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Comparison of Financial Inclusion and Income Between Countries with Multiple Correspondence Analysis

Nihan ÖKSÜZ NARİNÇ* Mehmet Nefi AKTAN**

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Abstract

Financial inclusion in the world has a long and constantly evolving historical process to connect every individual to financial services. Many financial institutions have evolved from offering only microcredit since the early 2000s to providing basic access to financial services such as savings and insurance. However, the 2008 global financial crisis, like all other economic crises, created changes in the dynamics of the economy and financial inclusion became a fundamental strategy in financial matters. In general, financial inclusion is defined as a process that provides access, availability and ease of use to financial services for all members of society. In terms of macroeconomic effects, studies on financial inclusion have been shaped around economic growth, financial stability, and income inequality. The World Bank's studies and indices on financial inclusion constitute a considerable part of the literature. In the literature, in countries where financial access and financial inclusion are high, the findings related to the reducing effect of income inequality are dominant. However, as new literature, there are also studies proving that financial inclusion increases income inequality. In this study, using the Global Findex 2017 data, the financial inclusion of individuals in high-income countries, low-income countries, and Turkey's lowest and highest 20 percent income levels were examined by Multiple Eligibility Analysis (MCA). One of the findings of the study is that in case of an urgent need for financing, individuals in low-income European and Central Asian countries turn to more traditional channels, not financial institutions. Similarly, it was concluded that savings and financial institutions are more preferred in high-income countries. Also, an important finding is that in case of such an urgent financing need in high-income "non-OECD countries", the needs are met through more employment channels.

Keywords: financial inclusion, income, multiple correspondence analysis

Çoklu Uygunluk Analizi ile Ülkeler Arasında Finansal Tabana Yayılma ve Gelirin Karşılaştırılması

Öz

Dünyada finansal tabana yayılma, her bireyi finansal hizmetlere bağlamak için uzun ve sürekli gelişen bir tarihsel sürece sahiptir. Pek çok finans kurumu, 2000'li yılların başından beri sadece mikro kredi sunmaktan, tasarruf ve sigorta gibi finansal hizmetlere temel erişim sağlamaya doğru gelişmiştir. Ancak, 2008 küresel finansal krizi, diğer tüm ekonomik krizler gibi, ekonomi dinamiklerinde değişiklikler yaratmış ve finansal tabana yayılma, finansal konularda temel bir strateji haline gelmiştir. Genel olarak, finansal içerme, toplumun tüm üyeleri için finansal hizmetlere erişim, kullanılabilirlik ve kullanım kolaylığı sağlayan bir süreç olarak tanımlanır. Makroekonomik etkiler açısından, finansal tabana yayılma ile ilgili çalışmalar ekonomik büyüme, finansal istikrar ve gelir eşitsizliği etrafında şekillenmiştir. Dünya Bankası'nın finansal tabana yayılmaya ilişkin çalışmaları ve endeksleri, literatürün hatırı sayılır bir bölümünü oluşturmaktadır. Literatürde finansal erişim ve finansal tabana yayılmanın yüksek olduğunu ülkelerde, gelir eşitsizliğini azaltıcı etkisi ile ilgili bulgular çoğunluktadır. Ancak yeni bir literatür olarak finansal tabana yayılmanın gelir eşitsizliğini arttırdığını kanıtlayan çalışmalar da bulunmaktadır. Bu çalışmada, Global Findex 2017 verileri kullanılarak, yüksek gelirli ülkelerdeki, düşük gelirli ülkelerdeki ve Türkiye'nin en düşük ve en yüksek yüzde 20'lik gelir düzeyindeki bireylerin finansal tabana yayılması Çoklu Uygunluk Analizi (MCA) ile incelenmiştir. Çalışmada elde edilen bulgulardan birisi acil bir finansman ihtiyacı olması durumunda, düşük gelirli Avrupa ve Orta Asya ülkelerindeki bireyler finansal kurumlara değil, daha geleneksel kanallara yönelmektedirler. Benzer şekilde yüksek gelirli ülkelerde tasarruf ve finans kuruluşlarının daha çok tercih edildiği sonucuna varılmıştır. Ayrıca, önemli bir bulgu olarak, yüksek gelirli "OECD dışı ülkelerde" bu kadar acil bir finansman ihtiyacı olması durumunda, ihtiyaçlar daha fazla istihdam kanalıyla karşılanmaktadır

Anahtar kelimeler: finansal tabana yayılma, gelir, çoklu uygunluk analizi.

* Dr. Öğr. Üyesi, AKDÜ., U.B.F., nihanoksuz@akdeniz.edu.tr , ORCID: 0000-0001-7650-0085
** Yüksek Lisans Öğrencisi., AKDÜ., S.B.E., nefiaktanoffical@hotmail.com , ORCID: 0000-0001-6942-3165

Introduction

Financial inclusion is a concept that encompasses the access of individuals and businesses to financial services, the protection of financial service users, financial technologies and financial literacy. In expanding the financial base, it is aimed that individuals and businesses have access to financial products and services as well as easy access to banking, credit and insurance products. The approach of the World Bank (Global Findex), which takes into account the demand side of this issue, and the approach of the IMF (Financial Access Survey), which takes into account the supply side, make significant contributions to the measurement of access and use of financial services. However, in the statements of institutions such as the World Bank, financial inclusion emerges as a concept that emphasizes whether people have an account in banks or financial institutions, or in other words, the unbanked population in the world. The first reason that financially excluded individuals do not meet the 'to have a bank account' requirement for financial inclusion is that they do not have enough income to use because they are poor. Nowadays, it is claimed in an increasing number of scientific studies that the increase in access and use of financial services not only helps growth, but also provides a solution to income inequality. Demand-side barriers to accessing financial services include poor financial literacy, cultural or religious beliefs that affect their financial decisions, and a lack of financial capacity. However, there is currently a vicious circle about the limited financial access of individuals or countries with low income levels and financial inclusion. As a matter of fact, as a novelty in the literature, the results of the studies on whether financial depth and financial inclusion contribute to income and inequality are quite different from each other.

In this context, in this study, using microdata, financial inclusion will be compared with countries from various income groups, and financial inclusion in Turkey's lowest and highest income groups will be examined with various variables. It is thought that the absence of any previous study on this subject in a broad scope will fill the gap in the literature. The design of the next part of the study is as follows: In the first part, the concept of financial inclusion will be presented from a historical perspective. In the second chapter, the studies in the literature will be mentioned. In the third section, the material and method used in the study will be included, and in the fourth section, the findings will be presented. Last section concludes with major findings of study.

1. Financial Inclusion

The economic surplus realized in capitalist economies before neoliberalism is covered by net fixed capital investments created by the private sector. With the Keynesian analysis, the

factors that constitute the Golden Age of Capitalism covering the period from World War II to the 1970s are the size of public expenditures and net private fixed capital investments (Robinson, 1965, p.52). During this period, developed countries were characterized by a high growth rate, close to full employment, and an increase in income levels and social welfare. So much so that the growth rate of the whole world economy has reached 2.9 percent, and real incomes have increased even in the poorest countries (Yeldan,2009,p.13; United Nations,2017). However, the early 1970s is regarded as a period when the Golden Age structure started to collapse. This period is also a breakthrough with the collapse of the Bretton Woods system, which relies on fixed exchange rates and the dollar standard based on gold (United Nations,2017). The breakdown of the reconciliation between labor, finance and industry in the USA, inflation pressure, financial innovations, the change of industrial capital, the rise of institutional investors and the war and financial problems of the 1960s are the basis for this collapse (Orhangazi, 2008, p.30-36). With this change, globalization in the world economy, and the phenomenon of financialization with neoliberalism started to be discussed. There are three basic approaches to the question of why financialization emerged in these years. In most of the analyzes made in mainstream economic theory, the accumulation crisis experienced in the 1970s is seen as the source of financialization. Another approach argues that financialization results from the effects of liberalization and deregulation policies in financial markets. The third approach emphasizes the role of politics and class dynamics (Orhangazi, 2008,p.7).

Conceptually, Gerald A. Epstein (2002,p.3), interprets it as the financial market actors taking an important position in the functioning of economic institutions. Similarly, Thomas Palley (2007); defines it as a process that affects the functioning of financial markets, institutions and elites, economic systems that gain more influence on economic policy, both at macro and micro levels. The financialization process in these definitions has led to the growth of retail finance markets from the 1970s to the 1980s and more people to reach a product range that they have never encountered before. Similarly, credit markets started to expand in the same years. One reason for this expansion is the increase in competition with financial liberalization and the other is the change in information technology in terms of risk valuation (Kempson & Whyley, 1999,p.1).

Facilitating access to credit in financial markets and new regulations applied for financial markets have changed the conjuncture since the 1980s. On the one hand, the overvaluation of the dollar, trade deficits caused inflation in asset prices, on the other hand, the lack of productivity-based wage increases and the unequal distribution of income caused an increase in household and corporate debt burden (Palley, 2007,p. 24-25). In the process of

financialization as being subject to regulation by subtracting the commissions paid to stockbrokers and the elimination of restrictions between commercial banking, investment banking activities deregulation was implemented (Tepav, 2009). Between 1973 and 1974, the Smithsonian Agreement and the collapse of Bretton Woods, as well as the oil crisis in October 1973 and the dominance of the bear market, caused the collapse of the world's major stock markets (Davis, 2003). As a result of the deregulation efforts, dissolution in savings and credit channels occurred in a period of ten years, causing the savings and credit crisis (Savings & Loan Crisis) that caused banks to close in the USA. In order to overcome this crisis, a new regulation has been tried to be introduced by establishing the Resolution Trust Corporation (Stiglitz, 2001,p. 9-14).

