years of age in over 140 economies around the world. Following the first survey in 2011, two more rounds in 2014 and 2017 were conducted. The database covers four areas of financial inclusion indicators. The first indicator focuses on accounts at a formal financial institution (such as a bank, credit union, co-operative, post office or microfinance institution), the mechanics of the use of these accounts (frequency and mode), the purpose of the accounts (personal or business, receipt of payment from work, government or family), and barriers to account use and alternatives to formal accounts (mobile money providers). The second

⁸ SDG1, SDG2, SDG3, SDG5, SDG8, SDG9, SDG10 as per <https://www.unCDF.org/financial-inclusion-and-the-sdgs>

⁹ The survey represents more than 97 percent of the world's population. See Demirgüç-Kunt et al., 2018, section Survey Methodology.

set of indicators focuses on savings behavior. The third indicator focuses on sources of borrowing (formal and informal), the purpose of borrowing (mortgage, emergency, or health purposes) and the use of credit cards. The fourth indicator is related to the use of insurance products for health care and agriculture.

But there are critics that such set of individual indicators developed through survey data cannot accurately capture the multifaceted concept of financial inclusion (Clamara, Peña & Tuesta, 2014). Many studies have been conducted to identify a comprehensive measure of the extent of coverage of a financial system called FI index (Sarma, 2008; Nguyen, 2020). Various FI index exists today with different approaches and indicators selected. Nguyen (2020) concluded that the measurement of the degree of financial inclusion has not yet reached a consensus.

This thesis builds on the data collected by the Global Findex database, which is still the world's most comprehensive data set on how adults save, borrow, make payments and manage risk. Following, three individual indicators with regards to account ownership and use, savings, access to and use of credit will be explained in the following subsections.

2.4.1.1 Account ownership and use

Account ownership is a key measure of financial inclusion because of the functions that an account provides. Individuals can store money and build up savings. Having an account makes it easier to pay bills, get access to credit, make purchases or send and receive remittances (Demirgüç-Kunt et al., 2018). According to the Global Findex database, 69 percent of adults across the world above 15 years of age had an account in 2017. That means that they have reported to either own an account either individually or jointly at a financial institution or through a mobile money provider. The first category includes accounts at a bank or other type of formal, regulated financial institution, such as a credit union, a cooperative, or a microfinance institution. The second consists of mobile phone-based services not linked to a financial institution, that are used to pay bills or to send or receive money. The surge of fintech companies in recent years and increasing innovation in the form of new providers or delivery channels have helped to further increase access to financial services (Beck, 2020). Account ownership is an important first step towards financial inclusion. However, individuals also have to use the account to fully benefit from the ownership. In the 2017 Findex report, about 76 percent

of all account holders (or 52 percent of all adults) reported that they had used the account at least once in the last 12 months, an increase from the previous years.

2.4.1.2 Savings

Making and receiving payments is an important use of an account. Saving is another. This may be for a large purchase in the future, investments in education or businesses, to prepare for individuals' needs in old age, or simply to have a cushion in case of emergencies. Individuals save in multiple ways. The Global Findex survey covers three types of savings, each considered to be mutually exclusive: i) saved money formally; meaning at a formal financial institution, ii) saved money semi-formally and iii) savings using other methods only (i.e. saving at home "under the mattress" or in livestock, jewelry). In 2017, 48 percent of adults around the world reported having saved or set aside money in the past 12 months (Demirgüç-Kunt et al., 2018). However, that share is considerably lower in EECA countries. One reason could be because in developing economies, people often rely on alternative ways of savings such as semi-formal ways: using a savings club, a person outside their family or other methods.

2.4.1.3 Credit

In 2017, 47 percent of global adults reported having borrowed money in the past 12 months, including with the use of a credit card. The share of adults with new credit, formal or informal, averaged 64 percent across high-income economies and 44 percent across developing economies. The most common source of credit in high-income economies was formal borrowing; in developing economies, family or friends. Credit cards are a payment instrument, but they also serve as a source of credit. They extend short-term credit whenever used, even when credit card holders pay off their balance in full each statement cycle and as a result pay no interest on their balance. The introduction of credit cards might therefore have affected the demand for and use of short-term credit (Demirgüç-Kunt et al., 2018).

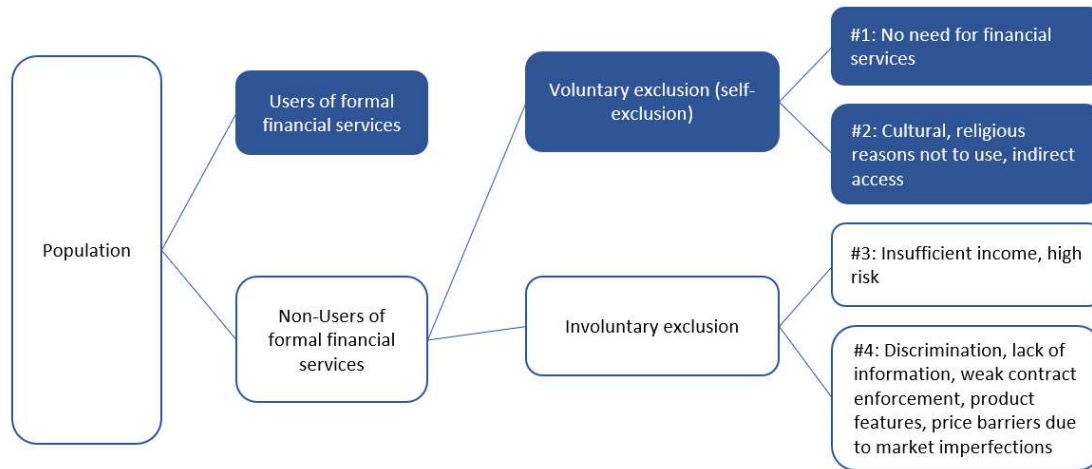
2.4.2 Reasons for being excluded

Barriers to financial inclusion can be classified into supply side, demand side and institutional (Morgan, Zhang & Kydyrbayev, 2018). Supply side barriers reflect limitations of the financial sector to offer financial services to poorer households. These include market-driven factors such as relatively high costs from maintaining aspects of

loans or deposits, the availability of access points or increased operational cost requirements. It also includes regulatory factors such as capital adequacy requirements or infrastructure factors such as the availability of a secure and effective payment system, mobile network and access to branches that further constrain financial inclusion. Institutional barriers include the inefficiency of bankruptcy laws and high collateral requirements resulting from inefficient credit assessment systems. Demand side factors are related to barriers an individual faces regarding the access and use of financial services. It is important to distinguish between access to and use of formal financial services. Some individuals and small enterprises have access to financial services but have voluntarily decided to not use services. This could be because of indirect access through a family or outside-family member, because they do not need the financial services, because they lack trust in the financial system or because of cultural or religious reasons. These non-users prefer to deal in cash or do not have growth opportunities worth investing in. Since this group chooses to exclude themselves from the financial system, they are to a lesser extent relevant for policy makers. Increasing financial literacy or offering financial services that are compliant with religious concerns could, however, create demand from this group for financial service and formally facilitate their inclusion (Demirgüç-Kunt & Klapper, 2012).

It is the group of involuntary non-users that is the focus of policy makers. Despite demanding financial services, they are not able to use them. According to the Findex data, the reasons why individuals are excluded range from physical barriers (distance to a bank branch or ATM), bureaucratic hurdles (increasing paperwork requirements, missing documentation), and financial barriers (cost to open or maintain an account, insufficient income or they pose a too high of a lending risk) (Demirgüç-Kunt & Klapper, 2012; Nurbekyan & Hovanessian, 2018). Figure 2 below provides an overview of the dichotomy of users and non-users, and potential reasons (#1-4) why one may be excluded.

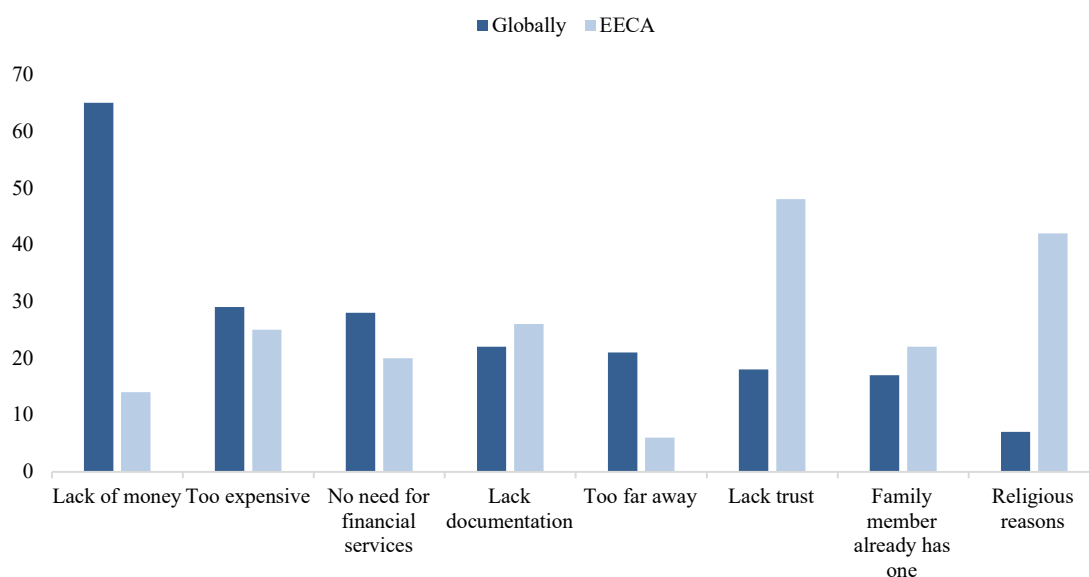
Figure 2. Access and use of financial services



Source: Adapted from Demirgüç-Kunt, Beck & Honohan (2008)

In the latest Findex survey from 2017, the reason most reported globally for not having an account was lack of money (by more than 60 percent) followed by too expensive (29 percent). About 28 percent of the respondents reported to not have any need for financial services which could imply voluntary exclusion (compare Figure 2). Trust and religious reasons are barriers for 18 and 7 percent of adults respectively. However, the picture looks different when zooming in on the EECA region. Lack of trust (cited by 48 percent) and religious reasons (reported by 42 percent) are the main barriers, while lack of money is only a barrier for 14 percent. Documentation requirements also seem to be an issue on the global and EECA levels. 26 percent of adults globally and 22 percent in EECA countries reported that they lack the necessary documentation to open an account. Figure 3 provides an overview of the reported reasons for not having an account at a formal financial institution both globally and for the EECA countries.

