Essays on Global Financial Inclusion

Recep Yorulmaz

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This dissertation is dedicated to my lovely family – my wife, Görkem Yorulmaz, and our gorgeous daughter, Özüm Bilge Yorulmaz – for their unconditional love, support and patience.

ABSTRACT

This thesis consists of three main essays on the global dimension of financial inclusion. These empirical analyses are different, yet related to each other. The main focus of the thesis is on constructing a broader multidimensional measure of financial inclusion as a composite index that can be used to assess the ease of and use of the access to financial markets. Additionally, as one of the main contributions of this study, access to other financial institutions such as microfinance institutions, post offices and cooperatives, has been added to the analysis to explore its impact on poverty and Islamic finance. The International Monetary Fund's International Financial Statistics and Financial Access Survey databases, the World Bank's Global Financial Development and Global Findex databases, and the survey data by Beck et al. (2006a) are used to collect the indicators of the indices. Using the broader multidimensional financial inclusion indices as a proxy of financial access, the study aims to assess the impact of financial inclusion on poverty reduction in the third chapter. In the next chapter, using the constructed financial inclusion indices as a proxy of financial exclusion, it aims to explore the impact of Islamic finance on financial exclusion to examine why our constructed financial inclusion indices are better measurements of financial access. Using the constructed indices in two different analyses, this thesis tests the arguments in studies that have made original contributions in the literature, to explore the predictability and comparability of these indices as the proxy of financial inclusion.

Following the steps of the OECD's handbook on constructing composite indices, the second chapter aims to measure the extent of financial access by constructing a broader multidimensional financial inclusion index, which contains aggregate information of the extent of a financial system in an economy using both demand and supply-side information in one single index. Adding the survey data of Demirguc-Kunt et al. (2015) and Beck et al. (2006a), which contain individual financial access information, this chapter extends the findings of previous studies by exploring broader, cross-country time-series data, which provides not only household-based, but also individual usage of financial services, along with other various indicators of financial access. Hence, using such data might provide a proper indicator for attracting researchers and policymakers. Unlike the previous financial inclusion studies, this chapter explores a new indicator as an additional proxy for financial inclusion. This contains access to other financial institutions. This new proxy comprises access to microfinance institutions, cooperatives and post offices. Thus, this chapter explores this new indicator along with other constructed financial inclusion indices.

The third chapter empirically assesses the association between financial inclusion and poverty reduction, using the constructed indices in the previous section as a proxy of financial inclusion

with a panel data from 143 developing and developed countries for the period 2004 to 2011. As one of the main contributions of this chapter, and unlike previous financial inclusion studies, it examines access indicators from other financial institutions such as micro finance institutions, cooperatives and post offices as the second proxy of financial inclusion in the models to assess their impact on poverty. The results suggest that broader access to financial services, from conventional banks to other financial institutions such as microfinance institutions, have significant effects on poverty reduction. It provides evidence that the constructed financial inclusion index is a good source to measure the extent of financial access while examining the impact of financial access outreach on specific poverty measures to eliminate involuntary financial exclusion.

The fourth chapter empirically investigates the effects of increasing the supply of Islamic banking services on voluntarily financially excluded groups using 52 Organization of Islamic Cooperation (OIC) member countries and 118 countries from different economic and geographic backgrounds. Additionally, it explores the relative performance of Islamic and conventional banks during the recent global financial crisis to test the arguments in the literature using the constructed financial inclusion index. Finally, this chapter further aims to: i) assess the mechanisms by which the impact of Islamic finance on financial exclusion occurs in Muslim-dominant countries, and ii) explore the mechanisms by which Islamic banks provide better performance during the global crisis using an aggregate data for Islamic banking products. The results suggest that, in improving on the arguments in the literature, we find a relatively stronger association between Islamic banking and financial inclusion in both country samples using our own financial inclusion measures. In this regard, our broader multidimensional financial inclusion index seems to efficiently explain the extent of financial access in terms of assessing the link between financial inclusion and Islamic finance to eliminate voluntary financial exclusion. In the meantime, testing the results in the literature using our constructed financial inclusion indices and the conventional bank proxy that has been used in previous studies, we find evidence that Islamic banks performed relatively better during the global financial crisis period. Furthermore, with the modification of the results in the literature, we find evidence that the redistributive tools of Islamic finance such as Zakah and Mudarabah explain the mechanism of this performance during the financial crisis period.

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Chapter 1 Introduction

This thesis consists of three different but related analyses on global financial inclusion. The main contribution of the thesis is to construct a broader multidimensional measure of financial inclusion that can be used to assess the ease of and use of the access to financial markets. Since the vast majority of financial inclusion studies have used various financial variables to assess the impact of these financial variables on growth, poverty and development, this thesis aims to improve on the literature by constructing multidimensional financial inclusion indices. These indices of financial inclusion have more variables than what have been used in the past in other studies. In doing so, they should be better able to explore the effect of shocks on financial inclusion. Using these measures of financial inclusion, first, this thesis focuses on exploring the impacts of financial access in terms of both commercial banks and microfinance institutions on poverty. Second, it explores the impact of Islamic finance on financial inclusion in a group of countries where commercial banking is not the primary source of financial intermediation. Hence, another main contribution of this thesis is to assess the impact of other financial institutions access, such as microfinance institutions, cooperatives and post offices, on specific macroeconomic factors.

In particular, this thesis aims to explore why these constructed indices are better measures of financial inclusion while examining the impact of financial inclusion on both a group of countries where commercial banking is not the primary source of the financial system and on the all countries samples. Other main contributions of this thesis lie in discussing and assessing the effects of microfinance on poverty reduction, exploring the mechanisms by which the impact of Islamic finance on financial exclusion occurs in Muslim-dominant countries, and, finally, to explore the mechanisms by which Islamic banks performed better during the global crisis.

The significance of finance in an economy has been an area of intensive research and a long-standing debate. First, there are three main arguments on the nexus between finance and economic growth. The first argument suggests that well-organised financial systems are generally beneficial for economic growth and poverty alleviation. Moreover, a properly structured banking system is necessary to facilitate an inclusive financial system (Levine, 2005; Beck, Demirguc-Kunt and Levine, 2004). The second argument is related to the Schumpeterian process, which is also known as the ‘creative destruction’ and is based on the theory of the emergence of new businesses. Basically, this theory implies that financial development leads to economic development by encouraging the emergence of new firms (Klapper, Laeven and Rajan, 2004). Finally, the third argument is based on the premise that access to financial services is as important as access to general public needs, such as safety, health and education (Peachey and Roe, 2004).

The most disputed part is the association and the direction of the causality between financial development and economic growth. The nexus between financial development and economic growth has become a highly relevant topic in the literature, especially after the recent financial crisis. Since this crisis affected developed countries more than others, the role of financial intermediation on economic growth still remains uncertain. The direction of causality is not obvious; some researchers have found that economic growth leads to financial development, while others have argued that countries with healthier financial systems tend to grow faster. Hence, it is clear that the causality among these factors runs both ways.

On the one hand, some leading economists, such as Schumpeter (1912) and Hicks (1969), argued in their analysis that the direction of causality goes from financial development to economic growth. On the other hand, Levine (1997) argued that economic growth leads to financial development. Moreover, they argued that there is a surplus of demand that is created by economic growth, and that the spontaneous response of the financial system to this demand leads to financial development. In doing so, it can be concluded that it is important to achieve financial development in an economy. There are several conditions that need fulfilling in order to achieve financial development. Some of these are establishing an inclusive financial system and having higher levels of access to financial services, which have become important policy goals in many economies (Ardic, Heimann and Mylenko, 2011).

According to Sarma (2008), there are several benefits associated with inclusive financial systems. The productive resources are allocated in an efficient manner, which in turn reduces the cost of capital. Moreover, access to financial services for the society concerned is facilitated (Levine, 1997; Pande and Burgis, 2003). The term 'financial inclusion', by which an attempt is made to include all those who are not contributing to the system in an economy, gains more importance for policymakers. So far, financial inclusion is defined in the literature as a tool that offers ease of access to formal financial services. It is considered a source of the tools used to make financial services, such as microfinance, available for everyone in society at an affordable price.

Governments, banks and financial regulators have started to pay more attention to financial inclusion by setting up new legislations and initiatives. The Financial Inclusion Task Force (2005) in the UK,[1] the Community Reinvestment Act (1997) in the United States[2] and the law

[1] The Financial Inclusion Task Force was established by the government in 2005 to explore financial inclusion development in the UK.

[2] The Community Reinvestment Act (1997) was established in the US to force banks to offer financial services to the whole country, especially credit services. It also prohibits them from offering credit exclusively to rich people. Some economists argued that this regulation was among the contributing factors for the recent financial crisis in the US (Financial Access, 2010). Hence, it is important to note

on financial exclusion, which regulates the right and freedom to have a bank account (1998) in France, are examples of government regulations on financial inclusion. The Alliance for Financial Inclusion (AFI), the International Finance Corporation (IFC), the Consultative Group to Assist the Poor (CGAP) and the World Bank Group (WBG), among others, are examples of the organizations that explore viable financial inclusion policies for the poor.