These crises were followed by many banking and stock market crises. A distinctive feature of financialization is the increase in the ratio of total debt to GDP. Looking at the period between 1973 and 2005, it is seen that total debt increased to 328.6 percent of GDP. During this period of almost a quarter century, the debt of the financial sector tripled. The rise in asset prices along with the financial boom has guaranteed households and firms to finance their debts (Palley, 2007,p. 24-25). The system, which expanded from a traditional and tightly regulated banking system to market-based financial institutions, went down in history as the biggest global financial crisis in 2008, after the Great Depression of 1929. Various explanations and theories have been put forward for the causes of the crisis. Lack of attention paid to banking system regulations, incentives to borrow to support households' spending, excessive global liquidity, and the US current account deficit creating a global dollar surplus are some of them (Wray, 2016,p. 6).

With financialization and developing markets, many people have not only facilitated access to financial products but also become a part of the financial system by borrowing people who cannot obtain income to meet their vital needs. However, today some households do not even have the most basic financial products such as owning a bank account. These households are the most disadvantaged, bottom-poor segment of society and are more generally subjected to social exclusion (Kempson & Whyley, 1999,p. 22). When the financial sector is examined, especially before and after the 2008 crisis, it gets deeper. The growth of bank deposits globally decreased by over 12 percent from 2006 to 2009 (Han & Melecky, 2013,p. 4-5).

After the global financial crisis, financial inclusion began to be universalized as a basic development strategy. In this context, G20 leaders formed a “Financial Inclusion Experts Group” (FIEG) at the Pittsburgh Summit in November 2009 to expand the access of the poor to financial services. This formation was followed by the "Innovative Financial Inclusion

Principles" approved at the Toronto Summit in June 2010. Today, more than sixty countries have started studies on financial inclusion. The Maya Declaration, supported by around 80 countries, was approved in 2011. These countries were represented more than 75 percent of the population without bank accounts globally. In this context, various commitments to financial inclusion and financial education have been made by the financial regulators of more than twenty developing countries. Although the concept of financial inclusion is not in its own name, it came to the fore as a result of the definition of "financial exclusion" before the 2008 crisis and indirectly before the G20 principles.

The early discussion and analysis of this concept developed in line with the concept of social exclusion and focused mainly on geographical access to banks and banking services. (Leyshon & Thrift 1993, 1995). The process that prevents certain individuals or social groups from accessing the financial system can be considered as one of the earliest definitions of financial exclusion (Leyshon & Thrift, 1995, p. 314). It can be said that microcredit-microfinance practices preventing financial exclusion are the pioneers of the concept of financial inclusion (Soederberg, 2013,p. 593).

Especially in the late 1990s and early 2000s, many financial institutions started to evolve from only offering microcredit to providing basic access to financial services such as savings and insurance. Sarma, sees financial inclusion as a process that provides access, availability, and ease of use to financial services of all members of the society (2008, 2012). Amidžić et al. defined financial inclusion as a concept related to socioeconomic and sociocultural variables other than productivity (2014). Similar to this view, financial inclusion is a concept that allows firms and individuals to take advantage of more business opportunities, save and invest for their education and old age, and take measures against risks (Beck, Demirguc-Kunt and Honohan 2008).

The development of the financial sector has been measured by "financial depth", which is generally expressed as the size of the funds transferred from the financial sector to the real sector. However, research on the factors affecting the inclusiveness of the financial system and access to the financial sector, namely financial inclusion, was not possible until 2005 due to lack of data. Beck et al. (2005) developed an indicator that measures the use of financial services by closing this gap. Between 2003-2004, a database measuring the use and access to banking services of 99 countries was created. To collect this data, they developed a questionnaire distributed among bank regulators in countries. The main questions of the survey are for banks and consist of variables related to the number of branches and ATMs of banks,

bank loans and deposits. In this study conducted according to low-income and high-income countries, countries are ranked according to each indicator.

Perhaps the first and most widely known study in the literature on financial inclusion was conducted by Sarma (2008). Multidimensional indicators used in this study; prevalence of banking services, accessibility to banking services and usage of banking services variables (p.8-9). The financial inclusion index was calculated between 0 and 1 and ranked according to countries. Accordingly, the countries with the highest financial inclusion were found to be Spain, Austria, Belgium, Denmark, Switzerland, and Malta (p. 12-13). The Global Financial Inclusion Index, which was first calculated by the World Bank in 2011, is the most comprehensive study known on financial inclusion and financial inclusion. This micro database, simply called Global Findex, is a database about the access of people over the age of 15 to financial services worldwide. The same microdata survey was applied in 2014 and 2017. Similarly, a financial access survey was conducted in 2012 under the leadership of the IMF institutionally. This survey is based on ATMs as financial access parameters, number of bank accounts and unpaid deposits as a percentage of gross domestic product. Demirguc-Kunt and Klapper (2012) calculated that in a comparison between developed and developing economies, almost half of the world population has no accounts in any financial institution. While 89 percent of individuals in developed countries have a bank account, it has been determined that this rate is 41 percent in developing countries. In this context, when we look at the reasons why individuals do not have an account in a bank or an official financial institution in the Global Findex 2017 data, there are differences according to the income levels of the countries (Figure 1). Even in high-middle-income countries, the option for not having an account is a lack of funds. In high middle-income countries, the rate of not having an account due to the fact that someone in the family has financial access is quite high compared to other countries. Not having an account in a bank or official financial institution is as low as 1 percent in low-income countries because financial services are not needed.[i]

Sarma, suggests that the limited coverage of the financial system in poor countries, the inadequacy of financial education, the dynamics of finance itself mean that an unorganized and informal financial sector fills the scene (2016). However, on the other hand, the criticism of financial inclusion is also very strong. For example, Taylor (2012) criticizes that financial inclusion is a product of microfinance, that is, the drive to commercialize microcredit and that it draws a neoliberal poverty framework as a result of exclusion. It also argues that it does not fulfill its task of reducing poverty and smoothing consumption. Taylor criticizes microfinance as continuing to be a legitimizing narrative as if it was a moral imperative as a way to reduce

vulnerability by smoothing the consumption of marginalized official financial services. (p.603-604). Ozili (2020) has summarized the problems of financial inclusion under seven titles. He says that it is not known how the excessive financial inclusion and its systemic risks will be transferred to the financial sector and that the sustainability of the changes in the economic cycle is uncertain. It emphasizes the more plausible consequences of optimal financial inclusion (p.11-15).

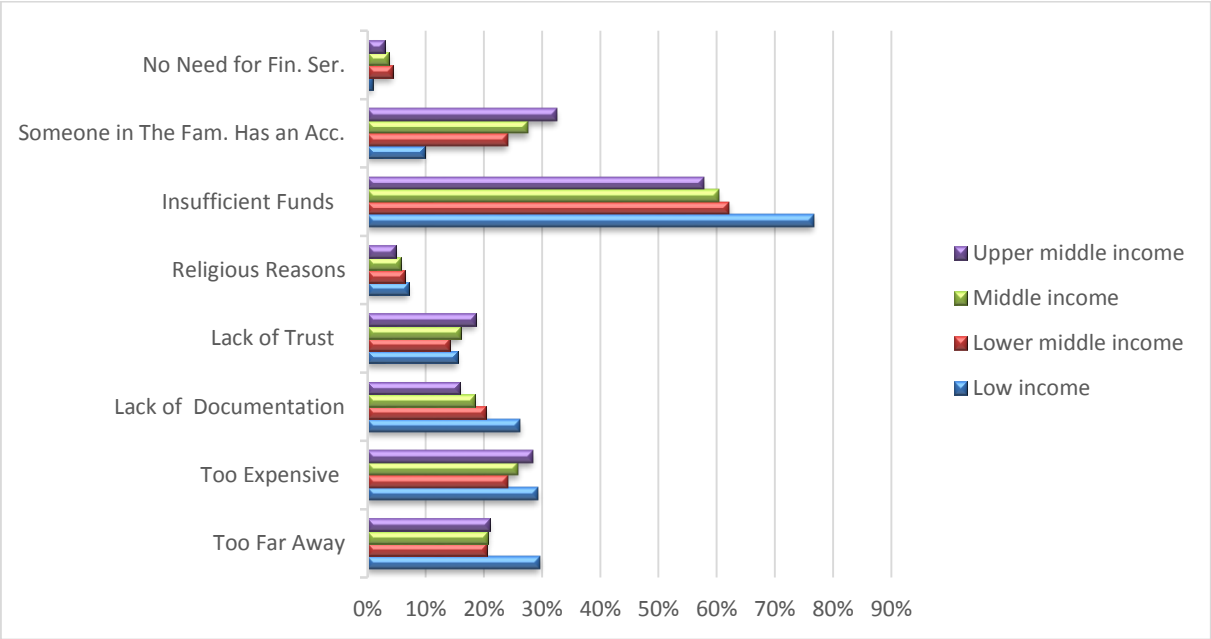

Figure 1. Reason for lack of financial access in some country groups

Source: Compiled from Global Findex 2017 database

The World Bank's equalization of the relationship between financial and real economic development has been found to be problematic. It is predicted that the real outputs of microcredit programs implemented in developing countries do not confirm the positive development foreseen by financial inclusion. It is claimed that the statistical relationship between the measures used in the studies conducted by the World Bank and the macroeconomic activities will be different for each country's economy. So if the relationship between financial developments and macroeconomic results is completely the same in all countries and over time, it will be valid (Kvangraven & Santos, 2018). There are also ideas that argue that the notion of financial inclusion has come to the fore to keep microfinance alive, which has lost its popularity and reputation to a great extent, and in fact, fails the poor. In the context of microfinance, there are concerns that financial inclusion is susceptible to an excessively risky credit supply increase and Minskian dynamics with Ponzi-style effects (Bateman and Chang, 2011,p. 26). In addition,

the concept has been criticized for the G20 principles to treat financial inclusion as anachronistic and apolitical, the neoliberal-led global development project, and its engagement with finance-led capitalism (Soderberg, 2013).