Figure 3. Reasons for not having an account, 2017



Note: Scale on the left indicates the percent of adults who reported respective reason for not having an account.

Source: Global Findex database

2.4.3 What matters for Financial Inclusion

Individual characteristics such as gender, age, income and education, and their impact on financial inclusion indicators are relatively well explored in the literature. Zins and Weill (2016) for example find that for African countries, being a man, richer, more educated, and older favors financial inclusion with a higher influence of education and income. Their findings are consistent with other studies that investigated the individual determinants of financial inclusion (see Fungáčová & Weill, 2015 on China; Simon, 2020 on India; Clamara et al., 2014; Tuesta, Sorensen, Haring & Cámara, 2015 on Peru and Argentina respectively). In addition to individual characteristics, Allen et al. (2016) considered a large set of country level characteristics and policies believed to affect inclusion measured by the use of bank account. Those factors include GDP per capita, several proxies for the various costs associated with a bank, documentation requirements (such as proof of identity through a government-issued ID) among other politically-related variables. They found that greater financial inclusion is associated with a better environment to enable access to financial services to, such as lower banking costs and greater proximity to branches. In addition, they found that stronger legal rights and political stability also matter for inclusion. They also confirmed the discriminating effect that women are less likely to have a bank account than men. However, unlike the

microeconomic variables, macroeconomic variables have received less attention in the literature with regards to their impact on financial inclusion.

2.5 Importance of Financial Development and Financial Inclusion

Financial inclusion can be thought of as an aspect of financial development and therefore it can be associated with many benefits that are derived from this process (Barajas et al., 2020). Inclusive financial systems are especially likely to benefit poor people and other disadvantaged groups (i.e. women, young adults). Without access to financial system and services, these groups must rely on their own limited savings to finance their education or become entrepreneurs, and small enterprises must rely on their limited earnings to pursue promising growth opportunities. This can contribute to persistent income inequality and slower economic growth (Demirgüç-Kunt & Klapper, 2012). It is widely recognized that financial inclusion reduces poverty and inequality by expanding the access to finance for poor and vulnerable groups, facilitating risk management to reduce these groups' vulnerability to shocks, and increasing investment and productivity produce higher income generation which in turn matter for economic development (Demirgüç-Kunt et al., 2008; 2017; Morgan et al., 2018). Inclusive financial systems enhance the efficiency and can increase wealth by providing secure means of savings and facilitating the use of a broad range of efficient financial services. This can also help to reduce the dependency on informal sources of credit that are often said to be exploitative (Sarma & Pais, 2011). There are many examples where through the access to and use of financial services, as well as through the leap in technology to facilitate access and use (i.e. mobile money, digital payments), people were able to create or increase their revenue streams, lower their costs and increase savings (see Demirgüç-Kunt et al., 2017; Barajas et al., 2020). Becoming more aware of finance and becoming more financially literate, people can make better financing decisions for themselves or for their businesses. Despite the positive relationship between financial development and economic growth, recent research has uncovered evidence that this relationship is not entirely increasing but rather hump-shaped, leading to the hypothesis that too much finance lowers growth or even weakens the economy given the very high level of financial development (mainly financial depth). This leads to the question if there is a tradeoff between financial development and financial stability.

3. Financial Inclusion in Eastern Europe and Central Asia

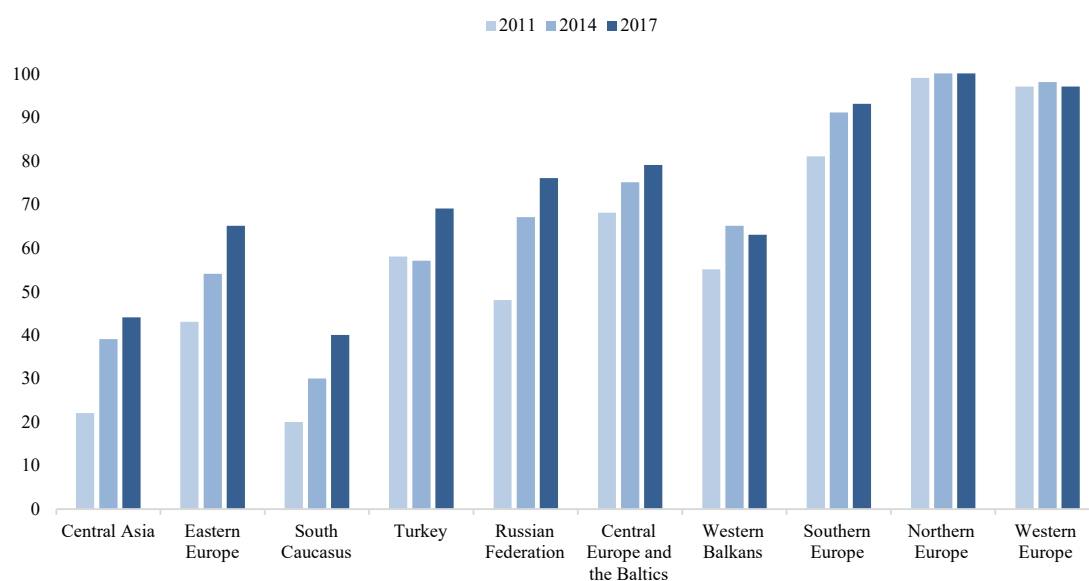
In this chapter the current state of financial inclusion and the characteristics of the unbanked are discussed. The chapter closes with an overview of endeavors to increase inclusion in EECA countries.

3.1 State of Financial Inclusion in EECA countries

About 39 percent¹⁰ of Europe and Central Asia's (ECA) population lives in the EECA area. Yet 85 percent of the unbanked people in the ECA, about 100 million people, come from EECA countries. Most of the unbanked population of ECA lives in Romania, the Russian Federation, Turkey, Uzbekistan, and Ukraine (World Bank, 2019). Out of the 20 countries with the largest unbanked population, 10 are in the EECA region. Figure 4 provides an overview of account ownership in the ECA regions and how it has developed since 2011. Account ownership levels of Eastern European countries remain below those of the rest of the EU. The share of account ownership in the high-income euro area increased to 95 percent in 2017 from 90 percent in 2011 (Demirgüç-Kunt et al, 2018). Compared with developing economies in the rest of the world, developing economies in ECA saw relative high levels of account ownership as of 2011 and have experienced moderate growth over time.

¹⁰ As per World Bank (2019)

Figure 4. Account ownership variation across countries in ECA



Note: Scale on the left-hand side indicates the percent of adults with an account.

Source: Global Findex database

During the same period, the Eastern Europe and Central Asia region increased the share of account ownership from 38 percent in 2011 up to 58 percent in 2017. Table 5. Account ownership and savings in ECA countries, 2011 to 2017 provides an overview of the two financial inclusion variables account and savings, for the ECA countries and how they developed since 2011. Countries such as Tajikistan, Kyrgyz Republic, Turkmenistan and Armenia have witnessed the largest increase in account ownership in the region, however they remain among the countries with the lowest inclusion rate in the ECA area (see World Bank, 2019). At the other end of the spectrum though, Azerbaijan and Uzbekistan only increased account ownership by 14 percent. With regards to savings countries such as Moldova and Turkey have seen an increase in the number of individuals who saved money in the last 12 months by almost one-third since 2011 leading the ECA region by a significant margin. However, the other countries have also increased savings between 5 to 23 percent. The only country that recorded a decrease in savings since 2011 is the Kyrgyz Republic.

Table 5. Account ownership and savings in EECA countries, 2011 to 2017

Region / Country	2011		2014		2017	
	Account	Savings	Account	Savings	Account	Savings
Eastern Europe	43	26	54	46	65	48
Belarus	59	28	72	53	81	51
Moldova	18	23	18	45	44	56
Ukraine	41	27	53	41	63	38
South Caucasus	20	10	30	26	40	26
Armenia	17	11	18	20	48	29
Azerbaijan	15	12	29	42	29	33
Georgia	33	7	40	16	61	16
Russian Federation	20	24	30	43	40	37
Turkey	58	11	57	45	69	42
Central Asia	22	31	39	45	44	40
Kazakhstan	42	23	54	31	59	41
Kyrgyz Republic	4	38	18	58	40	26
Tajikistan	3	14	11	32	47	32
Turkmenistan	0	46	..	58	41	51
Uzbekistan	23	33	41	45	37	50

Source: Global Findex database

The unbanked population in EECA countries share various characteristics. Women represent 56 percent of the entire unbanked population in the region (compared to 58 percent in ECA). The share however is even higher in some economies, such as Turkey, Armenia and Ukraine. Second, poorer people account for a significant share of the unbanked population: approximately half of all unbanked adults in the region are from the poorest 40 percent of households. In addition to gender and income, unbanked adults also tend to have a low educational attainment (Demirgüç-Kunt et al., 2018). While globally around 62 percent of unbanked adults have a primary education or less, this seems to be less relevant in EECA countries. The share of people with a completed primary education or less is comparably low with some exceptions such as Uzbekistan, Belarus and Turkey where the share exceeds one-third. The age distribution in addition shows that very large portion of unbanked people are above 26 years of age. This finding is consistent throughout the EECA countries. This appears to be contradictory to current findings in the literature as several studies argue that age is positively related to inclusion

(see Zins & Weill, 2016; Demirgüç-Kunt et al., 2018 to name a few). Table 6 provides an overview of the characteristics of the unbanked people in EECA countries.