In order to measure financial inclusion levels in an economy, the level of access to financial services has to be measured. Thus, calculation of the access is considered a key factor when exploring the impacts of financial inclusion on an economy. All the aforementioned organisations play an important role in the sustainability of financial inclusion policies across the world. For instance, the World Bank Group has recently released the Financial Access Indicators, which are used by regulators to explore inclusion levels.[3]

According to the literature, some specific financial access indicators from different institutions are used to calculate financial access. However, in order to obtain a broader picture of an economy in terms of financial access, researchers commonly use specific institutions indicators in practice. Traditionally, it is commonly considered in the literature that the way to measure financial access is to use commercial bank indicators. According to the Financial Access (2010), 85% of the data on financial inclusion are taken from commercial banks of relevant countries. Therefore, using data for the financial services offered by commercial banks is sufficient for comparison across nations. Moreover, not all countries have other financial institutions, such as microfinance and cooperatives. Using financial access indicators from these types of institutions may reduce the comparability of the study. As a matter of fact, using commercial bank-based indicators may result in some inconsistencies for the countries that mainly use other financial institutions. Thus, access indicators from other financial institutions may also be used if applicable.

The majority of the studies that brought original contributions to the literature used different sets of financial variables and explored their impacts on macro-economic factors. More recently, the focus shifted to these particular variables to explore their importance and impacts. Applying these indicators separately, they explored the importance of these financial variables on real macroeconomic variables. There are two methods to assess the impacts of financial access across countries in the financial inclusion literature. The vast amounts of studies that have original contributions apply financial access variables separately to assess their impacts. In

here that there may be a cost for financial inclusion in an economy (Beck, Demirguc-Kunt and Honohan, 2009). These types of effects should be taken into consideration by the regulators beforehand.

[3] Measuring financial inclusion needs some specific financial access indicators, which are released by different organizations. The organisations listed above held a G20 discussion on financial inclusion for households and SMEs. During the G20 discussions, it was argued that it is important to determine some specific indicators to gauge financial inclusion.

recent years, some researchers tend to have constructed a multidimensional financial inclusion index as a composite indicator, which contains various information on a single aggregate measure. They stress that this kind of multidimensional composite index might be a yardstick for measuring the financial access performance of countries. This index, which contains the aggregate information of different dimensions of financial access for a country, allows researchers and policymakers to make substantial comparisons across economies. Meanwhile, the concept of cross-country, minimum-maximum values in the index construction method increases the comparability of the analysis. Furthermore, a multidimensional index also explores the trend and relative rankings of countries' financial inclusion levels. Hence, these measures may give feedback and frame policies to target the extent of financial exclusion for researchers and policymakers.

Financial inclusion studies, such as those by Beck, Demirguc-Kunt, Honohan (2009) and Barr (2004), have mostly focused on using financial access indicators separately to analyse financial inclusion policies and impacts. Few studies have focused on the index construction process, using several access indicators to explore one single index for financial inclusion. Gupte et al. (2012), Kumar and Misra (2000), Arora (2010) and Mandira Sarma (2004) argued that using as many indicators as possible for the construction of financial inclusion indices makes them more comprehensive.

In Chapter 2, financial inclusion indices are explored to compare financial access among different countries. In order to test the above argument on the construction of financial inclusion indices, two different indices were designed. The first index was constructed using fewer indicators and more years, while the second index was constructed using more indicators but fewer years. Apart from these two indices, which have been constructed with commercial bank-based access indicators, this chapter uses another indicator from other financial institutions to examine the extent of financial inclusion. Thus, another contribution of this chapter is to assess an access indicator from microfinance institutions, cooperatives and post offices. In doing so, different financial inclusion indices, presented as composite indicators, are constructed using the datasets of the World Bank's WDI and Global Financial Development Database, the IMF's IFC and the survey by Beck et al. (2006). Besides, Chapter 2 attempts to examine the construction techniques of a financial inclusion index using the OECD's 'Handbook on Constructing Composite Indicators'.

Another contribution of this research is that it uses more dimensions and indicators of financial access and more years than previous studies have conducted on financial inclusion indices.[4]

[4] One of the contributions of Chapter 2 is to analyse two types of indices that have been applied for the financial inclusion in the literature. The first index is built using fewer indicators (ten), but over many years (2004–2011) and in several countries (179), while the second index is constructed using more

Accordingly, the indicators of the access and usage of commercial bank accounts, such as saving, checking, credits, deposits and loans, are used. Besides, in order to provide a complete set of financial inclusion gaps for economies, the barriers of financial inclusion, such as physical distance and cost of usage, are carefully considered in our analysis, along with the documentation requirements for opening an account. Most studies have analysed measures of financial depth, instead of measuring outreach and access. These studies have mostly used availability, accessibility and usage indicators by using aggregate banking data. At this point, in order to see the overall picture, it is necessary to add the user's side of financial inclusion to the measurement of access (Kumar and Mishra, 2000). This chapter fills this gap by analysing both the supply and demand side information, allowing us to provide a broader financial inclusion measurement.[5]

After performing the principal component analysis as the first step of the composite index construction process of Chapter 2, credit income ratio, deposit-income ratio and life insurance premium volume/GDP were found to be the most important (primary) indicators for the first financial inclusion index. In contrast to the indicators above, geographic ATM penetration, bank cost-income ratio and geographic branch penetration were found to be the less valuable indicators for the first index construction. Similarly, most of the indicators are essential for the construction of the second index. On the other hand, consumer loan fees and ATM card fees, as well as the cost of international transfer indicators, have been discovered to be the least relevant indicators.

Accordingly, countries' index values were found to be consistent with their income growth levels for both indices. Certainly, these results do not indicate any causal association between one another. Luxemburg has the highest values for all relevant years, regarding the first index. The United Kingdom, Singapore and Japan follow Luxemburg in the first index. However, low-income countries, such as Nigeria, Myanmar, the Republic of the Congo and Syria have the lowest values for the first index.[6] It is also suggested in Chapter 2 that the method of the second index construction is superior to the first index method in terms of doing a comprehensive analysis, which can explore the levels of financial inclusion, while the first index method is

indicators as a multidimensional index, with fewer countries (58) and only over one year. Time series estimations are another contribution of this chapter to the financial inclusion literature.

[5] We use the availability, accessibility, usage and even cost dimensions, such as the number of deposit and credit accounts, bank and ATM branches, volume of deposits and credit accounts, relating to demand side indicators, such as household and SME base saving, credit and insurance indicators.

[6] Since the first index is created with fewer dimensions and indicators, and is less comprehensive for measuring all aspects of the financial systems, it encompasses a number of advantages, such as exploring the time trend across countries.

better than the second one in terms of making meaningful comparisons across nations, considering more countries and exploring the time trend, and using more years for the index.[7]

Furthermore, we explore the correlations between the measures of financial inclusion with some specific macroeconomic income and poverty measurements, using scatter diagrams to assess the explanatory power of these proxies. These figures help us to assess the data by exploring the outliers and what they appear to represent, whether good or bad practice. According to the figures, the second index, which is the more comprehensive and broader multidimensional index to have appeared in the financial inclusion literature so far, seem to have relatively better correlations with other macroeconomic income and poverty measures. Thus, these proxies of financial inclusion are proven to be substantial tools for assessing the effects of financial access on various macroeconomic country-specific concepts. Using the proxies that are assessed in this chapter, we explore the effects of financial inclusion on poverty in the next chapter.

The numbers of people living below the poverty line has been high in recent decades. For instance, in 1998, 1.2 billion people were living on less than $400 per year around the world. In the 1990s, the income share of the poorest in an average economy was less than 6% of GDP. Meanwhile, approximately one billion people lived on less than $1 a day in 2001. However, the poverty gap is decreasing each year (Beck, Demirguc-Kunt and Levine, 2004). Thus, policymakers and researchers focus much on reducing poverty by first determining the reasons and then assessing the mechanisms for reducing poverty.

Deprivation, which directly affects peoples' livelihoods, is considered one of the main causes of poverty in recent years. According to the basic materialist belief, poverty is the inability to meet basic human needs, such as food, shelter and clothing. In the materialist view, there are two main mechanisms of poverty. One is having a constant level of wealth below the poverty line in terms of income, consumption and expenditure. The second is falling below the income, consumption and expenditure poverty line after suffering severe deprivation (Matin and Hulme, 2003). As poor people fear taking risk in undertaking new investment activities, risk exposure is considered one of the main reasons of poverty. Therefore, if risk exposure is reduced, poor people might build up new opportunities by undertaking investment. At this point, it is important to distinguish between the poor and the poorest. These groups need to be treated separately by policymakers. Furthermore, financial market barriers, such as asymmetric information, are also considered to be among the main reasons of poverty (Stiglitz, 1998). Hence, financial exclusion might be considered to be among the reasons of poverty.

[7] It has been found that adding more variables that indicate different aspects of the financial system are statistically significant and make index measurement more extensive.

The levels and measurements of poverty vary and, therefore, there has been no academic consensus on a definition of poverty measurement in the literature. Poverty is also a multi-faceted concept; therefore, there is no single definition to describe it. The World Bank's World Development Reports suggest that there are various measurements that explore different aspects of poverty. These definitions are as follows: Absolute poverty measures that assess people living below the poverty line, relative measures that consider people living below 60% of mean income, income-related definitions, asset-related definitions, health-related definitions, such as infant, toddler and maternal mortality rates, and vulnerability-related definitions. These definitions individually assess different concepts of poverty (Murdoch and Haley, 2002).

Boosting the supply of financial services that particularly target poor segments might lead to poverty reduction (Jalilian and Kirkpatrick, 2002). However, more competitive and inclusive financial intermediations that allow greater access to all segments in the economy are required to achieve this goal (Rajan and Zingales, 2003). Thus, it can be claimed that financial development may directly contribute to poverty alleviation by improving access opportunities for the poor, eliminating the causes of market failures, and strengthening the productive assets of the poor in developing countries (Jalilian and Kirkpatrick, 2005). In doing so, policymakers and global institutions are now focusing more on the policies of financial inclusion, which is one of the mechanisms of financial development, along with inclusive financial systems, for achieving more inclusive growth. Poor, low-income earners, and even small-scale entrepreneurs and micro-enterprises, can benefit from financial inclusion, especially in developing countries, through enhancing money management, providing access to financial services at a fair cost and finding a safe place to keep saving opportunities.