2. Literature

In the literature, there are many publications and researches on financial inclusion that have been examined in a wide range. So much so that the first bibliometric analysis on financial inclusion was made by Gálvez-Sánchez et al. in 2021. In this research alone, there are 1731 research articles recorded in the Scopus database for the period 1986-2020. As can be seen in the bibliometrics review, the increase in research has gained a serious momentum after 2005, as mentioned in the third part of this study**.** In terms of its macroeconomic effects, studies on financial inclusion have been shaped around economic growth, financial stability and inequality. In fact, the literature on the relationship between growth and finance is quite extensive and its history is quite old. There is general consensus that the financial sector plays an important role in the relationship between economic growth and development. One of the implications of these discussions is that investments will increase and poverty will decrease with the transfer of funds from the financial sector to the real sector. In terms of the fact that the first financial development in a country is one of the determinants of the next economic growth, country examples have been discussed in many studies (Levine, 1997 and Claessens, 2006).

The impact of financial access on growth has recently been examined separately. In a study they conducted in 2015b, Sahay et al. Analyzed 176 countries with the data they received from institutions such as the World Bank and IMF covering the years 1980-2012, and suggested that there is a strong positive relationship between household access to finance and growth and that the relationship between financial depth and growth is in the form of a bell curve. Sarma (2016), in her study examining the connection between financial inclusion and dimensions of economic growth for the Indian economy, concluded that banking penetration and service availability positively affect growth.

Sethi and Acharya (2018) analyzed the relationship between financial inclusion and growth, using panel data analysis for various countries, and found that financial inclusion would improve macroeconomic variables and benefit growth in the long run, given the necessary importance in the current period. For the impact of financial inclusion on financial stability, Han and Melecky (2013) concluded that increased use of deposits will contribute to the stability of financial bottlenecks, as a result of increased financial inclusion with greater access. Mehrotra and Yetman (2015), who studied about one hundred thirty countries, found that

financial inclusion has lower consumption fluctuations, especially in countries with high bank account ownership in an official financial institution. In an analysis conducted by Pearce (2011) for the World Bank, it has been shown that the financial inclusion in the MENA region is characterized by micro-credit sectors dominated by civil society organizations, postal networks, and state banks. It has been suggested that financial inclusion is a very important factor for the competitiveness of the country and has a poverty-reducing effect. In one aspect, it is known that a well-formed financial sector has an important role in providing savings, loans, payment, and risk management products to people. Financial services that are inclusive of the general public without any barriers mean a wide financial inclusion. It is predicted that this situation will especially benefit the poor and disadvantaged groups. Without such inclusivity, people outside the financial system struggle with limited opportunities for their needs and entrepreneurship (Demirguc-Kunt & Clapper, 2012).

Although there are many studies that conclude that financial inclusion has a corrective effect on income inequality in terms of removing barriers to access to credit for individuals with lower incomes and a fair distribution of capital, there are also studies suggesting that it primarily benefits only high-income individuals. Similar to Kuznets (1955)'s approach that economic growth increases income inequality in low and middle income countries, financial inclusion does not have a corrective effect on income inequality in low and middle income countries (Greenwood and Jovanovic, 1990; Dabla-Norris et al., 2015). It is even claimed that increases in the level of financial development and liberalization have a distorting effect on income distribution in a country. (Haan and Sturm, 2017; Park and Mercado,2018; Neaime and Gaysset,2018). Some findings conclude that the deterioration in income distribution causes low-income individuals to use leverage in order to continue their consumption and the financial system to deteriorate (Haan and Sturm, 2017). In highly developed economies, many people access financial markets and then feedback, helping larger parts of society. However, people who are already poor rely on informal family ties rather than a formal financial institution (Claessens & Perotti, 2007; Demirguç-Kunt, Klapper, & Singer, 2017; Kling et al., 2020). Dungey et al., in their study conducted in 2018, analyzed the financial inclusion with Multiple Correspondence Analysis (MCA) and Cluster Analysis for Australia. In a study conducted with customer data of a private bank, they found six separate family typology sets according to income, wealth, and mobility according to the results of MCA. It is concluded that customers who are attractive to financial institutions in terms of low risk and good returns have a wider range of mortgages, and those with wealth constraints have less choice in product selection,

especially when women are household heads. They also emphasized that MCA is a useful method for detecting insufficient financial service purchases in financial inclusion.

Cano et al. (2013), based on data from the World Bank and Banco de la República, calculated the determinants of access to a financial product basket using MCA, assuming that households with more financial products would likely use them. Accordingly, they concluded that access to different financial product baskets is related to variables such as gender, income and wealth levels, schooling and financial education level, household stability, and distance between housing and financial institutions.

In a study conducted for Mexico, a multiple correspondence analysis was applied to examine the financial inclusion with independent indicators for credit and savings products. It was found that current account and savings account contributed the most to inertia in asset products. In addition, on the liabilities side, it was found that bank loans were the instrument that contributed most to the inertia. So, products with the highest weight in the financial inclusion indicator in Mexico are current accounts and debit credit cards. (Peña and Tuesta, 2014).

In a study conducted for Ghana, both the Multiple Correspondence analysis and the three-step least squares method were used to measure the impact of financial inclusion on income and poverty. Accordingly, it is claimed that the financial inclusion among Ghanaians is very low and improvements should be made with more investment policies in mobile money infrastructure. In addition, according to the findings of the study, it reduces the probability of being poor in the short term by 32 percent and the risk of future poverty by 31 percent (Koomson et al., 2020). In a study examining the relationship between poverty and financial inclusion, based on the Global Findex 2011 and 2014 survey, they made use of the MCA. In the study, 8 questions from the 2011 survey and 12 questions from the 2014 survey were used as variables. Financial inclusion scores are closely related to the income levels of the countries. It was found that low-income countries clustered in low financial inclusion scores, and high-income countries were the opposite (Aslan et al, 2017).

For South Africa, an asset index was created to measure the financial inclusion by conducting a multiple-suitability analysis through a consumer survey. Then, quantile regression was applied with the combined asset index derived using monthly savings, insurance and MCA It is concluded that the relationship between asset ownership and financial inclusion is statistically significant. It is stated that social welfare programs that create progressive assets are feasible for poor and low-income families (Fomum & Jesse, 2017).

Yıldız and Çağlayan (2016) analyzed the relationship between financial and social exclusion and used Multiple Correspondence Analysis as a method. They found that those with an income above the hunger threshold were more likely to take risks when using financial products. It is observed that individuals with low income, insufficient education and elderly people avoid taking risks and are financially excluded. As a result, individuals who are financially excluded are also found to be socially excluded.

3. Materials And Methods

3.1. Materials

In this study, microdata from Global Findex published by the World Bank were used Based on survey data collected in cooperation with Gallup, Inc., the Global Findex database covers about 140 economies from 8 regions around the world, and approximately 1000 individuals from each country are interviewed (Global Findex, 2017). The data set consists of a total of 153,923 individuals. The content of the questionnaire generally represents nearly 200 variables consisting of issues such as account ownership, payments, savings, credit, and financial flexibility (Demirguc-Kunt et al, 2018). In the study, three regions classified as Europe and Central Asia (excluding High-Income Countries), OECD member (High Income), and Non-OECD (High Income) included in the Global Findex survey will be taken into consideration in order to make a regional and country comparison. It has also investigated financial inclusion based on the income situation in Turkey.

In the data, there are a total of 18.796 individuals from the first region, 28.149 individuals in the second region, 9154 individuals in the third region, and 928 individuals in Turkey. The variables used in the study are gender, age, education level, income level, employment status, bank account, credit card, mortgage, emergency fund source, and social transfer. Table 1 shows that 8051 male individuals and 10745 female individuals participated in the survey conducted in Europa and Central Asia. Mostly, individuals with secondary education participated in the survey and 47 percent of the individuals in this region are out of the labor force. While the rate of those who do not have a bank account is 52 percent, it is 83 percent for individuals without a credit card. The rate of those who do not receive mortgage loans is 12 percent and the rate of individuals who receive social transfers is 15 percent. In the Emergency Fund variable, 40 percent of individuals in Europe and Central Asia say that it will

not be possible to find an emergency fund source. This rate is followed by those who say that they can get funding from family, friends, and employers with 31 percent.

In High-income OECD countries, the rate of those with tertiary (ie high school and post) education is 28 percent. 13 percent of individuals who do not have a bank account, and 49 percent of individuals who do not have a credit card. In these countries, the rate of receiving a mortgage is 29 percent, while the rate of receiving social transfers is 27 percent. While the main source of an urgent fund need in the countries in this region is savings with 46 percent, 24 percent say that it is not possible for them to find such a fund.