Table 6. Unbanked characteristics in EECA, in %, 2017

	Adults w/o an Account	Women	Adults Belonging to the Poorest 40%	Adults with completed primary Edu or less	Age 26+
Belarus	19	54	54	52	69
Moldova	56	52	49	23	79
Ukraine	37	60	50	26	83
Armenia	52	61	50	12	48
Azerbaijan	71	51	46	18	63
Georgia	39	50	55	20	71
Russian Fed.	24	54	49	30	75
Turkey	31	73	55	44	64
Kazakhstan	41	51	49	28	61
Kyrgyz Rep.	60	54	43	24	60
Tajikistan	53	56	46	30	66
Turkmenistan	59	55	41	6	59
Uzbekistan	63	54	45	35	62

Note: Adults (Age 15+) in %
Source: Global Findex database

3.2 Endeavour to increase Financial Inclusion

In 2015, policymakers and regulators from the ECA region met in Skopje at the invitation of the Alliance for Financial Inclusion (AFI) to examine opportunities and challenges to expand financial inclusion in the region. They agreed on several ways for how inclusion can be strengthened and acknowledged that financial inclusion should be a policy priority for their institutions¹¹. The consensus to expand inclusion led to the development of common priority areas such as (i) Consumer Protection; (ii) Financial Literacy; (iii) SME

¹¹ See https://www.afi-global.org/wp-content/uploads/publications/2017-03/AFI_Skopje_statement_AW.pdf

Finance and (iv) Digital Financial Services among others and acknowledged that a systematic public-private dialogue is an important element to inform about policy design and implementation. Additionally, private sector support is welcomed in strengthening the technical capacity of their institutions in areas where the private sector has substantial expertise. Also, through other means, governments and businesses could help to reduce the number of unbanked adults by moving routine cash payments into accounts. Such payments could include public sector wages, public pensions, and government transfers of social benefits (World Bank, 2019, p.40). It is estimated that digitizing such payments could reduce the number of excluded adults by around 100 million. In the EECA region the opportunity to increase inclusion is prevalent and growing with an increasing number of adults owning a mobile phone. In a working paper of the Asian Development Bank (Morgan et al., 2018) the authors correctly outline that supra-national strategies are needed to set priorities and coordinate overall approaches to financial inclusions, followed by national-level strategies that are governed by strategies of the central bank, ministries and/or other financial regulatory bodies. The absence of common and centralized implementation of the financial inclusion programs can render the set strategies without any significant results.

4. Methodology and Data

This chapter presents the methodology and describes the econometric tool used for the evaluation. It further describes the variables used in this study and provides a detailed presentation of selected macroeconomic variables. The chapter closes with the empirical model that forms the basis of the results in chapter 5.

4.1 Methodology

This study employed data from 13 Eastern Europe and Central Asia countries for the years 2011, 2014 and 2017, reflecting the availability of detailed financial inclusion data drawn from the global survey conducted by Gallup Inc.¹². The data was made accessible in the Global Findex database that provides systemic financial inclusion indicators and key socioeconomic variables of individuals. This paper focused on two dimensions on financial inclusion such as ownership of an account at a formal financial institution or mobile money provider (*account*) and savings (*savings*). The dependent variables account and savings respectively are binary variables equal to 1 when an individual owns an account or did save money in the past 12 month and 0 otherwise. The two financial inclusion variables were linked with two sets of explanatory variables. One being the socioeconomic variables female, age, education and income and the second are macroeconomic factors that have been found in the literature to strongly matter for financial development such as financial openness, trade openness, inflation, GDP per capita and borrower's rights protection. The variables will be explained in section 4.2 below. Various openly available data sources (as supplied by the IMF or World Bank) have been tapped to extract data on macroeconomic variables assumed to support financial development. Data for the socioeconomic variables have been extracted from the Global Findex database. The collected multi-dimensional data with measures over three time periods was transformed into a balanced panel dataset, consisting of at least 1'000 observations per panel member (countries), per year and for each of the selected variables respectively resulting in a total number of 42'099 lines and 640'527 datapoints. Russia, due to its population size had 2'000 observations per year to meet representativeness requirements. The panel data structure consisted of 14'033 cross-

¹² Survey is called "The Gallup World Poll"

sectional units observed over three time periods. Since the dependent variables of interest are discrete represented by a binary choice variable ($y_{it} = 1$ if the event happens and 0 if it does not for individual i at time t), a binary response model must be used (Baltagi, 2005). The probit model (**probability unit**) was used to model the regression function for the binary dependent variables. Both the standard probit model and random effects probit model have been used to estimate the results.

4.1.1 Probit Regression

For probit models, the cumulative standard normal distribution function Φ is used to model the regression function when the dependent variable is binary. It is assumed that:

$$E = (Y|X) P = (Y = 1|X) = \Phi(\beta + \beta_1 X)$$

where $(\beta + \beta_1 X)$ plays the role of a quantile z .

$$\Phi(z) = P(Z \leq z), Z \sim N(0,1)$$

Such that the probit coefficient β_1 is the change in z associated with a one unit change in X . Although the effect on z of a change in X is linear, the link between z and the dependent variable Y is nonlinear since Φ is a nonlinear function of X (Hanck, Arnold, Gerber & Schmelzer, 2020). If Y is assumed to be a binary variable, the probit model is

$$Y = \beta_0 + \beta_1 + X_1 + \beta_2 X_1 + \dots + \beta_k X_k + u$$

The detailed model will be presented in section 4.3 below.

4.2 Data

The variables used as determinants in this model were identified and selected based on existing literature on the topic, the availability of such data and economic theory. Before regressing the model, a concise reasoning for why each variable is included is given. Table 7 reports the descriptive statistics for the financial inclusion indicators and Table 8 provides a summary of the variables used.

4.2.1 Financial Inclusion Variable

In line with former literature, this paper focuses on two main measures of financial inclusion obtained from the Global Findex database (see Barajas et al., 2020). *Account* refers to the situation where an individual has an account (either by themselves or together with someone else) at a bank, another type of financial institution (i.e. credit union, a

microfinance institution, a cooperative, or the post office or having a debit card in their own name) or reported personally using a mobile money service in the past 12 months. *Savings* refers to the individuals who reported saving or setting aside any money at a bank or another type of financial institution in the past 12 months.

Table 7. Descriptive statistics of the dependent variables

	Obs	Mean	Skewness	Missing obs.
<i>Financial inclusions indicator</i>				
Account	42099	0.44265	0.23094	0
Savings	42099	0.33854	0.68242	0

Note: Account and savings are described in Table 8. Definition and source of the variables.

Source: Gretl output

4.2.2 Socioeconomic Factors

In this paper, a range of socioeconomic factors are used with the aim to control the model output. Previous studies (see Demirgüç-Kunt et al., 2012; Zins & Weill, 2016; Demirgüç-Kunt et al., 2018) have found that gender, age, education and wealth have a significant impact on financial inclusion. Based on the Global Findex database, socioeconomic variables such as (i) gender, represented by female (measured if the person is a woman), (ii) age which is represented by two measures (in line with Zins & Weill, 2016) Age (number of years) and Age squared in order to control for possible nonlinear relationship between age and financial inclusion, (iii) the level of education and iv) the income quintile of a person within an economy are used.

4.2.3 Macroeconomic Factors

Section 2.3.2 has provided a comprehensive overview of macroeconomic and institutional variables that affect financial development. In this section, the selected factors are looked at in detail and the rationale for them being in the model is given.

4.2.3.1 Financial Openness

Intuitively, financial openness would seem to have a positive influence on financial development and hence economic growth. Foreign capital could flow into the economy can foster growth by bringing in advanced technology, managerial skills, knowhow and

making domestic markets more competitive through the entry of foreign companies (Estrada, Park & Ramayandi, 2015). Their view is based on research done by Chinn & Ito (2002) who examined the impact of capital controls and the financial development of credit and equity markets. They found that the rate of financial development (measured by private credit creation and stock market activity) is linked to the existence of capital controls. In an extension of their work they further found out that a higher level of financial openness contributes to the development of equity markets which translates into an increase in financial development. The results are however conditional to a certain development level of general legal systems and institutions (Chinn & Ito, 2005). Several studies have since confirmed the relevance of financial openness to financial development (see Seetanah et al., 2010; Ayadi, Arbak, Naceur & De Groen, 2013; Estrada et al., 2015; Nwala & Fodio 2019). Ayadi et al. (2013) found that capital inflow appears to primarily influence income, increasing income and thereby national savings which increases the affordability of credit. Based on the evidence of the impact of financial openness of financial development, it is assumed that financial openness also matters for financial inclusion. The present study uses the financial openness index developed by Chinn & Ito (2005). The index *KAOPEN* is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)¹³. *KAOPEN* is the first principal component of the original variables pertaining to regulatory controls over current or capital account transactions, the existence of multiple exchange rates and the requirements of surrendering export proceeds. The value of the score for “most financially open” economy is 2.33 whereas the “least financially open” economy score is -1.92 and gives a measure of the intensity of capital controls.

4.2.3.2 Trade Openness

In the context of globalization, countries have been embracing trade to induce both financial and economic development. However not all countries have presented themselves as open for international trade, because trade openness will inevitably bring foreign competitors to domestic markets. Through increased competition, profits will be

¹³ See http://web.pdx.edu/~ito/Chinn-Ito_website.htm

pressured. However such competition may also lead to investments in innovation (Seetanah et al., 2010). Rajan and Zingales (2003) identified that liberalizing trade reduces the power of those interest groups which capture politicians to shape policies in their favor which impedes financial development. Thus, the liberalization process can reduce inefficiencies, improves transparency and fosters a competitive environment which is conducive for the economy as a whole. A study by Kim, Lin and Suen (2011) investigated the interaction between financial development and trade openness through simultaneous-equation systems. Using a panel consisting of 70 countries over a period between 1960 – 2007, they found a two-way causal relationship between financial development and trade openness. A better-developed financial sector induces higher openness to trade, while higher openness in goods market stimulates financial development. Various studies concur this finding (see Ayadi et al., 2013; Guru & Yadav, 2019). In line with previous studies (see Seetanah et al., 2010), total trade divided by GDP is used as a proxy for trade openness. This study uses the trade in percent of GDP indicator provided by the World Bank. For this index, trade is the sum of exports and imports of goods and services measured as a share of GDP. The larger the ratio, the more the country is exposed to international trade.