In particular, these mechanisms of financial inclusion are achieved by microfinance services, which are the most substantial tool of financial inclusion. Microfinance is considered to be the most beneficial tool to combat poverty around the world, especially in some specific developing and low-income countries, such as Bangladesh, where the Grameen Bank model was established, Bolivia and sub-Saharan Africa. Furthermore, microfinance services are believed to be one of the most important development programmes around the world for poverty reduction (Van Rooyen et al., 2012). Microfinance aims to reach poor segments, especially women, who are considered the most reliable source in households to increase investment opportunities. Microfinance is politically considered as a redistribution tool for creating new self-investment opportunities. Meanwhile, leading MFIs in the world, such as the Grameen Bank of Bangladesh and the BKKs of Indonesia, have financially better outcomes than mainstream banks in terms of credit recovery rates in their respective countries (Christen et al., 1994; Robinson, 1996).

Unlike the evidence on the positive impact of microfinance on poverty, the total benefits from raising general poverty levels in economies tend to be small. This is because the scale of the transactions of microfinance services is not big enough to improve the overall wellbeing of the poor in an economy. Furthermore, since microfinance commonly exists in low-income economies, where low economic growth exists, increasing the rates of borrowing causes only income redistribution among people rather than further economic growth for the economy (Khandker, 2005). Nevertheless, the impact on reducing extreme poverty is one of the main arguments for providing microfinance. Microfinance is found to relatively cheaper and successful in terms of poverty alleviation for those groups close to the poverty line. However, it has been found to be ineffective in reducing extreme poverty with regard to the labour market and infrastructural measures (Mosley, 2010).

Furthermore, micro finance institutions (MFIs) alone are not enough to provide an inclusive financial system; other financial institutions, such as postal saving banks, cooperatives and consumer credit institutions, are necessary to reach this goal. In order to provide efficient services via MFIs and other financial institutions as financial inclusion, policymakers should consider three important tools: scale, depth and cost (Hulme, 2006). Moreover, there are four key factors required to obtain financial inclusion targets and strengthen the financial inclusion-poverty reduction nexus. These are private-sector development, financial literacy, micro finance and other specific financial institutions, and, finally, public sector support (Chibba, 2009). These factors allow policymakers to offer sufficient solutions to fight poverty.

Adopting the specifications proposed by Beck et al. (2004) and testing their argument, this chapter assesses the association between financial inclusion and poverty reduction using the proxies of financial inclusion that are examined in the previous chapter. Examining the impacts of both commercial bank-based access and access to microfinance institutions, cooperatives and post offices on poverty reduction is the main contribution of this chapter. Since poverty is a multi-faceted concept, and it has no single definition, we use different measurements for poverty in this chapter. As another contribution of this chapter, in order to capture various aspects of poverty, we use the income share held by the lowest 10%, a headcount poverty ratio of $2 a day and the infant mortality rate as the proxies of poverty.

The results imply a statistically significant linkage between financial access, from both commercial banks and microfinance, and poverty measures in this chapter. In particular, it is claimed in this chapter that financial inclusion, which is defined as both commercial bank-based access and microfinance services access separately, has a positive impact on the poorest by increasing the growth of the income share of the lowest quintile. Furthermore, we conclude that countries with better financial access levels in terms of both commercial banks and

microfinance have experienced more reductions in infant mortality rates. Finally, the results suggest that financial inclusion is strongly associated with absolute poverty measures. Thus, it can be concluded that greater financial inclusion levels are associated with larger reductions in the percentage of the people living on less than $2 a day.

The results of commercial bank-based access are robust for controlling reverse causality and specific country-fixed effects. Meanwhile, they are also robust for controlling for various macroeconomic stability factors, such as GDP per capita growth, inflation, trade openness and government expenditure. Unlike the results of commercial bank-based financial inclusion, the results of microfinance and other financial institutions are not robust for controlling for reverse causality. Due to the data limitations of these financial institutions, we are unable to use dynamic panel estimation methods for exploring the effects of microfinance. Therefore, these results need more qualifications on exploring the effect of microfinance on poverty reduction. However, we found a strong association between microfinance and poverty measures in this chapter.

To date, there has been growing concern about financially excluded groups, who have no access to financial services in societies. Since these groups live without access to basic formal financial services, financial exclusion and social exclusion are strongly associated with each other (European Commission, 2008). As shown in Figure 4.1, financial exclusion is described as both voluntary and involuntary exclusion. So far, scholars have paid more attention to involuntary excluded groups in order to measure financial inclusiveness and have ignored voluntarily excluded groups. They argue that these types of groups do not need any further policy actions (World Bank, 2008). However, in this thesis, it is assumed that in order to enhance an inclusive financial system in the economy, voluntarily excluded groups need to be considered as much as involuntarily excluded groups.

One of the most important reasons for voluntary exclusion is believed to be religious barriers, particularly among Muslim groups because of the Islamic rules on finance. Islamic law forbids any interest gained from financial transactions and most financial institutions lack Islamic law-compliant financial services. Thus, these types of groups face religious barriers to using formal financial services and voluntarily choose not to use them. Therefore, these groups need specific targeting regulations to be involved in the financial system. At this point, Islamic finance gains much importance in order to eliminate the reasons for voluntary exclusion and achieve more inclusive financial systems in the policy arena. The World Bank Global Findex database indicates that only five per cent of unbanked people declared religious reasons for avoiding using formal financial services. However, this rate is extremely high in the Middle East and North African countries, as well as in other Muslim-dominant countries. Hence, any attempt to

provide religious-compliant formal financial services in these countries may cause a sufficient increase in the account penetrations, which helps to build an inclusive financial system (Demirguc-Kunt and Klapper, 2013).

The Islamic financial system perspectives on financial inclusion have two dimensions: First, Islamic law promotes financial inclusion through risk-sharing contracts, which are the best alternative to conventional finance. Second, the Islamic banking system promotes financial inclusion through particular instruments of redistribution of wealth among all groups in society (Iqbal and Mirakhor, 2012). Risk-sharing financial instruments can be classified as *Shari'a*-compliant microfinance, SME financing and micro insurance, and *Shari'a*-compliant deposits and/or savings accounts, which operate under *Mudaraba* (profit sharing) in order to provide broader access to finance, which means more financial inclusion. These instruments can also be referred to as profit and loss sharing principle in all types of financial transactions. Risk-sharing financial instruments, as classified above, operate under the profit-sharing principle, wherein there is no interest gain for the account owners, but rather they share in the overall profit or loss of the Islamic financial institution (Demirguc-Kunt and Klapper, 2013). Moreover, the redistributive instruments are *Zakah*, *Sadakat*, *Qard-al-hassan* and *Waqf*, which target disadvantaged groups in order to eradicate poverty and enhance social justice in society. These redistributive instruments are considered as mandated levies (Mohieldin, Iqbal, Rostom and Fu, 2011).

To date, few empirical researches have been conducted on examining the association between financial exclusion and Islamic finance in the literature.[8] Therefore, Chapter 4 aims to contribute to the literature by empirically exploring two main analyses with two different estimation models. First, following the Global Financial Development Report, (2014), Demirguc-Kunt et al. (2013) and Naceur et al. (2015), this chapter explores the effects of Islamic finance on voluntary financial exclusion, which is determined by lack of access to formal financial services. Meanwhile, by modifying the results in the literature, we subdivide Islamic banking products to assess the mechanism by which the impact of Islamic finance on financial exclusion occurs. One of the most important contributions of this chapter is exploring this analysis in terms of both countries from different economical and religious backgrounds, on the one hand, and Muslim-dominant countries (OIC member countries) on the other.[9]

[8] Beck, T., Demirguc-Kunt, A. and Merrouche, O. (2013) and Mohieldin, M., Iqbal, Z., Rostom, A. and Fu, X. (2011) are the main research studies that pay much attention to the growth of Islamic finance and Islamic law (Shari'a) compliant financial services in order to enhance broader financial inclusion among Muslim groups.

[9] A total of 118 countries from different economical and religious backgrounds and 52 Organization of Islamic Cooperation (OIC) member countries were used in the models.

Second, Chapter 4 attempts to test Beck et al. (2013)'s argument in the literature by assessing the relative performance of Islamic and conventional banks during the global crisis, using both our constructed financial inclusion index and the conventional bank access indicators devised by Beck et al. in separate regressions equations. Meanwhile, in modifying their results, this chapter uses same disaggregated data on Islamic banking products to assess the mechanisms by which Islamic banks provided a better performance during the global crisis.

Our empirical findings show that higher levels of Islamic finance are associated with lower levels of conventional bank access in both all countries and OIC member countries. Moreover, we find evidence that Islamic banking loans, deposits and the total assets percentage of GDP explain the impact of Islamic finance on conventional bank access in all countries. Meanwhile, Islamic banking loans, deposits, capital ratio, zakah and the murabahat percentage of GDP variables explain this impact on OIC member countries.

Moreover, regarding the association between Islamic finance and other financial institutions, such as microfinance institutions, credit unions and post offices services, we find that Islamic banking indicators were significantly associated with higher levels of access to other financial institutions in both the all countries and the OIC member countries samples. In the meantime, we find evidence that Islamic banking deposits, total assets, total capital ratio, zakah and murabahat transactions as a percentage of GDP variables explain the impact of Islamic finance on access to other financial institutions in both the all countries and the OIC member countries samples.