Table 1. Frequency and Percentage Values Regarding the Variables Used According to the Regions

REGIONS		Europe and Central Asia (Excluding High Income) [ii]		OECD (High Income) [iii]		Non-OECD (High Income) [iv]		Total
Variable	**Variable Categories**	**Frequency**	**Percent (%)**	**Frequency**	**Percent (%)**	**Frequency**	**Percent (%)**	**Frequency**
Gender	Male	8.051	43%	13.179	47%	5.031	55%	26.261
	Female	10.745	57%	14.970	53%	4.123	45%	29.838
	Total	18.796	100%	28.149	100%	9.154	100%	56.099
Age	15-24	2.805	15%	2.920	10%	1.192	13%	6.917
	25-34	3.470	18%	4.040	14%	2.258	25%	9.768
	35-44	3.202	17%	4.469	16%	1.988	22%	9.659
	45-54	2.873	15%	4.839	17%	1.448	16%	9.160
	55-64	2.991	16%	4.793	17%	1.051	11%	8.835
	65+	3.455	18%	7.088	25%	1.217	13%	11.760
	Total	18.796	100%	28.149	100%	9.154	100%	56.099
Education	Primary or Less	3.321	18%	3.433	12%	1.072	12%	7.826
	Secondary	11.422	61%	16.773	60%	4.780	52%	32.975
	Tertiary or more	4.053	22%	7.943	28%	3.302	36%	15.298
	Total	18.796	100%	28.149	100%	9.154	100%	56.099
Income Level	Fifth 20%	4.650	25%	6.966	25%	2.137	23%	13.753
	First 20%	2.956	16%	4.446	16%	1.517	17%	8.919
	Fourth 20%	4.064	22%	5.982	21%	2.031	22%	12.077
	Second 20%	3.457	18%	5.132	18%	1.678	18%	10.267
	Third 20%	3.669	20%	5.623	20%	1.791	20%	11.083
	Total	18.796	100%	28.149	100%	9.154	100%	56.099
Employment	Out of workforce	8.760	47%	10.231	36%	2.677	29%	21.668
	In workforce	10.036	53%	17.918	64%	6.477	71%	34.431
	Total	18.796	100%	28.149	100%	9.154	100%	56.099
Bank Account	BA-YES	9.080	48%	24.491	87%	7.030	77%	40.601
	BA-NO	9.716	52%	3.658	13%	2.124	23%	15.498
	Total	18.796	100%	28.149	100%	9.154	100%	56.099
Credit Card	CC-YES	3.107	17%	14.493	51%	2.931	32%	20.531
	CC-NO	15.689	83%	13.656	49%	6.223	68%	35.568
	Total	18.796	100%	28.149	100%	9.154	100%	56.099
Mortgage	M-YES	2.270	12%	8.189	29%	1.907	21%	12.366
	M-NO	16.526	88%	19.960	71%	7.247	79%	43.733
	Total	18.796	100%	28.149	100%	9.154	100%	56.099

Emergency Fund	Family, Friends or emloyer	5.833	31%	3.401	12%	1.470	16%	10.704
	Working	2.229	12%	2.632	9%	1.109	12%	5.970
	Other	139	1%	261	1%	78	1%	478
	Financial Instution	732	4%	1.759	6%	257	3%	2.748
	Not possible	7.609	40%	6.821	24%	3.507	38%	17.937
	Saving	2.085	11%	13.005	46%	2.685	29%	17.775
	Sale of assets	169	1%	270	1%	48	1%	487
	Total	18.796	100%	28.149	100%	9.154	100%	56.099
Social Transfer	ST-YES	2.760	15%	7.687	27%	1.711	19%	12.158
	ST -NO	16.036	85%	20.462	73%	7.443	81%	43.941
	Total	18.796	100%	28.149	100%	9.154	100%	56.099

Source: Compiled from Global Findex, 2017 database

In the third region, in terms of education, the rate of those who have completed secondary education is higher than the others. While 71 percent of the individuals of the countries of this region are included in the workforce, the rate of those with bank accounts is 77 percent and the rate of those with credit cards is 32 percent. The ratio of those who say that they will meet an urgent fund need by working in low-income European and Central Asian countries and high-income non-OECD countries is 12 percent.

Frequency table for the variables used in the study is shown in Table 2 for Turkey. When the distribution was examined, 475 male individuals and 453 female individuals participated in the survey. In addition, 71 percent of the respondents are individuals between the ages of 15-44. Individuals with high school or higher education constitute 13 percent of the survey. The proportion of those in the fourth and fifth 20 percent income group is 52,59. It is observed that 32 percent of individuals are not possible in terms of resources to meet their urgent fund need, and 14 percent of them resort to savings. Among the respondents, 341 individuals are employed and 255 individuals do not have any bank accounts. The percentage of those using credit cards in Turkey is 52 percent. While 38 percent of the respondents prefer to borrow from family and friends, the rate of those who prefer financial institutions is 6 percent. 11 percent of the respondents receive social transfer.

Table 2. Frequency and Percentage Table Variables used in the study are related to Turkey

Variable	Variable Categories	Frequency	Percent (%)	Cumulative Percent (%)
Gender	Male	475	51%	51%
	Female	453	49%	100%
	Total	928	100.00	
Age	15-24	162	17%	17%
	25-34	275	30%	47%
	35-44	220	24%	71%
	45-54	139	15%	86%

	55-64	85	9%	95%
	65+	47	5%	100%
	Total	928	100%	
Education	Primary or Less	203	22%	22%
	Secondary	604	65%	87%
	Tertiary or more	121	13%	100%
	Total	928	100%	
Income Level	Fifth 20%	130	14%	14%
	First 20%	137	15%	29%
	Fourth 20%	173	19%	47%
	Second 20%	197	21%	69%
	Third 20%	291	31%	100%
	Total	928	100%	
Employment	Out of workforce	587	63%	63%
	In workforce	341	37%	100%
	Total	928	100%	
Bank Account	BA-YES	673	73%	76%
	BA-NO	255	27%	100%
	Total	928	100%	
Credit Card	CC-YES	483	52%	52%
	CC-NO	445	48%	100%
	Total	928	100%	
Mortgage	M-YES	112	12%	12%
	M-NO	816	88%	100%
	Total	928	100%	
Emergency Fund	Family, Friends or emloyer	354	38%	38%
	Working	86	9%	47%
	Other	-	-	47%
	Financial Instution	53	6%	53%
	Not possible	293	32%	85%
	Saving	131	14%	99%
	Sale of assets	11	1%	100%
	Total	928	100%	
Social Transfer	ST-YES	103	11%	11%
	ST -NO	825	89%	100%
	Total	928	100%	

Source: Compiled from Global Findex, 2017 database

3.2.Method

Multiple Correspondence Analysis (MCA) is a method that enables to analysis of the relationship between categorically dependent variables and is an extension of Correspondence Analysis. Therefore, it can also be seen as a generalization of principal components analysis when the variables to be analyzed are categorical rather than quantitative. MCA analysis was preferred because all variables in the data set used in this study are categorical and it is a method that determines the distinction between variables and individuals in large data sets. Data analysis was done in STATA v.14. The mathematical formulation of the correlation between the rows and columns of the contingency table was calculated by Hirschfeld (1935). Fisher (1940) made this application form discriminant analysis. Guttman (1941) discussed the general situation for more than two qualitative variables.[v] For the Correspondence analysis, Jean-Paul

Benzecri (1992), the approach that suggested the geometric framework of the technique in the early 1960s is an important development (Greenacre and Balsius, 2006, p. 5-6). However, it is not possible to give definite information about who and when developed the Multiple Corresondence Analysis. It is known by many names such as Optimal Scoring, Quantification Method, Scalogram Analysis (Tenenhaus and Young, 1985: 91; Abdi and Valentin, 2007, p.1). If there are two categorical variables, the method to be used is Simple Suitability Analysis. If there are three or more categorical variables, the solution will be difficult because the data will not be in the form of a two-way matrix. It is necessary to reduce the categories by dividing the data into a certain number of subsets by encoding the data according to their specific characteristics (Beh and Lombardo, 2014, p.375). In the Corresondence Analysis, the process of assigning the frequencies as percentages to the relevant lines called row profiles begins.

The average row profile is found by dividing the column totals by the grand total, and the average column profiles by dividing the row totals by the grand total. This point is often called the geometric center (centroid) and is placed at the origin of the major axes. How a found profile value will be positioned on the axis is determined by its distance from the average profile. In order for all points to be at the origin, they must be of equal profile value. Chi-square distance is used for average profiles when calculating this distance. If a_{ij} is considered as the elements of the line profile and a_j is considered as the elements of the center line profile, as seen in the formula to be calculated, the chi-square distance ($d(i,i')$) is the weighted Euclidean Distance (Clausen, 1998, p.10-12, Greenace, 2007,p. 25-32).