4.2.3.3 Inflation

In the literature, the views on the effect of inflation on financial development are mixed. The majority of the reviewed studies found that inflation has negative effects on financial development, yet some studies have a different view. One view on the relationship between inflation and financial development has been suggested by Boyd et al. (2001) which concluded that economies with high inflation rates are more likely to have smaller and less active financial institutions and financial markets. This view is confirmed in multiple studies, i.e. in Seetanah et al. (2010), which found that inflation had an adverse effect on financial development both in the short and long term. Studying the effects of economic and financial development on financial inclusion, Evans (2015) found that inflation is negatively linked with financial inclusion. A different result was shown by Almarzoqui et al. (2015), which aimed to identify policies that influence financial development. Their dynamic panel estimations have shown that inflation (among others) does significantly affect financial development. Similar results have been obtained by Nwala and Fodio (2019), who examined macroeconomic variables that affect financial sector development (FSD) in Nigeria. Inflation has been one of the indicators researchers

have studied the most. Given this attention, inflation will be included in the model of the present study. The country specific inflation data is obtained from the IMF database.

4.2.3.4 National Income

The relationship between financial development and national income has received a lot of attention by researchers. The conclusions, however, are mixed. Some studies have found a bidirectional relationship between finance and growth, others have found a unidirectional relationship, and some even found no relationship at all (Birru, Wassie & Tadesse, 2019). Running a simple analysis, Claessens and Feijen (2006) find that financial development ranks second among variables that are known for their substantial impact on GDP per capita. They support the consensus that economic growth follows financial development. Birru et al. (2019) used an Auto Regressive Distributed Lag model to investigate the direction of causality and the existence of a long run relationship between financial development and economic growth in Ethiopia. They found that there does in fact exist a bidirectional relationship. Expansion in financial development indicators related to the resource allocation function of the financial system lead to economic growth whereas economic growth causes financial development through increasing banks' assets in the long run. Intuitively, the effect of growth on financial development can be explained by the fact that the economic growth attained through industrialization and trade enhances the supply of and demand of financial services (i.e. credit). With higher national income, the likelihood of people acquiring education and financial literacy increases leading to more demand for financial services. This paper uses World Bank data to obtain the national income variable adjusted for the population. GDP per capita is gross domestic product (sum of gross value added by all resident producers in the economy).

4.2.3.5 Borrower and Lender Rights

Finance is based on contracts, hence the ability to enforce them is a crucial prerequisite. Countries with laws that protect the rights of external investors or creditors and enforce those rights effectively will do a correspondingly better job at promoting financial development than those without (Levine, 2005). Seetanah et al. (2010) also consider the existence of a strong legal framework to be crucial. They consider the nexus between institutional quality (defined as the extent to which laws and policies foster investor protection and enhance access to funds for entrepreneurs within financial exchanges) and

financial development as evident. With no means of enforcing property rights and adequate investor protection, investors are less likely to give out loans which inhibiting financial development. For this study, the “Strength of Legal Rights Index” (denoted here by SLR) provided by the World Bank is used. The index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 12, with higher scores indicating that the laws in force from the respective country are better designed to expand access to credit, hence supporting financial development.

4.3 Building the Model

In order to evaluate the determinants of financial inclusions for EECA countries, probit estimations are performed using the following equation:

$$(1) \quad Account_{it} = \beta_0 + \beta_1 * FEM_{it} + \beta_2 * AGE_{it} + \beta_3 * AGE2_{it} + \beta_4 * EDU_{it} + \beta_5 * IncQ_{it} + \beta_6 * FINO_{it} + \beta_7 * TRO_{it} + \beta_8 * INFL_{it} + \beta_9 * GDPpc_{it} + \beta_{10} * SLR_{it} + \mu_{it} + \varepsilon_{it}$$

$$(2) \quad Savings_{it} = \beta_0 + \beta_1 * FEM_{it} + \beta_2 * AGE_{it} + \beta_3 * AGE2_{it} + \beta_4 * EDU_{it} + \beta_5 * IncQ_{it} + \beta_6 * FINO_{it} + \beta_7 * TRO_{it} + \beta_8 * INFL_{it} + \beta_9 * GDPpc_{it} + \beta_{10} * SLR_{it} + \mu_{it} + \varepsilon_{it}$$

Where account and savings are the financial inclusion indicators, μ is the country dummy indicator (n-1 dummies) and ε the error term. The explanatory variables are the socio- and macroeconomic factors. The subscripts i and t indicate country and time respectively. Table 8 provides an overview and short description of the dependent and explanatory variables and their sources.

Table 8. Definition and source of the variables.

	Description
<i>Dependent Variable</i>	
Account (Account)	Measures if a person has (personally or through a family member) an account at a formal financial institution or mobile money provider. Source: Global Findex database.
Savings (Savings)	Measures if a person has saved or set aside any money at any type of financial institution in the past 12 months. Source: Global Findex database.
<i>Explanatory Variable</i>	
Female (FEM)	Measure if a person is female (1 Male, 2 Female). Source: Global Findex database.
Age (AGE)	Age of the person (+15). Source Global Findex database.
Age ² (AGE2)	Age squared to control for non-linear relationship between age and financial inclusion (see Zins & Weill 2016). Refer to (AGE) for Source.
Education (EDU)	Measure the level of education. 1 lowest and 3 highest. Source Global Findex database.
Income_q (IncQ)	Measure of the within-economy household income quintile. Source: Global Findex database.
Financial Openness (FINO)	Measure of financial openness. Values range from 2.33 (maximum open) to -1.92 (least open). Source: Chinn & Ito; Code: <i>KAOPEN</i> .
Trade Openness (TRO)	Measure of trade in % to GDP. Higher values indicate more exposure to international trade. Source: World Bank; Code: <i>NE.TRD.GNFS.ZS</i> .
Inflation (INFL)	Measure for inflation. Annual percentage change to the consumer price index is used. Source: IMF; Code: <i>FP.CPI.TOTL.ZG</i> .
GDP per capita (GDPpc)	GDP per capita (Constant 2005 USD). Source: Global Financial Development Database; Code: <i>NY.GDP.PCAP.KD</i> .
SLR (SLR)	Strength of Legal Rights index. Measure of legal quality pertaining to creditor protection. Source: World Bank; Code: <i>IC.LGL.CRED.XQ</i> .

Note: This table describes the variables collected for this study. The first column gives the names of the variable as used in this study; the second column describes the variable and provides the source from which it was collected.

5. Results

In this section the results of the probit estimations are presented and explained. It starts with descriptive statistics of the explanatory variables followed by the results of the standard and random effects probit regressions. The section closes with a critical discussion of the obtained results.

5.1 Descriptive Statistics

Table 9 provides a tabular overview of the summary statistics of the explanatory variables used in equation ((1), (2)). The Global Findex data for the EECA countries for the three years covered consists of 58 percent female respondents. The average age of the respondees across the observed period is 42 years, and on average, the respondents have completed their secondary education. Looking at financial openness one can see that even through one of the EECA countries has the maximum KAOPEN score of 2.33, the majority of countries have to be considered as less financially open with a median score of -1.12185. In addition, these countries are generally open to trade, yet significant intra-regional differences exist, with a median value of 79.78 compared with the 95-percentile value of 133.37. It can be seen that the EECA countries on average are confronted with substantial inflation rates. Average inflation across the years covered is above 9 percent. Also, the inflation rates are everything, but stable and substantial intra-regional differences exist. The same is true for GDP per capita where the highest value is above 11'678 however the average is at 5843. Finally, looking at the borrower's rights protection, the average score with 5.18 is subpar given the highest score is 12.

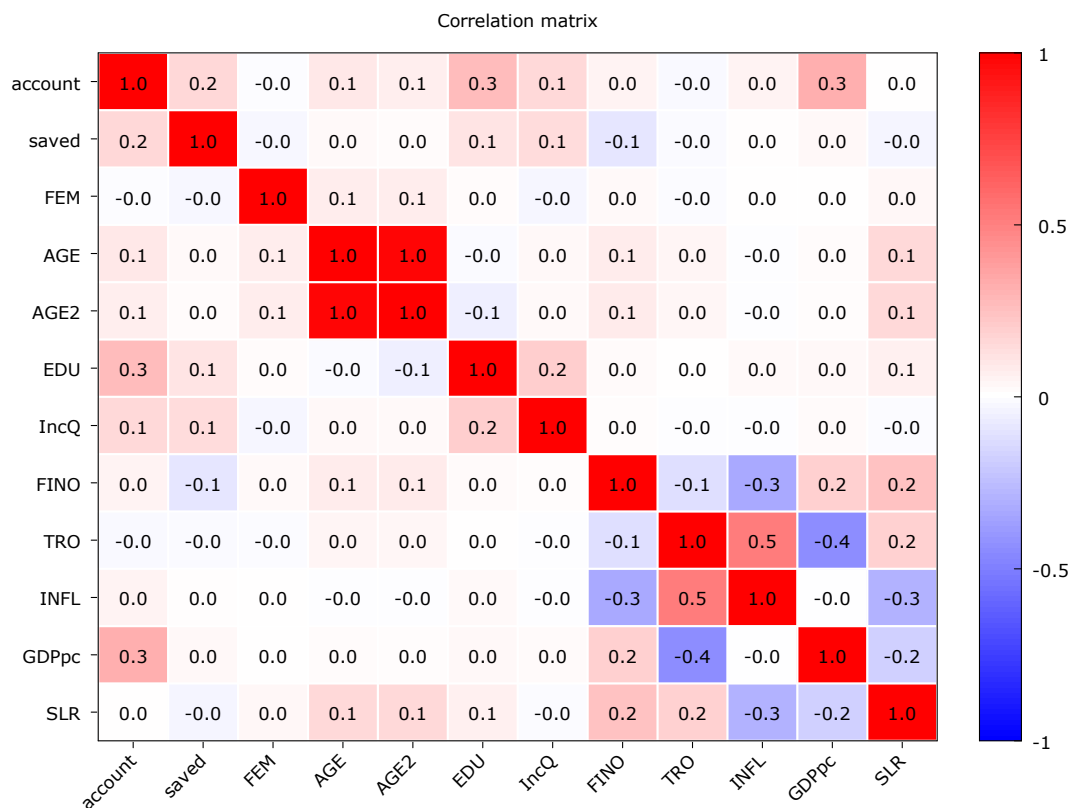
Table 9. Descriptive statistics of explanatory variables

	Mean	Median	Std.Dev.	Skewness	95% perc.
FEM	1.5847	2	0.49278	-0.34384	2
AGE	42.009	40	17.561	0.41346	28
AGE2	2071	1600	1635.3	1.0572	2296
EDU	2.0836	2	0.61400	0.16014	3
IncQ	3.2059	3	1.4137	-0.18363	5
FINO	-0.34454	-1.12185	1.3249	0.6648	2.3336
TRO	79.426	79.784	29.067	0.60179	133.37
INFL	9.2632	7.6873	8.8765	3.7686	18.120
GDPpc	5843.8	5006.3	4088.7	0.52230	11678

Note: Gretl output of the summary statistics of the panel data used.