In the second analysis, to assess the argument by Beck et al. (2013) in the literature, we find evidence that conventional banks perform better during general periods. However, unlike the results in the literature, we find evidence that Islamic banks performed significantly better during the global financial crisis. Additionally, in modifying their results by subdividing the products of Islamic banks, we find evidence that the Islamic banking zakah to GDP ratio in equity-asset ratios and stability indicators of banks significantly better explain the impact on Islamic banks during the crisis.

Structurally, this thesis is comprised of five chapters. Chapter 2 aims to construct a broader multidimensional measure of financial inclusion that can be used to assess the ease of and use of the access to financial markets. This broader financial inclusion index includes more variables than what have been used in the previous studies. This index is then calculated with other country-specific factors in the next chapters to test both their predictability and comparability. Moreover, using our index as a proxy of financial access, we test the studies in the literature using their specifications to see whether our broader financial inclusion index yields similar results in the next chapters.

Using our constructed broader financial inclusion index and the measure of microfinance institutions' outreach, Chapter 3 empirically analyses the impact of financial access on poverty reduction in terms of both commercial banks and microfinance institutions to test the results in the literature. Furthermore, the association between Islamic finance and financial exclusion is explored in Chapter 4. This chapter first explores the impact of Islamic finance on financial inclusion both in a group of countries where commercial banking is not the primary source of financial intermediation and in countries with different economical and geographical backgrounds. Second, using our broader financial inclusion index, the chapter explores the relative performance of Islamic and conventional banks during the global financial crisis to test the arguments in the literature by adopting their specifications. In the meantime, in modifying the results in the literature, this chapter uses disaggregated data on the products of Islamic banks to assess the mechanisms by which the impact of Islamic banks on financial exclusion amounted to a better performance during the crisis period. Finally, Chapter 5 contains an overall conclusion for this thesis.

Chapter 2 An Analysis of Constructing Comprehensive Financial Inclusion Indices around the World

2.1 Introduction

The significance of finance in an economy is considered a highly controversial and contentious topic for researchers. As explained in the first chapter, there are a number of arguments in the literature that explicitly recognise the impact of an in-depth financial services approach on extending and strengthening financial systems. Firstly, there is an argument relating to theoretical and empirical finance and economic growth literature. This argument suggests that financial systems that are well organised and carefully designed are beneficial for general economic growth and poverty alleviation.

Furthermore, a well-organised banking system is typically essential when it comes to facilitating an inclusive financial system (Levine, 2005; Beck, Demirguc-Kunt and Levine, 2004). The second argument is based on the theories of the emergence of new businesses and the Schumpeterian process, also known as 'Creative Destruction'. This theory suggests that the rise of new firms leads to financial development, which in turn results in economic growth (Klapper, Laeven and Rajan, 2004). King and Levine (1993) found proof for Schumpeter's argument in their analysis. They found that higher levels of various measurements of financial development were significantly associated with both current and future levels of several economic growth indicators.

The third argument supports the suggestion that financial services access is as important as general public needs access, such as safety, education and health (Peachey and Roe, 2004). As stated above, one of the most debated areas is the significant correlation between financial development and economic development, which is also a two-way causality issue. In addition, according to the modern development theories, access to finance is considered a key factor for the economy, while lack of access is emphasised as the reason for income inequality and slow economic growth. Access to finance is equally necessary in financial development (Levine, 1997; Pande and Burgis, 2003). Therefore, lack of access, which means the forfeiting of basic services, such as saving deposits, is harmful for the entire economy.

Hence, as a policy tool, establishing an inclusive financial system becomes important for governments. In addition, the role of providing financial access is increasingly assumed by policymakers, along with their traditional roles in establishing an inclusive financial system and ensuring financial stability by means of regulating and supervising financial institutions (Ardic, Heimann and Mylenko, 2011). However, this does not necessarily mean that more access to financial services, which indicates more borrowing and saving by the poor or small-scaled enterprises, can be always a good sign. A good example for this argument is the recent financial crisis, which took place in 2007 and 2008. Over borrowing resulted in a subprime mortgage

crisis in the United States, and the contagion spread across the world (Beck, Demirguc-Kunt and Honohan, 2009).

The United Nations suggests that almost half of the world's population lives in a financially excluded way. However, this rate is relatively small in developed economies (Financial Access, 2010). Therefore, the rate is higher in less developed countries. An inclusive financial system provides several benefits for society, particularly for disadvantaged segments, by eliminating these barriers (Sarma, 2008). Recent studies suggest that ease of access to financial services positively impacts living standards, especially those minorities who are considered low-income people (Dupas and Robinson, 2009). Also, for SMEs, ease of access to finance is one of the most important tools for achieving growth (Schiffer and Weder, 2001; Beck et al., 2005, 2006b, 2008).

In developing countries, the differences regarding account ownership according to individual characteristics are large. For instance, formal account ownership for men is 46%, while it is just 37% for women. According to Global Findex data,[10] account penetration is higher in economies with higher GDP per capita rates (Beck, Demirguc-Kunt and Peria, 2007a). People outside the financial system face different financial disadvantages, such as credit with higher interest rates, lack of insurance opportunities and higher-cost utilities. Those particularly vulnerable to financial exclusion and mostly unbanked are unemployed young people, housing association tenants, lone parents, divorced couples, the disabled, rural resided people, migrants, refugees, the homeless, the elderly and mostly women (Mitton, 2008).

At the global level, policymakers have started to implement certain financial sector reforms to promote more financial inclusion in terms of their development agendas. The Year of Microfinance in 2005, which was declared by the United Nations, the consensus on financial inclusion at the Pittsburgh Summit and the Korea G-20's communiqué support the above argument. Similarly, in 2006, Mohammed Yunus, who pioneered the concept of microfinance and founded the Grameen Bank, was awarded the Nobel Peace Prize. This highlighted the importance of financial inclusion in the international development agenda and caused the emergence of new international organisations.

The IMF, the IFC and the CGAP and the AFI lead the G20 discussion on financial inclusion for households and SMEs. In the meantime, the WBG has examined Financial Access Indicators, which are necessary to measure financial inclusion in the economy. Similarly, during the G20

[10] World Bank's Global Financial Inclusion Index Database: http://datatopics.worldbank.org/financialinclusion/.

discussions, which were initiated by the organisations mentioned above, the importance of determining specific indicators to measure the degree of financial inclusion was argued. Inclusive and well-functioned financial systems offer various financial services, such as savings, credits, payments and risk management products to low-income people, by exploring broader and easier access to these services, available at low or non-cost terms.

However, in terms of a non-inclusive financial system, people with a wider range of needs and small enterprises are forced to live with their own limited means. Hence, this may result in income inequality and slow economic growth in the relevant economy (Demirguc-Kunt and Klapper, 2012). Researchers and policymakers need specific indicators to work on financial inclusion for a particular country. Therefore, measuring the extent of financial inclusion for an economy will facilitate their work.

In order to measure the extent of financial inclusion, the indicators that represent the levels of various dimensions of financial system such as outreach, usage and ease need to be identified. Researchers and policymakers need to see consistent and reliable information about the levels of a financial system. Then they will be able to shape their policy agendas, devise their strategies and determine their action targets to overcome the barriers to access.

The majority of the studies that brought substantial contributions to the argument used some set of financial variables and explored their impacts on macro-economic factors. Recently, researchers' focus has shifted to these particular variables to explore their importance and impacts. Applying these indicators separately, they explored the importance of these variables on real macroeconomic variables. In particular, after the newly released indicators of financial inclusion following the summits held by different organisations, researchers mainly used these particular indicators of financial access.

Different organisations, such as the AFI, the IFC and the CGAP at the World Bank, have been established or regulated to explore sustainable financial inclusion policies for the poor. Furthermore, the WBG explored financial access indicators, which are used to measure financial inclusion in the literature. These organisations together have led the G20 discussions on financial inclusion for households and SMEs, exploring the importance of determining specific indicators to measure the degree of financial inclusion.

Similarly, with the Pittsburgh Summit in September 2009, which was organised by the CGAP and the IFC, the Financial Inclusion Experts Groups (FIEG) was launched. This group reviewed some specific topics to explore broader financial inclusion in economies. During those summits,

participating economies were encouraged to publish financial inclusion data periodically. In addition, they committed to improving the rates of financial inclusion.

In the financial inclusion literature, there are two major methods for analysing the impacts of financial access across countries: using financial access variables separately and constructing multidimensional financial inclusion indices. More recently, some researchers started to focus on exploring the aggregate information of financial access by constructing multidimensional indices of financial inclusion using the particular indicators outlined above. They argued that a multidimensional composite index is considered a yardstick for measuring the performance of a context. A multidimensional financial inclusion index, which contains aggregate information of different dimensions of financial access for a country, allows researchers and policymakers to make holistic comparisons across countries. Using cross-country, minimum-maximum values for the index construction method increases the comparability of the analysis. This kind of an index also explores the trend and relative rankings of countries' financial inclusion levels. Therefore, these measures may give feedback and frame policies to target the extent of financial exclusion for researchers and policymakers.