$$d(i,i') = \sqrt{\sum_j \frac{(a_{ij} - a_{i'j})}{a_j}}$$

After this step, inertia (Λ^2) is measured for variance (Variability). If d_i represents the chi-square distance of point *i* to the geometric center and $r_i$represents the weight of point i, inertia is calculated as follows:

$$\Lambda^2 = \sum_i r_i d_i^2$$

Inertia is the chi-square value found divided by the sample size. In other words, it can be represented as $\chi^2 = \Lambda^2 N$ (Greenace, 2007, p.25-32; Clausen, 1998,p.15; Greenacre and Blasius, 2006,p.12-15). The eigenvalues are calculated in the next steps. This is the process of breaking down the total inertia with the Singular Value Decomposition algorithm. The

eigenvalues obtained express the relative importance of the dimensions or how much of the total inertia they can explain. If f_{ik}^2 is the square of the coordinate of the point i in dimension k and r_i ; the weight of point i; The eigenvalue calculation for dimension k would be:

$$\lambda_k^2 = \sum_i r_i f_{ik}^2$$

In the Multiple Correspondence Analysis, an indicator matrix is created in which raw data are coded as individuals in the row and categorical variables as 1-0 in the columns. If the data matrix consists of categorical variables as many as Q, if we call the indicator matrix Z;

$$Z = \begin{bmatrix} Z_1 & Z_2 & Z_3 \dots \dots Z_Q \end{bmatrix}$$

The Z_Q term is the indicator matrix of the Qth category. In the Z indicator matrix, the sum of the rows is equal to 1 / n within a variable's own category and the number of variables within all categories. The Burt matrix is obtained by multiplying this indicator from the left with the matrix cycle. If the Burt Matrix (R) is shown as a block for Q variables;

$$R = Z'Z = \begin{bmatrix} Z_1'Z & Z_1'Z_2 & Z_1'Z_2 & \dots & Z_1'Z_2 \\ Z_2'Z & Z_2'Z_2 & Z_2'Z_2 & \dots & Z_2'Z_2 \\ Z_3'Z & Z_3'Z_2 & Z_3'Z_2 & \dots & Z_3'Z_2 \\ \vdots & \vdots & \vdots & \dots & \vdots \\ Z_Q'Z & Z_Q'Z_2 & Z_Q'Z_2 & \dots & Z_Q'Z_Q \end{bmatrix}$$

When the Simple Correspondence Analysis algorithm is applied to the Burt matrix, Multiple Correspondence Analysis is obtained and the procedure is the same.[vi] MCA can be explained as the whole analysis of all binary cross tabulation (Gifi 1990; Abdi and Valentin, 2007, p.5).

To summarize, the purpose of this method is to show the co-occurrence of the categories in space, with rows and columns as geometric elements in a large multidimensional dataset. If there is a close distance between two categories, while there is a close relationship between them, if any category moves away from the origin, it means that the category moves away from the average profile. For example, a group of individuals with a profile similar to the answers given in a questionnaire consisting of categorical responses and their relationship with the variables are similar. When results are presented graphically, variables with similar profiles are grouped together. Negatively or positively related categories are located on opposite sides of the origin on the graph. The distance between the category points and the origin measures the quality of the variable category (Abdi & Valentin, 2007; Kassambara, 2017). The distances between points in a multidimensional space are measured with chi-square in this method. First of all, the total chi-square values of the table are calculated by using the chi-square distances.

Then, the calculated chi-square value is divided by the total number of observations to find the general change in the contingency table, that is, the inertia value. The farther the total inertia value is from zero, the more the row profiles will be decentralized. A large inertia means that the association between rows and columns is high, while an inertia value close to zero means that there is no association (Greenacre, 2007; Clausen, 1998). If the percentage described by the first dimension is sufficient, there will be convergence when the row points are against the columns or when the column points show row-like profiles. For example; If the total inertia is 84%, it means that 84% of the total change can be explained by the two dimensions and the remaining 16% can be explained by other dimensions. It is considered sufficient if at least 70% of the variation (inertia) is explained by two dimensions (Higgs, 1991).

4. Findings

Interpretation in MCA is usually based on the proximity of points on a lower dimensional graph reduced to two or three dimensions. Accordingly, the findings of the study will first be handled as Europe, OECD member countries, and non-OECD high-income countries, according to the regional decomposition in the data. Then the findings will be presented in Turkey. The graph of the MCA of the Europea and Central Asia, OECD member countries, and non-OECD high-income countries as a whole is shown in Figure 2.

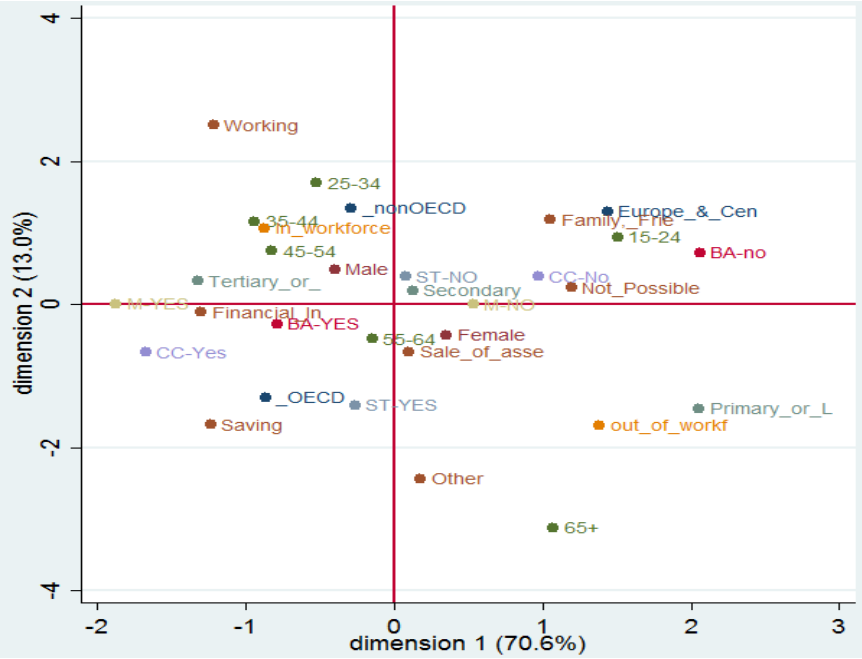

Figure 2. MCA of the European and Central Asia, OECD Member Countries and Non-OECD High Income Countries

The first and second inertia values were calculated as 0.032 and 0.006, respectively. Accordingly, the first dimension explains 70.6 percent of the total inertia, while the second dimension explains 13 percent. The total inertia value of 83.6 indicates that the two dimensions are sufficient to explain the change. the remaining 16.4 percent can be explained by other dimensions. In the first dimension, the highest positive values are those who apply to family, friends and employers for their urgent needs in the European and Central Asia. In the second dimension, that is, by contrast, OECD countries with the highest negative values are individuals who meet their immediate money needs with their savings. In the second dimension, the highest positive values are those who meet an urgent financial need by working, while in the second dimension, nothing can be said about meeting the urgent need for funds with the highest negative value. In high-income non-OECD countries, it can be argued that 25-54-year-old men with high school education and above are closer to working as a primary source to meet an urgent need for funding. In Europe, it is observed that individuals aged 15-24 according to the age group do not have accounts and credit cards, in case of urgent need they either cannot meet their needs or apply to family, friends, and employers. It can be said that individuals in OECD member countries see their savings as their main source of funding in case of an urgent need. Also a scatter chart that addresses all individuals whose data is used in the study is presented in Appendix-1.

According to the results of MCA made in Europe (Figure 3), the first and second eigen values were found as 0.029 and 0.001. Accordingly, while the first dimension explains 80.17 percent of the total inertia, the second dimension explains 4.19 percent. Total inertia meets sufficiency with 84.36 percent. The remaining 15.64 percent can be explained by other dimensions. When comparing individuals only in the European and Central Asian countries, the highest positive value in the first dimension is those over 65 years old, and the highest negative value in the first dimension is those who try to meet their urgent needs by working. In the second dimension, the highest positive value is those who use their savings for their immediate needs, and the highest negative value is those who cannot meet their immediate needs in any way. As seen in Figure 3, it can be said that working men in the 25-34 and 45-54 age group in Europe with an education up to high school level do not receive mortgage and social transfers and do not have credit cards. In addition, it is seen that the primary source they will apply for in urgent funding needs is family, friends, and employers. It can be said that individuals in low-income Tajikistan, Kyrgyzstan, Azerbaijan, and Turkmenistan meet their urgent needs through asset sale. In the first dimension, the highest positive value is the individuals living in Tajikistan and Kyrgyzstan who meet their urgent needs with asset sales.

On the contrary, the highest negative values in the first dimension are individuals applying to Financial Institutions and living in Turkey (Appendix-2).

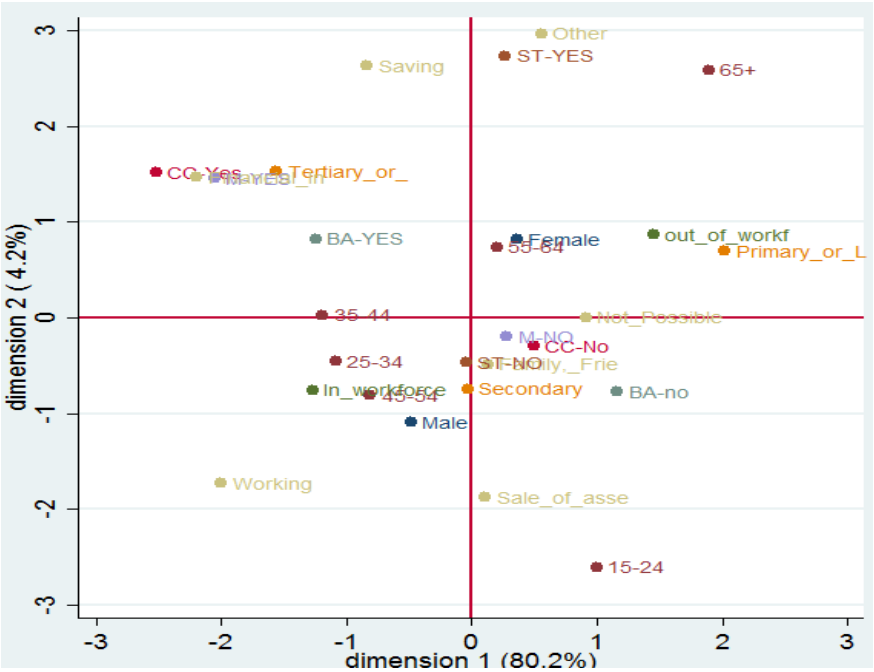

Figure 3. MCA of European and Central Asian Countries

If we evaluate the financial inclusion in these countries only through bank accounts, Kosovo, Bosnia Herzegovina, Armenia, and Albania are in the same group and it is seen that this group cannot find funds if they have an urgent need. In Croatia, it is observed that individuals with better education than others have bank accounts, receive housing loans, and apply to financial institutions for their needs more. It can be said that countries such as the Russian Federation and Belarus tend to meet their urgent funding needs through their savings (Appendix-2).