The correlation matrix in Figure 5 shows the correlation between the explanatory variables and account and savings respectively. The calculation of the correlation coefficients is based on Pearson and Spearman methods and range between -1 (dark blue) and 1 (dark red). Education and GDP per capita show the highest correlation to account ownership with 0.26 and 0.31 respectively (both rounded below). Other variables are less correlated or neutral to account ownership. Education and income are the variables with highest correlation to savings, yet on a relatively modest level (0.1 each). Financial openness shows weak negative correlation to savings (-0.09) while the other variables are neutral.

Figure 5. Correlation coefficients



Source: Gretl output

5.2 Regression Results

First a standard probit regression for equation (1) is performed under the assumption that the socioeconomic and macroeconomic variables considered reflect the full scope of possible variables (model 1). In a second step, the same equation (1) is estimated while introducing country specific dummy variables to test for potentially unknown, yet relevant variables. The country dummies are introduced to account for factors that might impact financial inclusion despite them having remained undetected by the current literature and in the review conducted for this paper. The results of model 2 are shown in Table 10 below (refer to Appendix for all model outputs). Running the second model has shown that the dummy variables for all countries are significant, indicating that they must be considered in the final model. The same procedure is repeated for equation (2) and the results of the regression with country dummies are shown in Table 11. In equation (1) and (2) account and savings are used as a proxy of financial inclusion. First it is worth mentioning that the signs of the socioeconomic variables (FEM, AGE, AGE2, EDU and IncQ) are consistent with the literature. The results show that being male, aged, better educated and with higher income results in a higher likelihood of having both an account and setting money aside in the last 12 months. Looking at the macroeconomic variables, the effect on financial inclusion is mixed. While the signs for financial openness (negative), trade openness (positive) and GDP per capita (positive) are the same for both equations ((1), (2)), the effect of inflation and creditor protection rights are varying. All variables however are statistically significant in determining the financial inclusion for EECA countries. Trade openness and GDP per capita have a positive and significant effect on both account ownership and savings while inflation only has a positive significant effect on account ownership but exerts a negative effect on savings. However, introducing dummy variables per country to account for relevant variables that have remained undetected, financial openness becomes positive for account ownership.

Table 10. Standard probit estimation, account, with country dummy

	Coefficient	Std. error	z-score
const	-4.15077***	0.09658	-42.9759
FEM	-0.04659***	0.01919	-2.4277
AGE	0.32326***	0.00279	11.6048
AGE2	-0.00028***	0.00003	-9.5800
EDU	0.55562***	0.01666	33.3502

IncQ	0.10659***	0.00681	15.6469
FINO	-0.03132***	0.00915	-3.4216
TRO	0.00750***	0.00050	14.8705
INFL	0.01832***	0.00296	6.1886
GDPpc	0.00014***	0.00000	46.2170
SLR	0.05361***	0.00358	14.9642
DCountry_1	-3.33473***	0.18520	-18.00621
DCountry_2	-2.41064***	0.18229	-13.22393
DCountry_3	-0.93289***	0.23473	-3.97434
DCountry_4	-4.07266***	0.22849	-17.82400
DCountry_6	-1.22208***	0.12546	-9.74115
DCountry_7	-0.64353***	0.06492	-9.91338
DCountry_8	-5.77942***	0.43195	-13.37976
DCountry_9	1.23877***	0.18840	6.57516
DCountry_10	-6.36606***	0.57251	-11.11946
Mean dependent var		S.D. dependent var	0.499425522
McFadden R-squared	0.218960865	Adjusted R-squared	0.217590351
Log-likelihood	-11397.74779	Akaike criterion	22835.49558

Note: Standard probit model with country dummies (model 2) produces a stronger output than probit without country dummies (model 1). See appendix for detailed model comparison. Significance indicated for coefficient values. *, **, *** indicate significance at the 10, 5 and 1 percent level respectively.

Table 11. Standard probit estimation, savings, with country dummy

	Coefficient	Std. error	z-score
const	-2.70009***	0.29340	-9.20281
FEM	-0.05583***	0.01853	-3.01300
AGE	0.00285	0.00270	1.05598
AGE2	-0.00002	0.00003	-0.63478
EDU	0.22155***	0.01598	13.86234
IncQ	0.10969***	0.00659	16.65065
FINO	-0.55092***	0.04513	-12.20614
TRO	0.00813***	0.00155	5.22976
INFL	-0.02770***	0.00398	-6.96655
GDPpc	0.00029***	0.00005	5.74740
SLR	-0.10285***	0.00978	-10.51847
DCountry_1	1.01554***	0.16206	6.26643
DCountry_2	-0.34335**	0.16841	-2.03884
DCountry_3	-1.32296***	0.22423	-5.89992
DCountry_4	1.15902***	0.20258	5.72119
DCountry_6	1.40610***	0.10970	12.81820
DCountry_7	0.80500***	0.06230	12.92163
DCountry_8	-0.77634*	0.40474	-1.91813
DCountry_9	0.34572*	0.18164	1.90337
DCountry_10	-2.31181***	0.54536	-4.23903

Mean dependent var	0.38261653	S.D. dependent var	0.486037368
McFadden R-squared	0.066423403	Adjusted R-squared	0.064998003
Log-likelihood	-13099.1584	Akaike criterion	26238.31681

Note: Standard probit model with country dummies (model 4) produces a stronger output than probit without country dummies (model 3). See appendix for detailed model comparison. Significance indicated for coefficient values. *, **, *** indicate significance at the 10, 5 and 1 percent level respectively.

The question is if the standard probit estimation is qualified to provide an answer on the determinants of financial inclusion for the panel data studied given the randomness of the explanatory variables. Therefore, the random effects probit estimate (RE probit) is introduced. RE probit models are useful for analyzing panel data with individual-level heterogeneity orthogonal to the independent variables (Bland & Cook, 2018). The equations ((1), (2)) are subsequently estimated with a RE probit both without country specific dummies (model 5, 7) and including dummies (model 6, 8). Even though the standard probit (model 1 – 4) and the RE probit (model 5 – 8) produce very similar results and show the same behavior when introducing country specific dummies to the model, the RE probit is better qualified for the panel data used in this study. This is indicated by the likelihood-ratio test (LR test) for rho equal zero (0). Since the p-value for the LR test is very small (6.23307e-020 for account and 1.34742e-037 for savings respectively), the hypothesis that rho is equal to zero can be rejected, hence the RE probit is the adequate model for the evaluation the present data set (Cottrell & Lucchetti, 2021). The subsequent presentation of results and following interpretation and discussion hence build on the RE probit model results.

Table 12. Random effects probit estimation, account, with country dummy

	Coefficient	Std. error	z-score
const	-5.11197***	0.34171	-14.95994
FEM	-0.08369***	0.02091	-4.00165
AGE	0.04005***	0.00304	13.15384
AGE2	-0.00039***	0.00003	-12.15805
EDU	0.50857***	0.01855	27.42085
IncQ	0.12886***	0.00750	17.16999
FINO	0.84437***	0.05747	14.69131
TRO	0.01098***	0.00188	5.84636
INFL	0.02119***	0.00469	4.51366
GDPpc	0.00062***	0.00006	10.55025

SLR	0.17740***	0.01212	14.63245
DCountry_1	-3.57768***	0.21041	-17.00306
DCountry_2	-2.56217***	0.20601	-12.43692
DCountry_3	-0.95672***	0.26593	-3.59769
DCountry_4	-4.35279***	0.25929	-16.78719
DCountry_6	-1.34376***	0.14311	-9.38985
DCountry_7	-0.70518***	0.07419	-9.50497
DCountry_8	-6.10608***	0.48750	-12.52538
DCountry_9	1.25855***	0.21303	5.90791
DCountry_10	-6.69973***	0.64709	-10.35356
lnsigma2	-1.98329***	0.12819	-15.47199
Mean dependent var	0.524206933	S.D. dependent var	0.499425522
Log-likelihood	-11355.97606	Akaike criterion	22753.95213

LR test for rho = 0

Test statistic: Chi-square = 83.5435 with p-value = 6.23307e-020 (***)

Note: RE probit model with country dummies (model 6) produces a stronger output than probit without country dummies (model 5). See appendix for detailed model comparison. Significance indicated for coefficient values. *, **, *** indicate significance at the 10, 5 and 1 percent level respectively.

Table 13. Random effects probit estimation, savings, with country dummy

	Coefficient	Std. error	z-score
const	-2.95716***	0.34418	-8.59197
FEM	-0.06377***	0.01998	-3.19187
AGE	0.00301	0.00292	1.03284
AGE2	-0.00002	0.00003	-0.58144
EDU	0.23978***	0.01736	13.80936
IncQ	0.12141***	0.00721	16.82924
FINO	-0.59681***	0.05344	-11.16706
TRO	0.00892***	0.00183	4.85955
INFL	-0.02977***	0.00470	-6.32901
GDPpc	0.00031***	0.00006	5.31168
SLR	-0.11033***	0.01158	-9.52524
DCountry_1	1.10389***	0.19166	5.75949
DCountry_2	-0.36603*	0.19891	-1.84015
DCountry_3	-1.43326***	0.26468	-5.41499
DCountry_4	1.25152***	0.23932	5.22941
DCountry_6	1.53017***	0.12999	11.77111
DCountry_7	0.87716***	0.07369	11.90313
DCountry_8	-0.84539*	0.47716	-1.77170
DCountry_9	0.38397*	0.21390	1.79512
DCountry_10	-2.51223***	0.64306	-3.90669
lnsigma2	-1.70863***	0.09586	-17.82417
Mean dependent var	0.38261653	S.D. dependent var	0.486037368
Log-likelihood	-13017.04337	Akaike criterion	26076.08674
LR test for rho = 0			

Test statistic: Chi-square = 164.23 with p-value = 1.34742e-037 (***)

Note: RE probit model with country dummies (model 8) produces a stronger output than probit without country dummies (model 7). See appendix for detailed model comparison. Significance indicated for coefficient values. *, **, *** indicate significance at the 10, 5 and 1 percent level respectively.