Following the argument made by Gupte et al. (2012), this chapter first measures the extent of financial inclusion across countries by constructing multidimensional and time series indices. Previous attempts at devising financial inclusion index methods have omitted some dimensions of financial access, time trends and varieties of institutions to add in their measurements. This study aims to fill these gaps in the literature. Studies of financial inclusion are somehow deficient because of the lack of proper data on household-based financial access. This chapter extends these studies by exploring broader cross-country, time-series data, which provide not only household-based but also individual usage of financial services, along with other various indicators of financial access. Hence, using such data might provide a proper indicator for attracting researchers and policymakers to adopt a financial inclusion agenda. Furthermore, this study tests the argument in the financial inclusion index literature, which is whether adding more dimensions and indicators to the index makes it more comprehensive and holistic. In light of this argument, two different financial inclusion indices, presented as composite indicators, are constructed using different data sets.[11] Finally, as the final step of constructing financial inclusion indices, this study tested the constructed indices to explore their explanatory powers, checking their correlations with some specific income and poverty measures. The results suggest that the second financial inclusion index, which is claimed to be the one the most

[11]The World Bank's World Development Indicators (WDI) and Global Financial Development Database (Global Findex), the IMF's International Financial Statistics, and, finally, the survey by Beck et al. (2006a).

comprehensive financial inclusion index in the literature, has relatively better explanatory power amongst the proxies of financial inclusion in this chapter.

One of the contributions of this paper is to analyse two types of indices, which contain more aggregate information and years than previous indices in the literature. The first index is built using fewer indicators (ten), but across many years (2004–2011) and several countries (178), while the second index is constructed using more indicators as a multidimensional calculation of the financial inclusion, with fewer countries (58) and for two years only. Adding a time-series estimation, which is an attempt that has never been made in the inclusion index literature, is an important contribution of this paper. Adding time trends here provides us with the trend of financial inclusion levels over time and shows how they have been affected by other subjects.

Another main contribution of this chapter is to add other financial institutions to the financial inclusion analysis. Access indicators, ranging from microfinance institutions to cooperatives, credit unions and post offices, along with the formal bank indicators, make this study more comprehensive than it has appeared so far. Therefore, this chapter develops the arguments of the studies by Gupte et al. (2012) and Beck et al. (2007 and 2008) in terms of adding time trends, more countries and access indicators from other financial institutions to the financial access measurements and regressions.

The rest of this chapter is organised as follows: Section two identifies the recent work on financial inclusion and index construction of financial inclusion. Section three determines the measurement of financial access and explores the contributions of the measurement method in this chapter by comparing it with previous studies. Section four presents the methods used for constructing the indices of financial inclusion and the empirical models. Section five examines the different databases, which are used for collecting dimensions, indicators and country-specific factors, used for the construction of an index. Section six explores the results of the construction methods of the indices. Moreover, it includes a discussion on the impact of adding more variables to the index construction and the advantages and disadvantages of the index construction techniques that are used in this paper. Furthermore, it contains a broader discussion on the impact of using different proxies for financial inclusion. Finally, section seven offers some concluding remarks and ideas for future work.

2.2 Related Work

In the finance literature, the studies that have made original contributions have mainly focused on finance-growth and finance-poverty nexus, using some indicators for financial development, economic growth and poverty. Using a variety of variables to measure financial development on

the right hand side of the regressions, they empirically explored the association between these variables. These studies can be traced back to through economic history.

The link between financial development and economic growth is a well-studied topic that has also been widely debated in the literature. In early studies, Adam Smith (1776) indicated in his study of Scotland that a high density of banks made a significant contribution to economic growth. In the same line of research, Joseph Schumpeter (1912) argued that banking system credits were the primary sources for driving economic growth for households and entrepreneurs. According to Schumpeter, the successful implementation of technological innovation, initiated by well-organised banks through the creation of new credit opportunities, enabled entrepreneurs to improve their capabilities, thus leading to significant growth in the economy.

Using some specific indicators for financial development and economic growth, King and Levine (1993) found proof for Schumpeter's argument in their analysis. They found that higher levels of various measurements of financial development are significantly associated with both current and future levels of several economic growth indicators. In terms of firm and industry levels of the countries, financial depth and economic growth are found to be positively related with each other (Beck et al., 2000; Rajan and Zingales 1998; and Demirguc-Kunt and Maksimovic, 1998).

Moreover, Sir John Hicks (1969) indicated in a case study of England that financial system development leads to the successful implementation of innovation. Similarly, Levine (1997) indicated, in an empirical study of the neo classical view and using various indicators for both financial development and economic growth, that the growth rate is higher and faster in countries that have well-functioning and larger banks and active stock markets. Furthermore, Arestis and Demetriades (1997) argued that the relationship between financial development and economic growth varies across countries using time-series estimations. They claimed that cross-country regressions might fail to explore specific country situations, such as institutional structure (financial liberalisation levels), the policy regimes of countries and governance performance.

Yet, although many studies suggest that financial development boosts income and reduces poverty or vice versa, the mechanisms by which this impact occurs is not clear. Hence, researchers have paid more attention to the mechanisms of financial development recently. Researchers' focus has shifted to the particular financial variables that have been used in the literature so far to explore their importance and impacts. Applying these indicators separately, they explored the importance of these variables on real macroeconomic variables. For instance, analysing financial access indicators separately, Frost and Sullivan Report (2009) argued that

banking services are considered as a public good; banking services are increasingly considered public policy tools. Therefore, they should be available for everyone in the economy, without any discrimination. Similarly, Mehrotra et al. (2009) concluded that financial inclusion was a 'quasi-public good'. They claimed that financial inclusion is not as important as 'defense' as a public good, but it is still as important as access to basic infrastructural facilities or other goods, such as education.

Ease of usage and access to financial services are different terms and it is necessary to distinguish between them. The non-users of financial services are divided into two types: the voluntarily excluded people and the involuntary excluded ones. Voluntary exclusion is considered to be a lack of demand for financial services because of religious or cultural reasons, and/or indirect access to financial services via family members. Since voluntary self-exclusion is related to lack of demand, it does not cause serious problems for policymakers. However, policymakers should in all cases attend to these kinds of problems by creating new reasons of demand for those people. The most critical issue is the involuntary exclusion of people. An involuntarily excluded group of people has four drawbacks: insufficient income, discrimination, informational framework, and product and price features. This is a group of unbanked people and firms whose incomes are too low. They are considered unbanked due to their income level, and they are considered the source of the need for financial inclusion as well.

Therefore, in order to bring this group into the financial system, policymakers should use non-lending support mechanisms, such as microfinance, alongside financial inclusion policies. Similarly, the other three involuntarily excluded groups, as outlined above, require specific policy actions (Beck, Demirguc-Kunt and Honohan, 2009). In order to recognise the gap in terms of the particular groups mentioned above, measuring the levels of financial access is necessary for an economy. Across the groups above, there are some particular methods to measure access and usage in the literature.

The first approach relies mostly on measuring the clients of basic financial services. The second approach seeks to measure the quality of the financial services that the households and firms obtain. Finally, the third one deals with physical and cost barriers to access (Beck et al., 2009). Measurement of financial inclusion, which involves exploring the scope of availability, accessibility and usage of financial services, is necessary to identify the gap in an economy or across economies. Moreover, Kempson et al. (2004, p.5) defined the reasons of exclusion: 'Identity requirements, terms and conditions of bank accounts, levels of bank charges, physical access to bank branches, psychological and cultural influences, and the ease of usage of the banking services'. Those barriers to financial inclusion are the key factors determining the dimensions of a financial inclusion index that shows the levels of the financial system outreach

in an economy. Similarly, Beck, Demirguc-Kunt and Peria (2005) analysed banking sector penetration with new indicators, which they presented across 99 countries. After using these indicators, they predicted the usage of banking services for households and firms.

Hence, measuring access to banking services is necessary as an attempt to understand how and in what ways financial inclusion may affect economies. The main aspects of measuring financial inclusion are monitoring and exploring the extent of inclusion in an economy. This deepens the exploring-related indicators and policies of financial inclusion. Furthermore, it helps policymakers to notice the importance of obtaining ease of access to banking services. In doing so, policymakers should design attractive policies (Porteous, 2009).

Kempson and Whyley (1998), Connolly and Hajaj (2001) and Barr (2004) argued that exclusion from the system takes place for economically disadvantaged people, particularly in developed countries with well-organised financial systems. Beck, Demirguc-Kunt and Peria (2005) argued that banking outreach is associated with financial development. Similarly, effective governance of a country and transportation infrastructure factors are also related to higher banking services usage.

As a policy instrument, financial inclusion deals with bringing excluded people under the roof of the financial system. It facilitates the significant allocation of resources by exploring equal opportunities to access basic banking services for everybody in a society (Conroy, 2008). Financial inclusion is the source of improving access and removing the impediments to the lack of access through several channels, such as the provision of credit, savings and insurance tools. Those channels can help them to improve the usage of financial resources for the poor and new entrepreneurs. As a consequence, they will be capable of make profitable investments, and this will assist their future consumption. In the light of this information on financial inclusion, it is helpful to reduce both inequality and poverty (Gersovitz, 1988; World Bank, 2008). There are some particular aspects to financial inclusion, such as a proper demand and supply side decision-making process. A proper decision-making process needs financial literacy, the basic knowledge of concepts and financial capability, which becomes necessary with the increase of new financial products emerging in the system (World Bank, 2008).

One of the first pieces of financial inclusion research in the UK was by Midgley (2005), who discussed and studied the discourses and implementations of financial exclusion policies in Britain. It indicated that providing broader access to universal banking services by the post office network is the one policy issue that is used for dealing with geographical barriers to access to finance. It examined the modernisation of Post Office services, leading to different policy responses to different people's access to universal banking services in rural, urban and

remote areas. As a cross-country measurement in terms of financial inclusion across the world, the number of people who are out of the banking system were counted by Ardic, Heimann and Mylenko (2011), who analysed the state of access to loan and deposit services and also the range of retail networks.