In Figure 4, it is not possible for individuals without an account and credit card to find money from any source in high-income OECD countries. In the analysis made regarding this, while the first inertia was 0.025, the second inertia value was found to be 0.004, while the first dimension explains 69.40% of the total inertia, while the second dimension explains 11.12%. Its total inertia (variance) value is 80.52 percent and it has explanatory power. It is seen that men aged 55-64, who have an account and credit card, and who are above high school, receive mortgages and apply to financial institutions when they need it. Among the High Income OECD countries, Greece is generally a country where those without bank accounts are concentrated in this region. Poland and Slovakia apply to family, friends, or employers for urgent funding needs, while Czech, Latvia, Estonia, and Italy are places where immediate funding is not

possible and people without credit cards are concentrated. Countries such as Denmark, Belgium, New Zealand, Sweden, and Canada meet their urgent funding needs through savings. Spain and Israel are countries that focus on meeting their funding needs by working and Japan by selling assets. In the first dimension, the highest positive value is Norway, while the highest negative value is Chile. In addition, the highest positive value in the second dimension is the option to work in meeting an urgent need (Appendix-3).

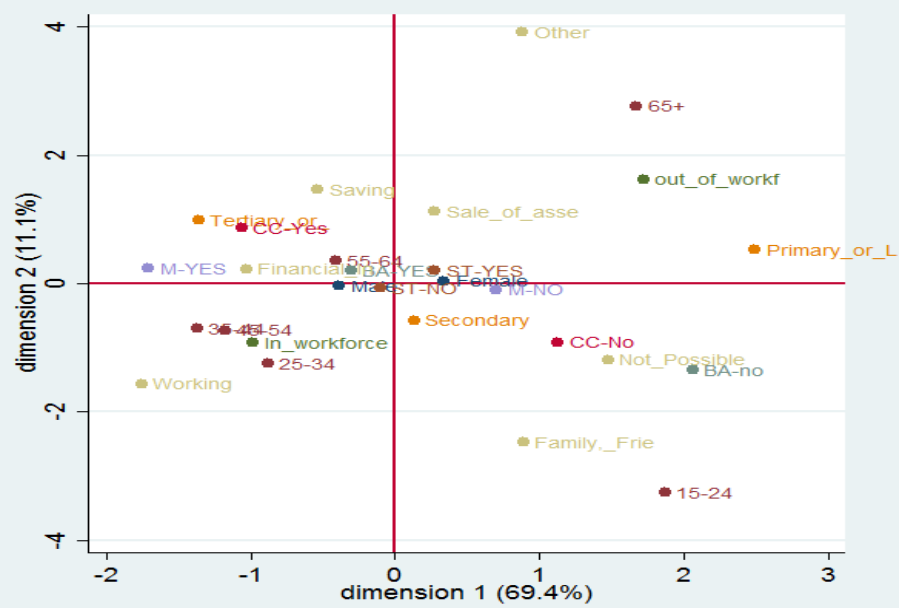

Figure 4. MCA of High Income OECD Countries

In Figure 5, graphical results of MCA for non-OECD high income countries are shown. Considering the analysis values, the first inertia was calculated as 0.038 and the second inertia was 0.002 for this country group, and the first dimension constitutes 77.29 percent of the total inertia, while the second dimension constitutes 5.52 percent. The total inertia value is 82.81 percent, a value greater than the theoretically recommended value of 70%. This is a sufficient ratio for analysis. While the highest positive rate in the first dimension is people over the age of 65, the highest negative rate in the first dimension is to apply to financial institutions in their urgent needs. In the second dimension, the highest positive value is to meet their urgent needs through savings, while the highest negative value is for those who do not have a bank account. Accordingly, it is not possible for individuals who have received education up to secondary education level and who do not have a credit card to meet these needs in an urgent need for money or they are provided by asset sales. In the distribution of high-income countries outside the OECD, it can be seen that Malta and Singapore are intense in saving and Bahrain in applying to financial institutions to meet the urgent need for funds. Lithuania, where women in Cyprus

apply for other options for their funding needs, is a country that does not have a credit card and tends to sell assets (Appendix-4).

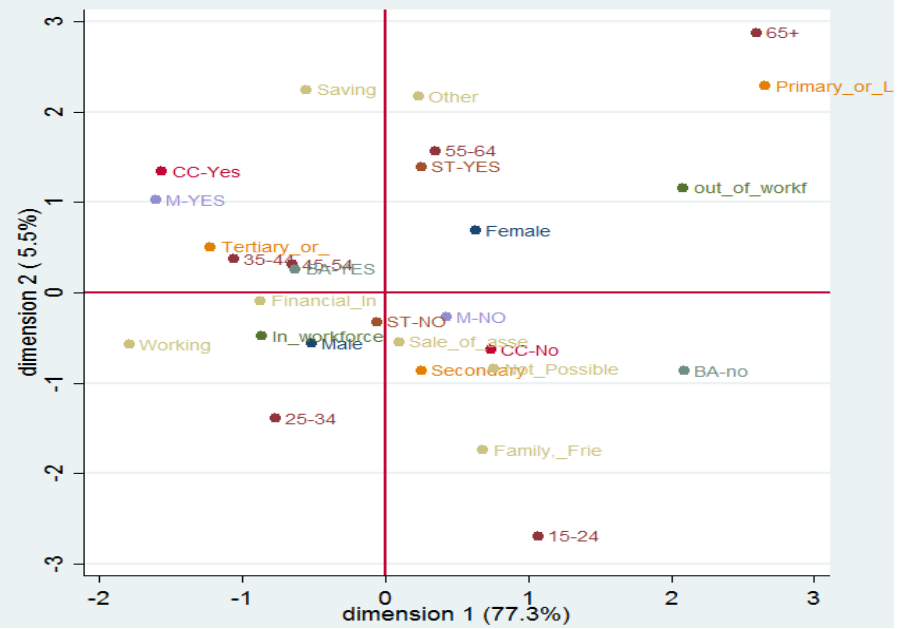

Figure 5. MCA of Non-OECD High Income Countries

Regionally, which it seems to be in the same group with countries such general terms the analysis for Turkey in the second dimension describes the 6 percent while explaining the first dimension of 72.4 percent in the same group with countries such as Croatia and Kazakhstan. It is observed that individuals out of the labor force are individuals without credit cards and bank accounts. This group is distinctive in that they are generally individuals in the first, second, and third percentile income bracket. Individuals who have completed secondary education meet their urgent funding needs through asset sales. It is seen that male individuals between the ages of 25-44 in the workforce have credit cards and bank accounts. In addition, they use the savings, employment, or financial institutions in case of an urgent need for funds. The determinant here is the individuals who are in the fourth and fifth 20 percent income bracket. It is observed that individuals who consider financial institutions as an emergency fund source have a high education level (Appendix-5).

As seen in Figure 6, the first dimension explains 60.6 percent of the total inertia, while the second dimension explains 9.3 percent. These two dimensions explain about 70 percent of the change. The remaining 30% is explained by other dimensions. The highest positive value of the first dimension is individuals over 65 years of age. The highest negative value of the first dimension is those who are male and meet their immediate needs with their savings. The highest

positive value of the second dimension is 35-44 years old individuals, and the highest negative value is those who do not have a bank account. It has been observed that among the individuals with the lowest income distribution of 20 percent, those who are elderly and have lower education do not have credit cards and bank accounts. It is noteworthy that especially young women with lowest income will not be able to meet their urgent funding needs and that men between the ages of 25-34 in the workforce prefer saving for their urgent need.