The RE probit results for the dependent variable account and savings both estimated with and without country dummies are shown in Table 12 and Table 13. The dummy variables are all significant for both financial inclusion variables, hence must be considered in the model. The effect of introducing the dummies on the explanatory variables is however distinct. A substantial change was found on financial openness for equation (1) where the sign changed from negative to positive. While financial openness was found to decrease the likelihood of having an account without dummies, the impact of financial openness changed in the dummy model indicating that more financial openness increases the likelihood of someone having an account. For both models (7, 8) all variables are significant, and the number of correctly predicted cases increased to 15'353 (72.8 percent) when introducing dummies. In the estimate for equation (2) no change in sign was observed on the variables. Creditors protection laws (SLR) experienced the biggest change, as it did in the dummy model, though the effect is significant at the 1 percent level compared to the 10 percent level previously. Unlike the estimate for account ownership, for savings not all explanatory variables are significant. Age and Age squared are not significant in both models hence cannot be used to explain an increase in savings over the past 12 months. Looking at the sign of the coefficients of Table 12 and Table 13, the effect of the variables on the financial inclusion indicator is not always consistent. Being female reduces the likelihood of being financially included for both dependent variables indicated by the negative and significant coefficient. Education and income have the same impact on both financial inclusion variables, albeit positive. Being better educated or in the middle to upper part of a country' income quintile increases the likelihood of having an account or have set money aside in the last 12 months. These findings are consistent with the existing literature (Demirgüç-Kunt et al., 2018; Zins & Weill, 2016). While the sign of the age and age squared coefficient is the same for both dependent variables, age is only significant for account ownership, indicating that being older increases the likelihood of having an account. In high age, this effect is reversed, indicated by the negative sign of age squared. Turning to the macroeconomic variables the relationship is less unified. Financial openness has a positive and significant impact on the likelihood of having an account, however for savings, the sign is negative

indicating that more financial openness does reduce the likelihood that people save money. Trade openness in turn has a positive and significant effect on both account and savings, while inflation only has a positive effect on account ownership and not on savings. The positive sign for GDP per capita for both account and savings indicates that higher national income increases the likelihood of financial inclusion. The Strength of Legal Right measure as a proxy for the strengths of creditors rights protection does have a positive and significant effect on account ownership but is negative for savings.

Table 14. Determinants of financial inclusion in EECA countries

	Account		Savings	
		Marginal Effect		Marginal Effect
FEM	-0.08*** (0.021)	-1.893%	-0.06*** (0.020)	-2.445%
AGE	0.04*** (0.003)	1.300%	0.00 (0.003)	0.120%
AGE2	-0.00*** (0.000)	-0.005%	-0.00 (0.000)	-0.001%
EDU	0.51*** (0.019)	19.767%	0.24*** (0.017)	9.400%
IncQ	0.13*** (0.008)	4.245%	0.12*** (0.007)	4.807%
FINO	0.84*** (0.057)	2.203%	-0.60*** (0.053)	-16.656%
TRO	0.01*** (0.002)	0.437%	0.01*** (0.002)	0.310%
INFL	0.02*** (0.005)	0.620%	-0.03*** (0.005)	-1.096%
GDPpc	0.00*** (0.000)	0.002%	0.00*** (0.000)	0.005%
SLR	0.18*** (0.012)	6.718%	-0.11*** (0.012)	-3.737%
Observations	21089		21098	
Correctly Predicted	15353	-	13693	-
Cases				
Log-Likelihood	-11355.98		-13017.04	

Note: This table describes the determinants of financial inclusion in EECA countries. Account and savings are the dependent variables. Individual and macroeconomic variables are the explanatory variables both as described in Table 8. Coefficients are presented and standard error are in parentheses. The marginal effects were calculated manually based on the methodology used by O'Halloran.

Raising the variables (i.e. FINO, INFL etc.) by one unit does not translate into a constant effect on account ownership or if a person has been able to save money or not in the past 12 months. This is because in the probability scale, all effects are non-linear. Therefore,

a marginal effects calculation is required for the RE probit model, as the equations ((1), (2)) do not just depend on β_{it} , but on the value of x_{it} and all other variables in the equation. One way of solving this is setting all variables to their medians when calculating the marginal effects (O'Halloran). Based on the calculation methodology of O'Halloran, the marginal effects for account and savings were computed and are shown in Table 14. Being a woman decreases the probability of being financially included in the sense of having an account or having saved money in the past 12 months by -1.9 percent and -2.4 percent respectively. As one becomes older, this increases the probability of having an account by 1.3 percent. The variables with the strongest impact on the probability of being financially included are education and income. Being better educated increases the probability of having an account by 19.7 percent and of saving money by 9.4 percent and increasing individual income does raise the probability of being included by 4.2 percent for account ownership and 4.8 percent for savings. Strength of Legal Rights and financial openness are the variables that increase the probability of having an account by the most; 6.7 percent and 2.2 percent respectively. Trade openness and inflation both have a positive and significant impact, however they increase the probability of having an account by just 0.4 percent and 0.6 percent respectively. Increase in national GDP per capita only raises the probability of having an account by only 0.002 percent. Unlike the positive influence financial openness has on account ownership, more financial openness does reduce the probability of having saved money in the past 12 months by 16.6 percent. Trade openness in turn does increase the probability of having an account by 0.3 percent. Both inflation and strength of legal rights do have a negative impact on savings; the probability of having saved is reduced by 3.7 percent and 1.1 percent respectively. The impact of GDP per capita on savings is similar to the impact on account ownership, both positive and significant, increasing the probability by 0.005 percent.

5.3 Discussion of Results

The results of the random effects probit estimations have shown that all macroeconomic factors are significant determinants of financial inclusion and with the sole exception of age for the inclusion indicator savings, all socioeconomic variables are significant determinants for account and savings. The findings on individual characteristics are predominantly in line with those from the literature. As Table 14 shows, being male, older, better educated and with higher income increases the likelihood of having an

account at a formal financial institution or a mobile money provider. The same is true for savings, with the sole exception that no significance was found for age. This is contradictory to the existing literature, who also found age as a significant determinant of financial inclusion (compare Demirgüç-Kunt et al., 2018; Zins & Weill, 2016). Education and income appear to be the most important individual characteristics that are found to increase the probability of being included, as the marginal effect calculation demonstrated. Table 12 reports the results on account ownership as measure of financial inclusion. Financial and trade openness, inflation, GDP per capita and strength of legal rights are all statistically significant determinants of financial inclusion (and all at the 1 percent level). They all demonstrate a positive sign of the coefficients which is translated into positive influence on financial inclusion. The findings on the openness variables are consistent with the financial development literature where both factors were found to be positive and significant determinants for financial development (Chinn & Ito, 2005; Seetanah et al., 2010). Rajan & Zingales (2003) as well as Law & Habibullah (2009) found that trade openness is a significant determinant for capital market development thus supporting financial development. While the findings of the RE probit estimates for the openness variables are fully consistent with literature on account ownership, they deviate for the effect on savings. The results showed that there exists negative and significant effect indicating that greater financial openness does not increase the number of people who were able to set money aside in the last 12 months. In addition, the marginal effects calculation shows that this negative effect is considerably strong resulting in the largest decrease in probability for saving money given a (positive) one-unit change in financial openness. Countries of the EECA region are not among the countries that are considered as “most financially open” as per the Chinn & Ito Index. Armenia ranked 60th in 2017 with the other EECA countries far behind. Ukraine and Uzbekistan even were at the bottom of the listing¹⁴. The Kyrgyz Republic for example showed that while they have increased financial inclusion drastically since 2014, they have also become more financially open. The results suggest that advancing in becoming more financially open could result in a more inclusive financial sector. This is in line with the results shown in Table 14. In terms of inflation, the results show that inflation is significant at the 1 percent level for both financial inclusion indicators. Yet the sign of the coefficient shows a

¹⁴ As per the Chinn & Ito Index; http://web.pdx.edu/~ito/Chinn-Ito_website.htm

different impact. For account ownership, inflation has a positive effect while on savings, inflation is negative. This is in line with existing literature where it is confirmed that higher levels of inflation reduce the real returns and as a result saving becomes less attractive (Almarzoqi et al., 2015). The findings in the literature (compare Table 4) that the impact of inflation is predominantly negative can thus only partially be confirmed. Further, the fact that countries with inflation problems experience lower levels of financial development (Boyd et al., 2001) could not be replicated with the results shown. Also, certain EECA countries experienced inflation rates above 13 percent above which according to Rousseau & Wachtel (2002) the finance-growth nexus breaks apart. Further evaluation is required to replicate such results for the financial inclusion variables. National income measured by GDP per capita has a positive and significant effect on account ownership and savings. The impact on the probability of being financially included however is rather low given a growing economy. The directional findings are consistent with Law & Habibullah (2009) who also found that GDP per capita positively influences financial development. Even though the findings confirm that economic growth leads to financial inclusion, the prevailing findings in the literature however demonstrate a finance-growth nexus and this relationship is broadly accepted by researchers and policy makers. In order to solve the ambiguity of whether GDP growth leads to financial development or vice versa, and which relationship is stronger, a bi-directional assessment is necessary. Protecting creditors rights as measured by the strength of legal rights index (SLR) is important for financial inclusion. The results show that better creditor protection laws do increase the probability of account ownership. Given the SLR index measures, i.e, the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending, increased lending may result in more people having an account to utilize the borrowed money. Conversely, stronger creditor protection laws do negatively influence an individual's saving behavior. The results revealed the determinants of financial development in EECA countries. It is however important to note that these findings are not considered causal and further research must be done to also show causality of the identified factors. In addition, there exists a conceptual problem with the estimation method selected. An infinite number of variables of different origins could be estimated in the probit regression with a potentially significant outcome, yet they might not be qualified to actually influence financial inclusion. The variables selected were thoroughly identified through literature review and

possess a solid rationale for why they are relevant for financial inclusion. The initial list of variables though was markedly larger, but was subsequently shortened to five factors. Another problem that may arise with the selection of a large number variables is duplication. This problem was mitigated, however, by a narrow selection of distinct factors.