Furthermore, they argued that financial inclusion policies around the world are using the Consultative Group to Assist the Poor and the World Bank Group's 'Financial Access' database. They indicated that 56% of adults never use formal banking services. In developing countries, this rate increases to 64%. They suggested that informal financial services are more costly and less reliable than formal financial services. Therefore, policymakers should impose various regulations to provide formal and affordable financial services for unbanked people in order to make positive changes to their lives and to integrate them into the formal financial system. Moreover, Honohan (2008) measured the population share of the usage of formal financial intermediaries by using the number of banking and MFI accounts for more than 160 countries. The empirical results of this study indicated that this measurement of the usage of formal financial intermediaries is associated with inequality and poverty.

In the financial inclusion literature, there are two major methods for analysing the impacts of financial access across countries: performing financial access variables separately and constructing multidimensional financial inclusion indices. After exploring the studies that have mostly dealt with financial inclusion variables separately, it is important to determine the new trend in financial inclusion studies that use multidimensional indices to measure financial inclusion levels. More recently, some researchers have started to focus on exploring the aggregate information of financial access by constructing multidimensional indices of financial inclusion using these particular indicators above. They argued that a multidimensional composite index is considered a yardstick for measuring the performance of a context. A multidimensional financial inclusion index, which contains aggregate information on different dimensions of financial access to a country, allows researchers and policymakers to make holistic comparisons across countries.

Since financial inclusion is considered an important policy tool for developing and emerging market countries, research on financial inclusion, such as index construction, mostly remains local for that kind of country, especially South Asian countries, such as Bangladesh and India. One of the first and most important pieces of research on the financial inclusion index was conducted by Sarma (2004), who only used three dimensions to calculate 'the index of financial inclusion', for 2004. These dimensions are banking penetration – the number of bank accounts per 1000 adults – availability – the number of bank branches and number of ATMs per 1000 adults – and, finally, usage – the number deposits plus credits as a percentage of GDP. She

checked the association between her financial inclusion index and other country-specific factors chosen by Sarma and Pais (2008) by using simple OLS regression.

Similarly, Arora (2010) used more dimensions and indicators for constructing a financial inclusion index. She adapted the IMF's classification of two primary groups of 98 countries: advanced economies, and developing and emerging economies. She used more dimensions and indicators than Sarma, except for the usage dimension in the study. However, geographic penetration and the dimensions of ease of usage and cost of the services were added to the index construction.

All of these studies adopted the UNDP's Human Development Index (HDI) calculation concept, as have most of the others in the literature. This concept includes equal weighting for the calculation method. Furthermore, Kumar and Misra (2000) measured separate financial inclusion indices, using both supply and demand side indicators for 2002 and 2003 in all the states of India. They found a lot of variations across rural and urban regions, and even within a state. They explored the presence of informal financial services and discovered its significance in rural areas. In doing so, they found that providing a large variety of financial inclusion policies and widening the scope of these policy initiatives reduces the dependency of informal financial services. In the meantime, it is necessary to offer broader access in vulnerable regions.

Similarly, the study by Gupte et al. (2012) is one of the leading pieces of recent research in the literature on financial inclusion indices. They claimed that incorporating as many dimensions as possible in an index construction makes the index more comprehensive. Therefore, they used as many dimensions as possible to make the index more indicative for 2008, 2009 and 2010.

Additionally, Mehrotra et al. (2009) constructed an inclusion index, using such indicators as the number of rural deposit accounts and bank credits for the states of India. The World Bank (2008) calculated a composite measure of access, which included the percentage of people who had an account with a financial intermediary in 51 countries. Moreover, the World Bank's report, 'Banking the Poor' (2009), measured the access to banking services, using the number of bank accounts per thousands of people in 45 countries. They empirically analysed the association between this measurement of banking access, bank transactions and policymakers' regulations for the relevant economies.

2.3 Measuring Financial Access

Financial inclusion is defined by being a tool offering smooth access to formal financial services. Therefore, financial inclusion simply means the ways to make financial services available at an affordable price for everyone in society. In the literature, measuring financial

access is the way to determine the extent of financial inclusion. As explained above, some specific financial access indicators from different institutions have been used to measure the financial access of an economy. However, in order to understand an economy better in terms of financial access, researchers commonly use specific institutions' indicators in practice.

At this point, it is important to identify the barriers of financial access. Kempson et al. (2004, p.5) determined that the six main reasons of financial exclusion were: 'identity requirements, conditions of bank accounts, levels of banking services fees, physical access to bank branches, social and cultural influences, and ease of usage of financial services.' The policies and efforts to overcome these barriers also alter the reasons and conditions of financial exclusion, and therefore boost the levels of financial access.

Therefore, in order to measure the extent of financial inclusion, the indicators that represent the levels of various dimensions of financial system need to be identified. Researchers and policymakers need to see consistent and reliable information about the levels of a financial system. Then they are able to shape their policy agendas and determine their action targets to overcome the barriers of access.

As was explained and outlined above, the common indicators that are used in the literature can range from outreach to usage to, ease to cost dimensions. The outreach dimension contains geographic and demographic elements and ATM penetrations, while the usage dimension contains the number of clients with credit and deposit accounts and credit and deposit income ratios. The ease dimension refers to accessibility and eligibility indicators. Finally, the cost dimension contains the usage fees for clients' accounts.

In the financial inclusion literature, there are two major methods for analysing the impacts of financial access across different countries. The majority of the studies use some set of specific financial access indicators separately, such as outreach, usage, accessibility and eligibility, and cost indicators. Second, some researchers have started to focus on using the aggregate information of financial access by constructing multidimensional indices of financial inclusion.

2.3.1 Using Separate Financial Access Indicators

The papers that have original contributions typically have run regressions with a group of financial indicators on the right-hand side and found that these indicators mattered. Recent studies have started to examine these variables to test the reasons and mechanisms of their impacts. Using some specific variables that are presented in Tables 2.1 through to 2.4, they have

explored their impacts on some macroeconomic, financial and infrastructure country-specific variables (Beck et al., 2007, 2008; Ardic et al., 2011; Kumar, 2013).

Beck et al. (2007) explored some sets of cross-country banking outreach indicators and indicated the ways to use these indicators to find household and firm base usage of financial services. Moreover, they empirically explored the linkage between some specific banking outreach indicators and some sets of financial, infrastructure and institutional development factors. As can be seen from Table 2.1, they used eight commercial bank-based outreach and usage indicators from 99 countries for 2003 and 2004. Their results suggest that higher rates of banking outreach associated with financial development and economic growth. Furthermore, they found that transport infrastructure, well-organised communication, and well-developed governance are also correlated with higher rates of banking outreach.

Table 2.1 Financial access indicators according to Beck et al. (2007)

Outreach Indicator	Usage Indicators	Ease (Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
Number of Bank Branches per 1000 sqkm.	Numer of Loans per 1000 people	N/A	N/A	Indicators are used seperately - OLS & Ordered Probit Models	2003 - 2004	99 Countries	8	Commercial Banks
Number of Branches per one lakh population	Numer of Deposits per 1000 people							
Number of ATM's per one lakh population	Average size of Loans / GDP per capita							
Number of Bank ATMs per 1000 sqkm.	Average size of Deposits / GDP per capita							

Beck et al. (2008) separately analysed the indicators of outreach, affordability and eligibility barriers to credits, deposits and payment services using information from 193 banks in 58 countries. As can be seen from Table 2.2, they used 17 commercial bank-based ease and cost indicators for 2004 and 2005. Using these banking barriers, they checked their associations with a set of banking and country-specific factors to explore the importance of them for access to financial services. They found that these banking barriers vary across countries and these barriers result in people being unable to use financial services in many countries. They also found that there are lower banking barriers in more competitive and well-developed countries.

Their findings suggest that even though foreign banks normally charge higher fees than others, in foreign bank-dominated financial systems, fees seem to be lower, and it is easier to open bank accounts or apply for credit. However, in government-owned dominant banking systems, customers' fees are relatively lower but they face more barriers to applying for or accessing banking services.

Table 2.2 Financial access indicators according to Beck et al. (2008)

Outreach Indicators	Usage Indicators	Ease(Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
N/A	N/A	Locations to open deposit accounts	Annual fees savings account (%of GDP)	Indicators are used seperately - OLS Model	2004 and 2005	58 Countries	17	Commercial Banks
		Locations to submit loan applications	Annual fees checking account (%of GDP)					
		Minimum amount to open savings accounts	Fees consumer loans (% of minimum loan amount)					
		Minimum amount to be maintained in checking accounts	Fees SME loans (% of minimum loan amount)					
		Minimum amount to be maintained in savings accounts	Cost to transfer funds internationally (%of 250 dollars)					
		Number of documents to open checking account	Amount of fee using ATM Cards (%of 100 dollars)					
		Number of documents to open savings account						
		Minimum amount of consumer loan						
		Minimum amount of SME loan						
		Days to process consumer loan application						
		Days to process SME loan application						

As can be seen from Table 2.3, the paper by Ardic et al. (2011) is another leading one that used financial access indicators separately to test and compare impacts. A Table 2.3 shows that they used 14 outreach, usage, ease and cost indicators from 154 countries for 2008 and 2009. Their main contribution to the literature has been to compare credit and deposit penetrations from banks and non-bank institutions. They only consider credit and deposit services in this study and compared bank and non-bank institutions in terms of credit and deposit penetrations with the limited data of non-bank financial institutions. However, the limitations of data prevented them from making robust comparisons across countries. For instance, credit penetrations data is available from specialised state financial institutions of 15 countries and the microfinance

institutions of seven countries. Furthermore, this paper separately ran regressions with 14 different financial access indicators on various financial, infrastructural and economic country variables using OLS and Tobit estimation models.