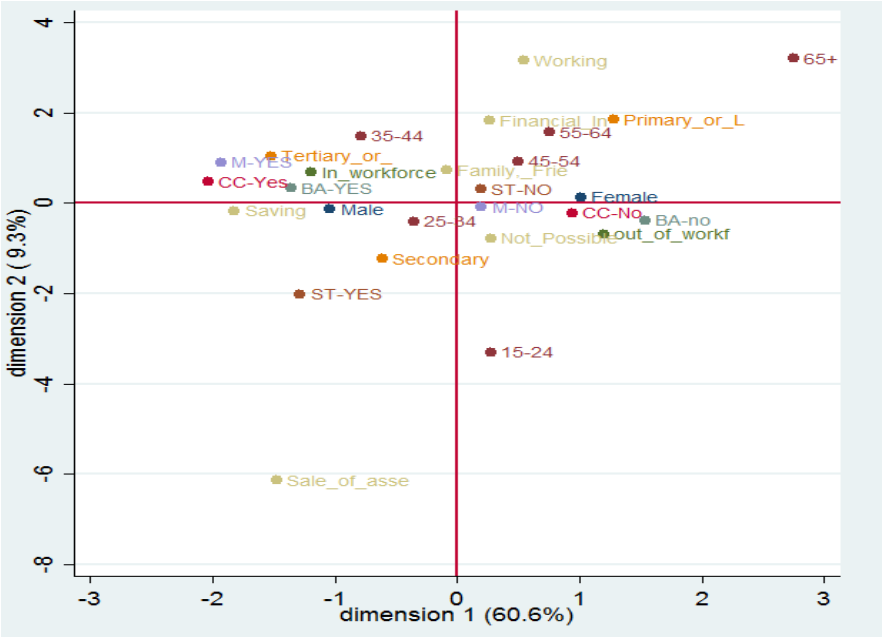

Figure 6. MCA analysis of 20% of the lowest income quintile in Turkey

Multiple Correspondence Analysis results relating to the individuals in the highest 20 percent of income for Turkey are shown in Figure 7. According to this graph, the first dimension explains 63.5 percent of inertia, while the second dimension explains 7.9 percent of total inertia. Total variability is explained by the first and second dimensions at a rate of 71.04 percent.

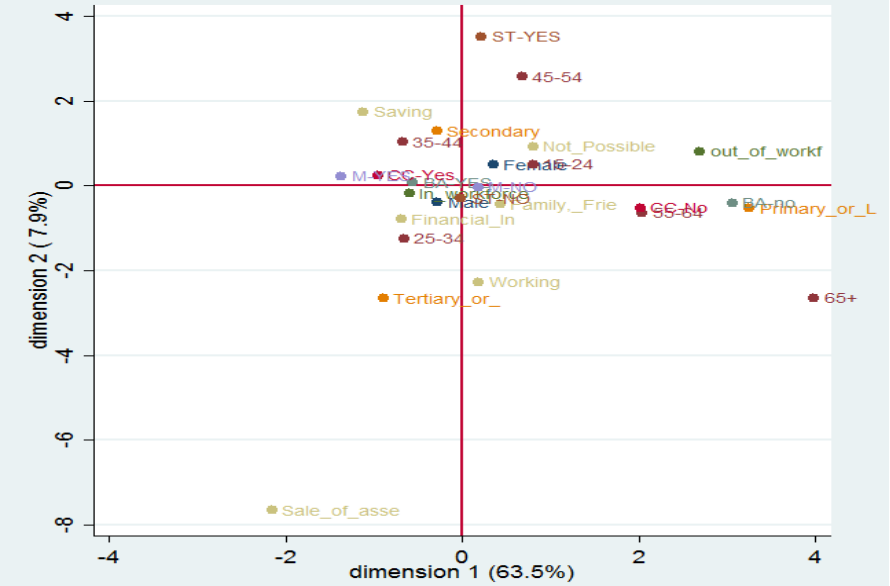

Figure 7. MCA analysis of 20% of the highest income quintile in Turkey

The highest positive value of the first dimension is those who are out of the labor force, and the highest negative value of the first dimension is in the workforce, men and applicants to financial institutions. Among individuals, it is observed that 15-24-year-old women cannot meet any urgent funding needs. It is seen that individuals with more education time can meet their funding needs through savings.

5. Conclusion And Evaluation

With the rapid transformation of the financial system especially after the 2008 crisis, the concept of financial inclusion has become a highly debated issue. It is desirable that financial inclusion covers a significant portion of societies. However, in the complexity of the financial system, this concept often takes shape according to whether individuals have a bank account or not. As a matter of fact, according to the calculations of the World Bank, while 51 percent of the world population had an account in a bank in 2011, this rate increased by 18 percent in 2017. Still, 31 percent of the world population does not have a bank account. In this respect, it is important to examine the factors that affect the accessibility and availability of financial services to a wide range of society. Analyzing the factors and differences affecting financial access between countries is noteworthy in terms of determining the financial inclusion. In this study, the factors affecting the financial inclusion of high-income OECD countries, non-OECD high-income countries, and non-high-income European and Central Asian countries as a whole and separately are examined.

Variables such as age, gender, bank account ownership, credit card ownership, income status, employment status, ability to meet urgent funding needs were used. One of the findings of the study is that individuals in high-income OECD countries use their savings to a greater extent to meet an urgent need for funding. In high-income non-OECD countries, it seems that the majority of well-educated men prefer to work as a primary source to meet an urgent need for funding. The low-income young population in Europe and the Middle East, on the other hand, apply primarily to family, friends, or employers for their urgent need for funding. Again, in this region, it is observed that men who are employed with less than high school education do not receive mortgage loans and do not have a credit card. One of the interesting results of the study is that individuals without accounts and credit cards are not able to find money from any source in an emergency in high-income OECD countries. Turkey is seen as the financial inclusion the concept of public policy strategies variable is added to the analysis of the income bracket also are discussed. Individuals who do not have a credit card and bank account are generally those who are in the first three 20 percent income bracket and are out of the labor force. Among individuals of fifth 20% income quintile, it is observed that 15-24-year-old women cannot meet any urgent funding needs. Individuals with longer years of education meet their urgent funding needs through savings. The financial sector, which is well-formed and has good process monitoring, has important benefits for people in matters such as savings, credit, payment, and risk management. Increased financial inclusion has a very delicate balance in income, education, and gender issues. As seen in the comparison between developed and underdeveloped countries in terms of income, employment status, gender, age, income level, and especially education become evident in meeting the urgent need for funds and being a bank account. These results, Claessens and Perotti, 2007; Demirguc-Kunt et al. 2017; Kling et al. 2020; supports its findings. In addition, Aslan et al., 2017, found a similar result to the conclusion that low-income countries clustered in low financial participation scores, while high-income countries were in the opposite situation.

Whether countries with high or low income, women's financial inclusion is very low. Also, of course, the limited database used in this study could not be examined in terms of behavioral finance, as it could not address socio-cultural, religious, and traditional differences between countries. However, in general, educated individuals in high-income non-OECD countries prefer to work for their urgent funding needs, which can be examined in another study. It can be concluded that financial inclusion is directly related to income and education since the countries that prefer financial institutions in terms of meeting their urgent funding need are mostly high-income OECD countries and individuals with high income and education in the

society among low-income countries. Therefore, although the concept of financial inclusion preserves whether the country is high-income or low-income, it can be said that bottom-poor and socially excluded individuals do not have bank accounts and are unable to meet their immediate funding needs or receive from their family, friend, or employer.

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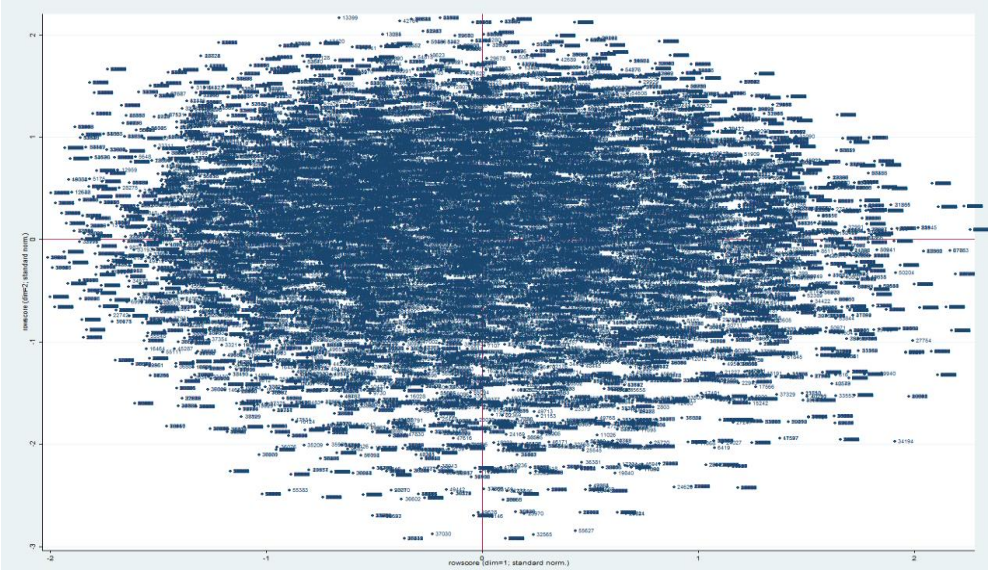
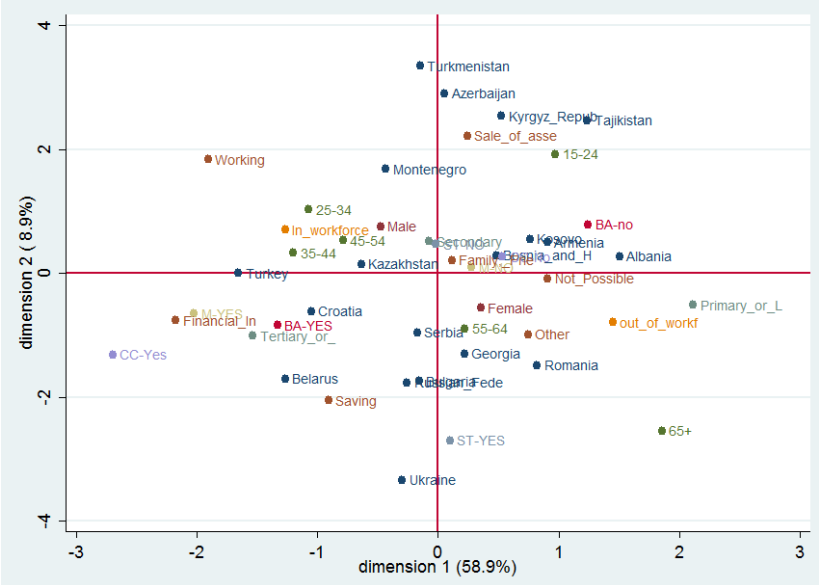
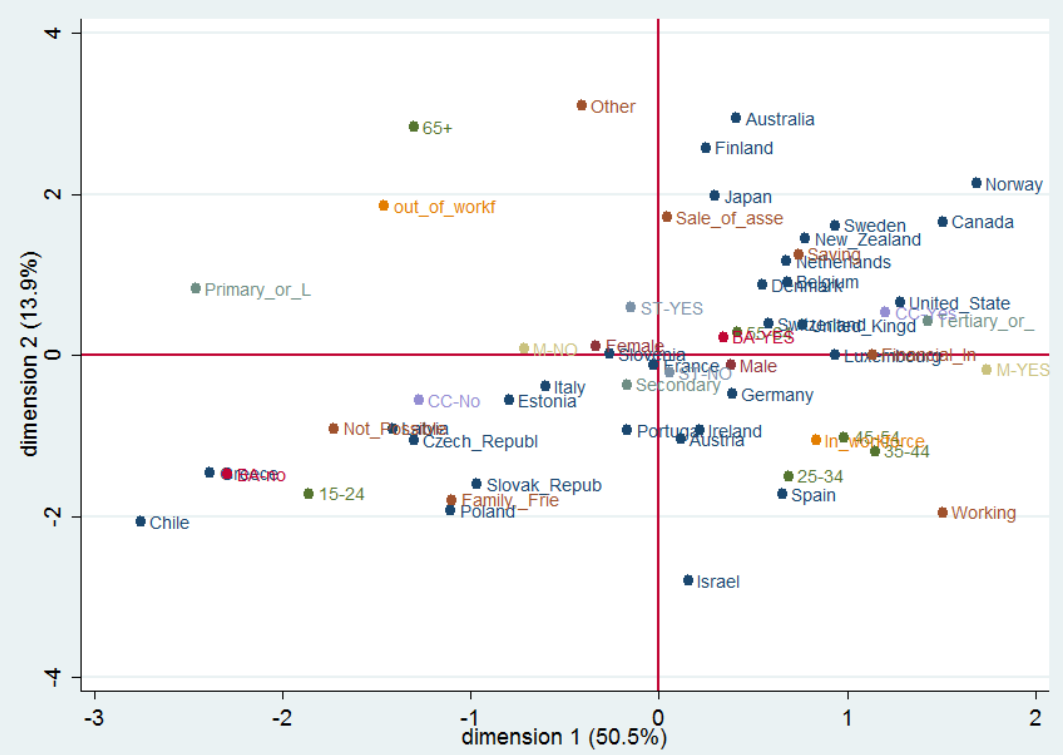