6. Conclusion

This section concludes the thesis by providing a summary of the results. Recommendations and implications for practice are discussed followed by an outlook for further research.

6.1 Summary

The purpose of this thesis has been to shed light on the macroeconomic determinants of financial inclusion that are qualified to explain the recent advances of Eastern Europe and Central Asia countries in becoming more financially inclusive. While the socioeconomic determinants such as gender, education or income were already well explored in the literature, little evidence was available with respect to macroeconomic variables that could support financial inclusion. By means of reviewing existing literature on macroeconomic factors that are found to support financial development, a series of macroeconomic variables have been identified and linked with two distinct financial inclusion indicators such as account ownership and savings. Data for both set of variables (financial inclusion variables and macroeconomic variables) have been collected from publicly available databases such as the Global Findex database or Global Financial Development database. The variables were observed for the years 2011, 2014 and 2017. Due to the binary nature of the financial inclusion variables, a binary outcome model was employed. The panel data for the thirteen EECA countries and the selected variables over three different years were analyzed using a random effects probit model. The final model consisted of account ownership and savings made in the last 12 months as a proxies for financial inclusion as dependent variables and macroeconomic factors such as financial openness, trade openness, inflation, GDP per capita and strength of legal rights as well as socioeconomic factors such as gender, age, education and income as explanatory variables. First, standard probit for both financial inclusion variables with and without country dummies has been estimated followed by a random effect estimation for the same. The LR-test indicated that the random effects probit regression was better suited to estimate the panel data. The findings on socioeconomic variables as determinant of financial inclusion are mainly in line with the literature. Being male, older to a certain extent, better educated and with higher income increases the likelihood of having an account at a formal financial institution and savings, while age was found not to be significant for savings. Further, the results reveal that financial and trade openness,

inflation, GDP per capita and borrower's rights protection are supporting account ownership demonstrating positive and significant coefficients, while only trade openness and GDP per capita are positively influence savings. The signs of the coefficients on all macroeconomic variables are consistent with financial development theory given all demonstrate positive and significant signs for account ownership but not for savings. Financial openness and borrower's rights protection laws are most important for account ownership, while openness to trade is the most relevant macroeconomic factor for savings.

6.2 Recommendation and Implications for Practice

The results indicate that governments and policy makers in the EECA region can play an important role in increasing the level of financial inclusion. For example, acceleration of financial liberalization and openness to trade would boost account ownership and partially increase savings. It is important to consider the potential negative impact greater financial openness has on savings. Though being aware of this, appropriate countermeasures could be taken from policymakers. Further, the results confirm the present gender inequality indicating the requirement for dedicated campaigns to extend access to and use of formal financial services to women, young people and poorer households.

6.3 Outlook

Financial inclusion is clearly an important topic and many economies have realized the benefits of highly inclusive financial systems. The understanding of the socio and macroeconomic determinants of financial inclusion is crucial, and the present paper contributes in this aspect. Yet, the identified factors are far from conclusive as the availability of possible factors that influence inclusion is large. Further research is required to identify additional critical factors for a wider set of financial inclusion indicators to further sharpen economic policy. In addition, the channels through which the various factors influence inclusion is even more relevant. More research will be needed to show how the findings can be translated into effective policies and it should be looked at from a full cost perspective. Further, technological innovation and the involvement of Fintech companies opens up new spaces for disruptive financial offerings which could potentially impacting financial inclusion. Finally, frictions preventing the

financial system from being inclusive must be identified and the hypothesis that too much finance might be at the disadvantage for growth and economic stability should be further explored.

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8. Appendix

8.1 Standard Probit Regression – Dep. Var.: Account

Model 1: Probit, using 21089 observations
Dependent variable: account
Standard errors based on Hessian

	coefficient	std. error	z	p-value
const	-4.15077	0.0965838	-42.98	0.0000 ***
FEM	-0.0465959	0.0191933	-2.428	0.0152 **
AGE	0.0323265	0.00278562	11.60	3.90e-031 ***
AGE2	-0.000280230	2.92516e-05	-9.580	9.71e-022 ***
EDU	0.555628	0.0166604	33.35	7.24e-244 ***
IncQ	0.106599	0.00681278	15.65	3.49e-055 ***
FINO	-0.0313204	0.00915378	-3.422	0.0006 ***
TRO	0.00750683	0.000504814	14.87	5.12e-050 ***
INFL	0.0183206	0.00296038	6.189	6.07e-010 ***
GDPPc	0.000148757	3.21866e-06	46.22	0.0000 ***
SLR	0.0536145	0.00358286	14.96	1.26e-050 ***

Mean dependent var 0.524207 S.D. dependent var 0.499426
McFadden R-squared 0.179585 Adjusted R-squared 0.178831
Log-likelihood -11972.37 Akaike criterion 23966.73
Schwarz criterion 24054.25 Hannan-Quinn 23995.29

Number of cases 'correctly predicted' = 15183 (72.0%)
f(beta'x) at mean of independent vars = 0.398
Likelihood ratio test: Chi-square(10) = 5241.38 [0.0000]

	Predicted	
	0	1
Actual 0	6975	3059
1	2847	8208

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 37.2426
with p-value = 8.18213e-009

Model 2: Probit, using 21089 observations
Dependent variable: account
Standard errors based on Hessian
Omitted due to exact collinearity: DCountry_12

	coefficient	std. error	z	p-value
const	-4.88212	0.302654	-16.13	1.54e-058 ***
FEM	-0.0782248	0.0186892	-3.973	7.10e-05 ***
AGE	0.0369845	0.00284628	12.99	1.32e-038 ***
AGE2	-0.000357845	2.99383e-05	-11.95	6.28e-033 ***
EDU	0.481665	0.0171704	28.05	3.78e-173 ***
IncQ	0.120741	0.00699437	17.29	5.86e-067 ***
FINO	0.786358	0.0505257	15.56	1.29e-054 ***
TRO	0.0107139	0.00166281	6.443	1.17e-010 ***
INFL	0.0194415	0.00413786	4.698	2.62e-06 ***
GDPPc	0.000594511	5.21989e-05	11.39	4.73e-030 ***
SLR	0.167063	0.0106553	15.68	2.11e-055 ***
DCountry_1	-3.33473	0.185199	-18.01	1.74e-072 ***
DCountry_2	-2.41064	0.182294	-13.22	6.38e-040 ***
DCountry_3	-0.932886	0.234727	-3.974	7.06e-05 ***
DCountry_4	-4.07266	0.228493	-17.82	4.60e-071 ***
DCountry_6	-1.22208	0.125455	-9.741	2.01e-022 ***
DCountry_7	-0.643529	0.0649152	-9.913	3.64e-023 ***
DCountry_8	-5.77942	0.431953	-13.38	7.94e-041 ***
DCountry_9	1.23877	0.188402	6.575	4.86e-011 ***
DCountry_10	-6.36606	0.572515	-11.12	1.01e-028 ***

Mean dependent var 0.524207 S.D. dependent var 0.499426
McFadden R-squared 0.218961 Adjusted R-squared 0.217590
Log-likelihood -11397.75 Akaike criterion 22835.50
Schwarz criterion 22994.63 Hannan-Quinn 22887.42

Number of cases 'correctly predicted' = 15364 (72.9%)
f(beta'x) at mean of independent vars = 0.398
Likelihood ratio test: Chi-square(19) = 6390.62 [0.0000]

	Predicted	
	0	1
Actual 0	7037	2997
1	2728	8327

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 25.9671
with p-value = 2.2978e-006

8.2 Standard Probit Regression – Dep. Var.: Saved

Model 3: Probit, using 21089 observations
Dependent variable: saved
Standard errors based on Hessian

	coefficient	std. error	z	p-value
const	-1.26033	0.0837754	-15.04	3.77e-051 ***
FEM	-0.0622403	0.0183084	-3.400	0.0007 ***
AGE	0.00428260	0.00267309	1.602	0.1091
AGE2	-4.15030e-05	2.83039e-05	-1.466	0.1426
EDU	0.193033	0.0154460	12.50	7.73e-036 ***
IncQ	0.108862	0.00652635	16.68	1.82e-062 ***
FINO	-0.229425	0.00925664	-24.78	1.30e-135 ***
TRO	0.00189129	0.000448409	4.218	2.47e-05 ***
INFL	-0.0214270	0.00284580	-7.529	5.10e-014 ***
GDPPc	3.75060e-05	2.81807e-06	13.31	2.05e-040 ***
SLR	-0.00673725	0.00332171	-2.028	0.0425 **

Mean dependent var 0.382617 S.D. dependent var 0.486037
McFadden R-squared 0.051112 Adjusted R-squared 0.050328
Log-likelihood -13913.99 Akaike criterion 26649.99
Schwarz criterion 26737.51 Hannan-Quinn 26678.55

Number of cases 'correctly predicted' = 13409 (63.6%)
f(beta'x) at mean of independent vars = 0.379
Likelihood ratio test: Chi-square(10) = 1434.32 [0.0000]

	Predicted	
	0	1
Actual 0	11296	1724
1	5956	2113

Excluding the constant, p-value was highest for variable 10 (AGE2)

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 22.1483
with p-value = 1.55078e-005

Model 4: Probit, using 21089 observations
Dependent variable: saved
Standard errors based on Hessian
Omitted due to exact collinearity: DCountry_12

	coefficient	std. error	z	p-value
const	-2.70009	0.293398	-9.203	3.49e-020 ***
FEM	-0.0558279	0.0185290	-3.013	0.0026 ***
AGE	0.00285152	0.00270036	1.056	0.2910
AGE2	-1.82090e-05	2.86857e-05	-0.6348	0.5256
EDU	0.221553	0.0159824	13.86	1.07e-043 ***
IncQ	0.109686	0.00658749	16.65	2.99e-062 ***
FINO	-0.550917	0.0451344	-12.21	2.88e-034 ***
TRO	0.00813187	0.00155492	5.230	1.70e-07 ***
INFL	-0.0276987	0.00397596	-6.967	3.25e-012 ***
GDPPc	0.000287212	4.99726e-05	5.747	9.06e-09 ***
SLR	-0.102854	0.00977842	-10.52	7.10e-026 ***
DCountry_1	1.01554	0.162061	6.266	3.69e-010 ***
DCountry_2	-0.343352	0.168406	-2.039	0.0415 **
DCountry_3	-1.32296	0.224233	-5.900	3.64e-09 ***
DCountry_4	1.15902	0.202594	5.721	1.06e-08 ***
DCountry_6	1.40610	0.109696	12.82	1.30e-037 ***
DCountry_7	0.804599	0.0622985	12.92	3.40e-035 ***
DCountry_8	-0.776341	0.404739	-1.918	0.0551 *
DCountry_9	0.345715	0.181635	1.903	0.0570 *
DCountry_10	-2.31181	0.545362	-4.239	2.24e-05 ***