Using the Consultative Group to Assist the Poor and the World Bank Group's 'Financial Access' database, they counted the number of people who are out of the banking system, analysing the state of access to loan and deposit services and also the range of retail networks. Moreover, they pointed out the scope of financial inclusion policies around the world. The findings of this paper show that fifty-six percent of adults live without using formal banking services. In developing countries, this rate increases to sixty-four percent. They suggested that informal financial services are more costly and less reliable than formal financial services. Therefore, policymakers should impose various regulations to provide formal and affordable financial services for unbanked people in order to make positive changes to their lives and adopt them into the formal financial system.

Table 2.3 Financial access indicators according to Ardic et al. (2011)

Outreach Indicators	Usage Indicators	Ease(Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
Number of Branches per one lakh population	Deposit interest rate	Locations to submit loan applications	Annual fees checking account (%of GDP)	OLS & Tobit Estimations	2008 and 2009	154 Countries	14	**1- Commercial Banks** (All indicators)
Number of Branches per 1000 sq. km	Credit-income ratio	Minimum amount to open checking accounts	Fees consumer loans (% of minimum loan amount)					**2- MFI's** Small number of countries
Credit accounts per 1000 adults	Deposit-income ratio	Places to submit loan application						**3-Cooperatives** Small number of
Deposit accounts per 1000 adults		Minimum amount of consumer loan						**4- Credit Unions** Small number of countries
		Days to process consumer loan application						**5- Post Offices** Small number of countries

Finally, Kumar (2013) aimed to explore the determinants of financial inclusion in India using six banking outreach and usage indicators from 1995 to 2008. He regressed the indicators separately on certain financial access variables along with other country-specific factors. Unlike the previous studies, he used panel-fixed effects and GMM estimations models to control for the dynamic endogeneity of the variables.

The findings suggested that a branch network has a positive impact on financial inclusion. Furthermore, the proportion of factories and employment are also significantly associated with

banking penetration indicators. He argues that financial development and industrialisation positively affect financial inclusion.

Table 2.4 Financial access indicators according to Kumar (2013)

Outreach Indicators	Usage Indicators	Ease (Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
Number of Bank Branches per 1000 sqkm.	Numer of Credit Accounts (in lakh)	N/A	N/A	Panel Fixed Effects & GMM	1995 - 2008	The 29 States of India	6	Commercial Banks
Number of Branches per one lakh population	Numer of Deposit Accounts (in lakh)							
	Credit Amount outstanding (Rs score)							
	Deposit Amount (Rs score)							

As was explained above, all these papers separately analyse these indicators and their impacts on various set of country-specific factors. However, these studies have some limitations in terms of data for banking outreach indicators, such as lack of time trends, the variety of financial services that are used, using commercial bank-based indicators only, and, finally, using quantity unit indicators, so the price dimension of the outreach is not provided.

2.3.2 Financial Inclusion Index

More recently, as was discussed above, researchers started to analyse the financial variables that are used in the financial inclusion literature to check why they are important and what they are important for. In particular, some researchers have constructed financial inclusion indices and used them in regressions to explain the impacts of financial access in an aggregate manner. At this point, the question of why we need to construct an index should be answered.

Researchers have increasingly accepted index construction methods as a tool for the relative performance of countries, benchmarking and policy analysis (OECD, 2008). A multidimensional index helps users to make it easier to interpret the information of the context and determine the complex phenomena. This kind of an index is considered a supporting analytical tool for the decision-making process. Hence, this kind of a tool is a starting point for

discussions and to attract the interest of researchers and policymakers (Contreras, Blancas and Ramirez-Hurtado, 2014).

One of the main reasons for answering this question can be explained as the potential shortcomings of the usage of these variables individually. This may cause the analysis to ignore some important information about the mechanisms of a financial system. There may also be a misinterpretation of countries' financial inclusion levels for researchers and policymakers (Sarma, 2010). Using single access indicators would not be enough to conduct a broader financial inclusion analysis. It would be better to expand the number of countries that are used, the types of services and institutions that supply these services, the dimensions of access and the coverage of the time trend. This kind of comprehensive analysis would help to monitor policymakers' attention and regulation efforts to achieve higher financial access (Beck, Demirguc-Kunt and Honohan, 2009).

There is also the potential that some of these indicators might be substitutes for the others. Hence, this may lead one to conclude that an aggregate measure of financial inclusion may contain more information on the context. Such a multidimensional and comprehensive index that infers information from various dimensions can be used to compare the extent of financial inclusion across economies (Sarma, 2008). Finally, such a multidimensional index can be used to track the financial inclusion policy initiatives progress of economies.

Some major papers have constructed multidimensional financial inclusion indices in the literature. One of the first and leading pieces of research on a financial inclusion index is that of Sarma (2008). She constructed a financial inclusion index using the three main dimensions of financial access for 2004. As can be seen from Table 2.5, these dimensions are banking penetration – the number of bank accounts per 1000 adults, availability – the number of bank branches and number of ATMs per 1000 adults, and, finally, usage-deposits plus credits as a percentage of GDP. Using these indicators, these studies explored these indicators' impacts on some specific macro factors as has been traditionally done in the literature.

Table 2.5 Indicators of financial inclusion index according to Sarma (2008)

Outreach Indicator	Usage Indicators	Ease (Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
Number of Bank Accounts per 1000	Deposits + Credits / GDP	N/A	N/A	UNDP's Human Development Index method - Equal Weighting	2004	49 Countries	4	Commercial Banks
Number of Branches per one lakh population								
Number of ATM's per one lakh population								

Arora (2010) also constructed a multidimensional index using more dimensions and indicators than Sarma (2008). As can be seen in Table 2.6, geographic penetrations and the dimensions of ease of usage and cost of the services were added to the index construction. She adapted the IMF's classification of two primary groups of 98 countries: advanced economies, and developing and emerging economies. This paper also constructed the index for one year and used commercial bank access indicators. Moreover, Chakravarty and Pal (2013) contributed to the financial inclusion index literature using an axiomatic approach for the measurement. Using this approach, the percentage contribution of the indicators can be determined in the index.

Table 2.6 Indicators of financial inclusion index according to Arora (2010)

Outreach Indicators	Usage Indicators	Ease(Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
Number of Branches per one lakh population	N/A	Locations to open deposit accounts	Fees consumer loan (% of minimum loan amount)	UNDP's Human Development Index method - Equal Weighting	2008	98 Countries	20	Commercial Banks
Number of ATM's per one lakh population		Locations to submit loan applications	Fees mortgage loan (% of minimum loan amount)					
Number of Branches per 1000 sq. km		Minimum amount to open savings accounts	Annual fees checking account					
Number of ATM's per 1000 sq. km		Minimum amount to be maintained in checking accounts	Annual fees savings account					
		Minimum amount to be maintained in savings accounts	Fees using ATM cards (% of $ 100)					
		Number of documents to open checking account						
		Number of documents to open savings account						
		Minimum amount of consumer loan						
		Minimum amount of mortgage loan						
		Days to process consumer loan application						
		Days to process mortgage loan application						

Furthermore, the study by Gupte et al. (2012), which is among the leading recent research in the literature on financial inclusion index, argues that adding more dimensions makes the index more comprehensible. They claimed that incorporating as many dimensions as possible in the index construction makes the index more comprehensive. Therefore, they used as many dimensions as possible to make the index more indicative for 2008 and 2009. As seen in Table 2.7, they used 22 banking indicators of all dimensions that are explained above for 139 countries. Since previous studies did not add some financial access dimensions; they attempted

to fill this gap by adding all access dimensions to construct a more indicative financial inclusion index.

Finally, Kumar and Misra (2000) also measured multidimensional financial inclusion indices, using both supply and demand side indicators for 2002 and 2003, for all the states of India. They found a lot of variations across rural and urban regions, even within a state. They explored the presence of informal financial services and discovered its significance in rural areas. They are among the few researchers who have added other financial institutions such as microfinance and cooperatives into the financial inclusion measures. The structure of the financial system of India, which has a large amount of non-bank financial institutions, gave them the opportunity to compare the financial services in terms of institutional types.

Table 2.7 Indicators of financial inclusion index according to Gupte et al. (2012)

Outreach Indicators	Usage Indicators	Ease(Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
Number of Branches per one lakh population	Volume of Deposits and Loans % of GDP	Locations to open deposit accounts	Fees consumer loan (% of minimum loan amount)	UNDP's Human Development Index method - Equal Weighting	2008 and 2009	139 Countries	22	Commercial Banks
Number of ATM's per one lakh population		Locations to submit loan applications	Fees mortgage loan (% of minimum loan amount)					
Accounts per 1000 adults		Minimum amount to open savings accounts	Annual fees checking account					
Number of Branches per 1000 sq. km		Minimum amount to be maintained in checking accounts	Annual fees savings account					
Number of ATM's per 1000 sq. km		Minimum amount to be maintained in savings accounts	Fees using ATM cards (% of $ 100)					
		Number of documents to open checking account						
		Number of documents to open savings account						
		Minimum amount of consumer loan						
		Minimum amount of mortgage loan						
		Days to process consumer loan application						
		Days to process mortgage loan application						

2.3.3 Contributions of the Indices

Following the argument made by Gupte et al. (2012), we constructed two different indices to test whether adding as many dimensions as possible into the construction of the financial inclusion index makes it more indicative. In doing so, we constructed our first index using fewer dimensions as was done in the literature. Then we constructed the second index using more dimensions than previous index construction studies. Hence, using these indices, we were able

to compare countries' levels of financial inclusion in terms of two different indices. In the meantime, apart from the indices we constructed, in order to conduct a broader analysis of the extent of financial inclusion, we used another proxy of financial inclusion, adding an access indicator from other financial institutions, such as micro finance institutions, cooperatives and credit unions. This new proxy allowed us to compare the impacts of access in terms of both commercial bank-based only indicators and indicators from all financial institutions.