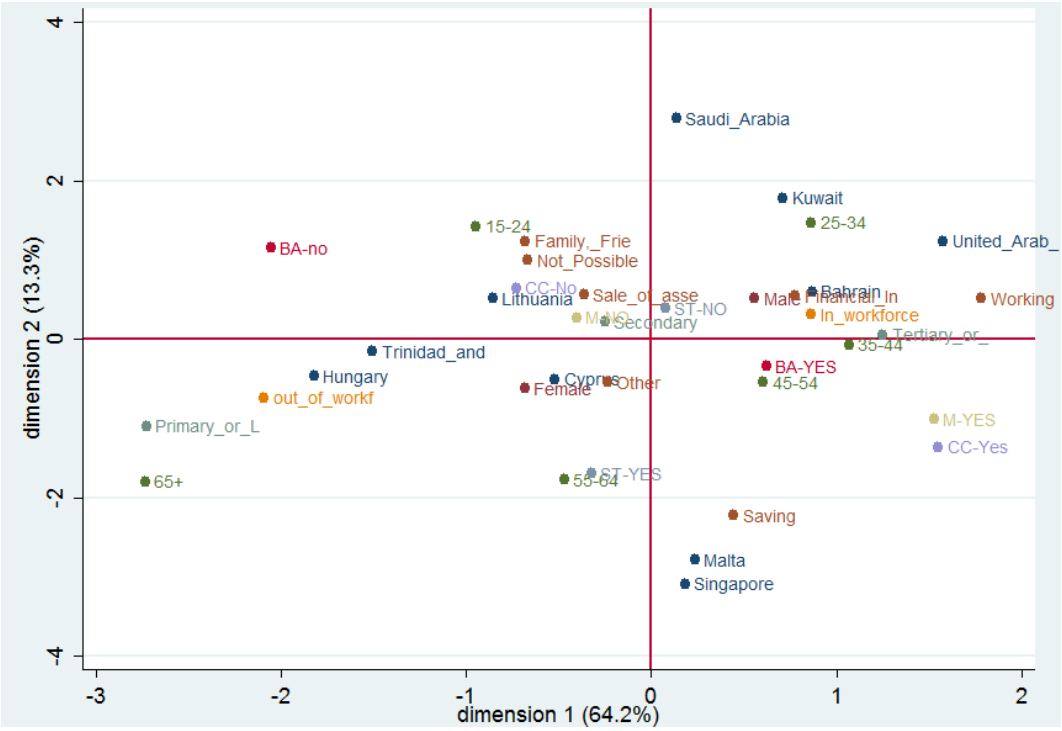
Appendix-1



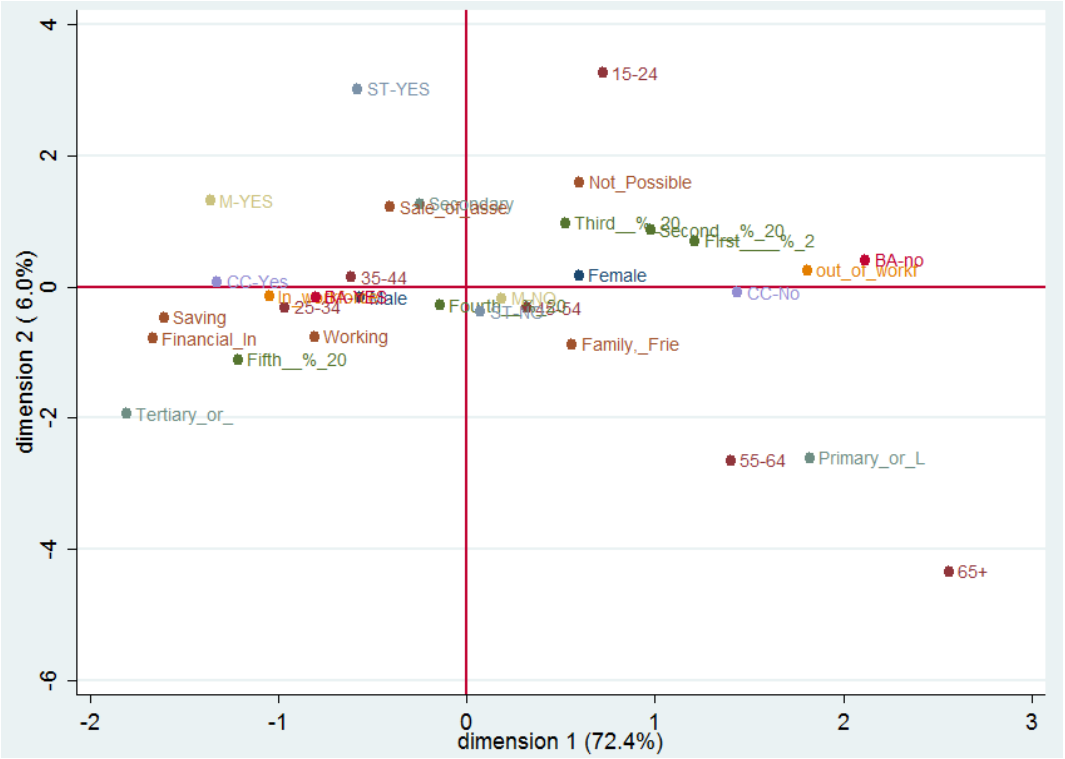
Appendix-2



Appendix-3



Appendix-4



Appendix-5

[i] In Turkey, on the other hand, it is seen that the first reason arises from the existence of someone else in the household who has an account, rather than financial inadequacies.

[ii] Non-high income countries in Europe and Central Asia region consist of Turkey, Turkmenistan, Ukraine, Albania, Croatia, Georgia, Kazakhstan, Kosovo, Montenegro, Romania, Serbia, Azerbaijan, Belarus, Bosnia and Herzegovina, Kyrgyz Republic, , Armenia, Bulgaria, Russian Federation, Tajikistan.

[iii] High-income OECD countries consist of Australia, Austria, Belgium, Czech Republic, Denmark, Estonia, Germany, Greece, Italy, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal Slovak Republic, Slovenia, Spain, Sweden, Switzerland United Kingdom, United States, Finland, France, Ireland, Israel, Canada, Chile, , Japan, Latvia,

[iv] , Non-OECD high-income countries, can be listed as Bahrain, Cyprus, Lithuania, Malta, Singapore, Trinidad and Tobago, the United Arab Emirates, Hungary, Kuwait, Saudi Arabia,

[v] For detailed chronological information on this subject, see Le Roux and Rouanet (2010), Beh and Lombardo (2014) and Clausen (1998).

[vi] In order to see the algorithms in detail, see Gifi (1990).