Mean dependent var 0.382617 S.D. dependent var 0.486037
McFadden R-squared 0.066423 Adjusted R-squared 0.064998
Log-likelihood -13099.16 Akaike criterion 26238.32
Schwarz criterion 26397.45 Hannan-Quinn 26290.25

Number of cases 'correctly predicted' = 13678 (64.9%)
f(beta'x) at mean of independent vars = 0.378
Likelihood ratio test: Chi-square(19) = 1863.99 [0.0000]

	Predicted	
	0	1
Actual 0	11047	1973
1	5438	2631

Excluding the constant, p-value was highest for variable 10 (AGE2)

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 0.00790906
with p-value = 0.996053

8.3 RE Probit Regression – Dep. Var.: Account

--- FINAL VALUES:
loglikelihood -11857.0034356 (step 2.62144e-013, norm 9.13e-002)

Model 5: Random-effects probit, using 21089 observations
Included 7035 cross-sectional units
Time-series length: minimum 1, maximum 3
Dependent variable: account
Using 8 quadrature points
Standard errors based on Hessian

	coefficient	std. error	z	p-value
const	-4.58307	0.115850	-39.56	0.0000 ***
FEM	-0.0574627	0.0211868	-2.712	0.0067 ***
AGE	0.0375502	0.00309839	12.13	7.13e-034 ***
AGE2	-0.000336425	3.25345e-05	-10.34	4.62e-025 ***
EDU	0.593405	0.0187192	31.70	1.54e-220 ***
IncQ	0.120761	0.00763709	15.81	2.56e-056 ***
FINO	-0.0326152	0.0112972	-2.887	0.0039 ***
TRO	0.00832931	0.000622243	13.39	7.31e-041 ***
INFL	0.0210022	0.00365862	5.740	9.44e-09 ***
GDPpc	0.000164864	4.09373e-06	40.27	0.0000 ***
SLR	0.0601467	0.0041013	13.64	2.37e-042 ***
lnsigma2	-1.40201	0.0850077	-16.49	4.13e-061 ***

Mean dependent var 0.524207 S.D. dependent var 0.499426
Log-likelihood -11857.00 Akaike criterion 23738.01
Schwarz criterion 23833.48 Hannan-Quinn 23769.16

sigma_u = 0.496085
rho = 0.197497

Number of cases 'correctly predicted' = 15188 (72.0%)

	Predicted	
	0	1
Actual 0	6981	3053
Actual 1	2848	8207

LR test for rho = 0
Test statistic: Chi-square(1) = 230.726
with p-value = 4.13991e-052

--- FINAL VALUES:
loglikelihood -11355.9760626 (step 2.62144e-013, norm 1.69e-001)

Model 6: Random-effects probit, using 21089 observations
Included 7035 cross-sectional units
Time-series length: minimum 1, maximum 3
Dependent variable: account
Using 8 quadrature points
Standard errors based on Hessian
Omitted due to exact collinearity: DCountry_12

	coefficient	std. error	z	p-value
const	-5.11197	0.341710	-14.96	1.34e-050 ***
FEM	-0.0936882	0.0209134	-4.002	6.29e-05 ***
AGE	0.0400499	0.00304473	13.15	1.62e-039 ***
AGE2	-0.000389083	3.20021e-05	-12.16	5.20e-034 ***
EDU	0.508572	0.0185469	27.42	1.55e-165 ***
IncQ	0.128955	0.00750467	17.17	4.45e-066 ***
FINO	0.844368	0.0574740	14.69	7.33e-049 ***
TRO	0.0109809	0.00187824	5.846	5.02e-09 ***
INFL	0.0211904	0.00469471	4.514	6.37e-06 ***
GDPpc	0.000622507	5.90040e-05	10.55	5.07e-026 ***
SLR	0.177398	0.0121236	14.63	1.74e-048 ***
DCountry_1	-3.57768	0.210414	-17.00	7.79e-065 ***
DCountry_2	-2.56217	0.206013	-12.44	1.65e-035 ***
DCountry_3	-0.956721	0.265926	-3.598	0.0003 ***
DCountry_4	-4.35279	0.259292	-16.79	3.03e-063 ***
DCountry_6	-1.34376	0.143108	-9.390	6.01e-021 ***
DCountry_7	-0.705181	0.0741907	-9.505	2.00e-021 ***
DCountry_8	-6.10608	0.487496	-12.53	5.42e-036 ***
DCountry_9	1.25855	0.213028	5.908	3.46e-09 ***
DCountry_10	-6.69973	0.647094	-10.35	4.03e-025 ***
lnsigma2	-1.98329	0.128186	-15.47	5.36e-054 ***

Mean dependent var 0.524207 S.D. dependent var 0.499426
Log-likelihood -11355.98 Akaike criterion 22753.95
Schwarz criterion 22921.04 Hannan-Quinn 22808.48

sigma_u = 0.370966
rho = 0.120969

Number of cases 'correctly predicted' = 15353 (72.8%)

	Predicted	
	0	1
Actual 0	7032	3002
Actual 1	2734	8321

LR test for rho = 0
Test statistic: Chi-square(1) = 83.5435
with p-value = 6.23307e-020

8.4 RE Probit Regression – Dep. Var.: Saved

--- FINAL VALUES:
loglikelihood -13195.6465314 (step 2.62144e-013, norm 6.90e-002)

Model 7: Random-effects probit, using 21089 observations
Included 7035 cross-sectional units
Time-series length: minimum 1, maximum 3
Dependent variable: saved
Using 8 quadrature points
Standard errors based on Hessian

	coefficient	std. error	z	p-value
const	-1.40348	0.0969777	-14.47	1.82e-047 ***
FEM	-0.0709136	0.0200362	-3.539	0.0004 ***
AGE	0.00420950	0.00292874	1.437	0.1506
AGE2	-3.77119e-05	3.10192e-05	-1.216	0.2241
EDU	0.217326	0.0171331	12.68	7.20e-037 ***
IncQ	0.122768	0.00726046	16.91	3.86e-064 ***
FINO	-0.255585	0.0114010	-22.42	2.64e-111 ***
TRO	0.00209255	0.000549200	3.810	0.0001 ***
INFL	-0.0239760	0.00347810	-6.893	5.45e-012 ***
GDPpc	4.19473e-05	3.46066e-06	12.12	8.16e-034 ***
SLR	-0.00739577	0.00405284	-1.825	0.0680 *
lnsigma2	-1.50087	0.0829094	-18.10	3.04e-073 ***

	Mean dependent var	S.D. dependent var	
Log-likelihood	0.382617	0.486037	
Schwarz criterion	-13195.65	Akaike criterion	26415.29
	26510.77	Hannan-Quinn	26446.45

sigma_u = 0.472161
rho = 0.182296

Number of cases 'correctly predicted' = 13408 (63.6%)

	Predicted	
	0	1
Actual 0	11276	1744
1	5937	2132

Excluding the constant, p-value was highest for variable 10 (AGE2)

LR test for rho = 0
Test statistic: Chi-square(1) = 236.696
with p-value = 2.0663e-053

--- FINAL VALUES:
loglikelihood -13017.0433682 (step 1.04858e-014, norm 7.73e-002)

Model 8: Random-effects probit, using 21089 observations
Included 7035 cross-sectional units
Time-series length: minimum 1, maximum 3
Dependent variable: saved
Using 8 quadrature points
Standard errors based on Hessian
Omitted due to exact collinearity: DCountry_12

	coefficient	std. error	z	p-value
const	-2.95716	0.344177	-8.592	8.55e-018 ***
FEM	-0.0637684	0.0199784	-3.192	0.0014 ***
AGE	0.00301087	0.00291514	1.033	0.3017
AGE2	-1.79994e-05	3.09567e-05	-0.5814	0.5609
EDU	0.239775	0.0173632	13.81	2.24e-043 ***
IncQ	0.121410	0.00721421	16.83	1.49e-063 ***
FINO	-0.596810	0.0534438	-11.17	5.91e-029 ***
TRO	0.00891577	0.00183469	4.860	1.18e-06 ***
INFL	-0.0297666	0.00470320	-6.329	2.47e-010 ***
GDPpc	0.000312889	5.89058e-05	5.312	1.09e-07 ***
SLR	-0.110326	0.0115825	-9.525	1.65e-021 ***
DCountry_1	1.10389	0.191665	5.759	8.44e-09 ***
DCountry_2	-0.366029	0.198913	-1.840	0.0657 *
DCountry_3	-1.43326	0.264684	-5.415	6.13e-08 ***
DCountry_4	1.25152	0.239324	5.229	1.70e-07 ***
DCountry_6	1.53017	0.129994	11.77	5.50e-032 ***
DCountry_7	0.877161	0.0736917	11.90	1.14e-032 ***
DCountry_8	-0.845390	0.477162	-1.772	0.0764 *
DCountry_9	0.383970	0.213897	1.795	0.0726 *
DCountry_10	-2.51223	0.643060	-3.907	9.36e-05 ***
lnsigma2	-1.70863	0.0958604	-17.82	4.59e-071 ***

	Mean dependent var	S.D. dependent var	
Log-likelihood	0.382617	0.486037	
Schwarz criterion	-13017.04	Akaike criterion	26076.09
	26243.17	Hannan-Quinn	26130.61

sigma_u = 0.425574
rho = 0.153341

Number of cases 'correctly predicted' = 13693 (64.9%)

	Predicted	
	0	1
Actual 0	11045	1975
1	5421	2648

Excluding the constant, p-value was highest for variable 10 (AGE2)

LR test for rho = 0
Test statistic: Chi-square(1) = 164.23
with p-value = 1.34742e-037