Improving on Gupte et al. (2012) and in order to explore the level of financial inclusion across nations, indicators of the access and usage of commercial bank accounts, such as saving, checking, credits, deposits and loans were all used. Moreover, so as to provide a complete set of financial inclusion gaps for economies, the obstacles of financial inclusion, such as physical distance and cost, as well as the documentation requirements needed for opening a bank account, were all carefully considered in the analysis presented here. As has been explained above, the previous index construction studies used one or two years in constructing their indices. Therefore, constructing the index for eight years is another contribution of this chapter. The same situation applies for the number of countries that are used to make relative comparisons among economies in this chapter. All of these studies above have adopted the UNDP's Human Development Index (HDI) calculation concept, as have most of the others in the literature.

This concept includes equal weighting for the calculation method. Unlike these studies, this chapter adopted a new methodology to construct the indices using the OECD's handbook of constructing composite indicators. This new methodology contains a principal component analysis to explore the relative importance of indicators used in the index construction process and factor analysis to assign different weights according to their relative importance.

Furthermore, most studies have analysed the measures of financial depth, instead of measuring outreach and access. These studies have mostly used availability, accessibility and usage indicators by using aggregate banking data. At this point, in order to see the overall picture, it is necessary to add the user's side of financial inclusion to the measurement of access (Kumar and Mishra, 2000). This study fills this gap by analysing both the supply and demand side information, which allows us to provide a broader financial inclusion measurement. We use the availability, accessibility and usage, and even the cost dimensions. For instance, the number of deposit, credit and savings accounts, the bank and ATM branches, the volume of deposit and credit accounts, and relating to demand-side indicators, such as households and SMEs, base saving, credit and insurance indicators.

Most importantly, expanding the studies of financial inclusion, this chapter added individual information of access into the index construction process by using the survey data of Beck et al. (2006) and Demirguc-Kunt et al. (2015), along with all other methods and data of financial access. This survey data gives us to chance to add individual usage of financial services from all financial institutions rather than just analysing the number of accounts. This allows us to measure the access across sub-groups.

Moreover, one of the main contributions of this chapter is to use a new proxy for financial inclusion, which contains access indicators from microfinance institutions, cooperatives, credit unions and post offices by incorporating Demirguc-Kunt and Klapper (2012)'s survey data into the analysis. This new proxy can be considered as a third index in this chapter to explore the impact of microfinance services' outreach on different macroeconomic country-specific factors. Adding this kind of data to the financial inclusion measurement allows us to make broader comparisons across countries by adding the impacts of other financial institutions, especially microfinance institutions. It is important to add this information to make holistic cross-country comparisons since some specific countries have mainly microfinance institutions rather than general commercial banks. It is suggested in the literature that this kind of analysis can inform policymakers about considering financial inclusion policies. Additionally, this kind of a study allows for the identification of the degree to which groups are excluded from the formal financial system in various economies.

2.3.3.1 Access from Formal Financial Institutions

It is stated in the literature that the traditional way to measure financial access is to use commercial bank indicators. According to the Financial Access (2010), 85% of the data of financial inclusion are taken from commercial banks of relevant countries. Therefore, using data for financial services served by commercial banks is sufficient to make a comparison across nations. However, not all countries have other financial institutions, such as microfinance and cooperatives. Using financial access indicators from these types of institutions may reduce the comparability of the study. In doing so, we first start to explore commercial bank-based financial inclusion indices as the first proxy of financial inclusion. Then we use the third proxy of financial inclusion by adding the outreach indicator from other financial institutions to the analysis and comparing the results in terms of two measures of financial inclusion.

Table 2.8 explores the indicators used to calculate the first financial inclusion index. Following the argument by Gupte et al. (2012), we test the impacts of adding more variables to the financial inclusion index construction. In doing so, we first construct an index using 11

outreach, usage and cost indicators for 178 countries for 2004 to 2011. Adding the time trend and the aggregate banking access indicators from more countries makes this index more competitive than previous indices in the literature. Besides, the construction method of this index has not been used before in the literature.

Table 2.8 Indicators of the first financial inclusion index of this study

Outreach Indicators	Usage Indicators	Ease (Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
Number of Branches per one lakh population	Deposit-income ratio	N/A	Bank cost - income ratio	OECD's handbook on constructing composite indicators methods	2004 - 2011 (8 years)	179 Countries	11	Commercial Banks
Number of ATM's per one lakh population	Credit-income ratio							
Number of Branches per 1000 sq. km	Private credit by deposit money banks and other financial institutions / GDP							
Number of ATM's per 1000 sq. km	Life insurance premium volume / GDP							
Deposit accounts per 1000 adults								
Credit accounts per 1000 adults								

As can be seen from Table 2.9, the second index is constructed using 27 outreach, usage, ease and cost indicators from 58 countries for 2004 and 2005. This index is the most comprehensive and competitive one in terms of the scope of the indicators that have been used in the literature so far. Unlike most of the literature, which only uses the numbers of people for assessing account penetrations, it contains individual information on outreach and usage indicators by using the survey data of Beck et al. (2006). These two indices are constructed and compared in terms of country ranks to check their effectiveness. All of these indicators used to construct the indices will be explained in detail in the data section below.

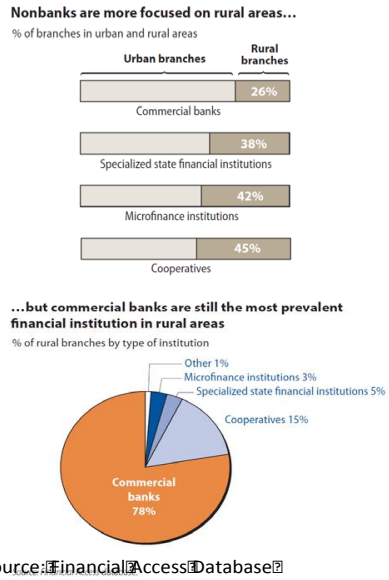
Table 2.9 Indicators of the second financial inclusion index of this study

Outreach Indicators	Usage Indicators	Ease(Accessibility & Eligibility) Indicators	Cost Indicators	Methodology	Time Period	Number of Countries	Number of Indicators	Institution Type
Number of Branches per one lakh population	Deposit-income ratio	Locations to open deposit accounts	Annual fees savings account (%of GDP)	OECD's handbook on constructing composite indicators methods	2004 and 2005	58 Countries	27	Commercial Banks
Number of ATM's per one lakh population	Credit-income ratio	Locations to submit loan applications	Annual fees checking account (%of GDP)					
Number of Branches per 1000 sq. km	Private credit by deposit money banks and other financial institutions / GDP	Minimum amount to open savings accounts	Fees consumer loans (% of minimum loan amount)					
Number of ATM's per 1000 sq. km	Life insurance premium volume / GDP	Minimum amount to be maintained in checking accounts	Fees SME loans (% of minimum loan amount)					
Deposit accounts per 1000 adults		Minimum amount to be maintained in savings accounts	Cost to transfer funds internationally (%of 250 dollars)					
Credit accounts per 1000 adults		Number of documents to open checking account	Amount of fee using ATM Cards (%of 100 dollars)					
		Number of documents to open savings account						
		Minimum amount of consumer loan						
		Minimum amount of SME loan						
		Days to process consumer loan application						
		Days to process SME loan application						

2.3.3.2 Indicators from All Financial Institutions

As mentioned above, we used commercial bank-based indicators to construct the indices of financial inclusion to determine the extent of financial access for the economies. Financial services from microfinance and other financial institutions were not added to the data of these indices before due to two main reasons. As can be seen from Figure 2.1, the most significant reason is an obstacle relating to data availability; there is not enough available data for such institutions. The other reason can be identified as the scale of the countries for such institutions. Only particular countries have microfinance and other financial institutions. Therefore, it is not possible to use their data in an index that makes a comparison across numerous countries. In other words, the data obstacle of the access indicators of other financial institutions prevents researchers constructing such indices as was done above for financial inclusion.

Figure 2.1 Branch breakdowns



Source: Financial Access Database

However, using only commercial bank-based indicators in measuring financial access to determine the extent of financial inclusion may cause some inefficiency for countries that have mainly other financial institutions. Making a worldwide comparison with only commercial bank-based indicators for financial inclusion may lead to inconsistent results for states like India, Malaysia and Singapore, where other financial institutions are mainly used. In order to overcome these inconsistencies, another proxy was used to determine financial inclusion.

Apart from the multidimensional indices, which are constructed using commercial bank indicators, this new proxy is a single indicator for financial inclusion. The 'formal accounts at all financial institutions' indicator is used as the third index in this chapter. Because of the data obstacle, it is not possible to construct same kind of multidimensional index as constructed before. Therefore, a single indicator is used to determine the extent of financial inclusion, which also contains data from other financial institutions.

Since the new proxy does not include different indicators to make a composite index, there is no need to run the same steps as was done for the indices above. Therefore, the new proxy of financial inclusion is used in an econometric model to examine the effects of financial inclusion on country-specific variables in terms of all financial institutions. This new model also let us know what kind of country-specific, macro-economic variables explain financial inclusion in terms of considering all financial institutions. In doing so, a new econometric model was run with the new proxy of financial inclusion and the outcomes are discussed in the sections below. The methodology and the data of the new model are also discussed below.

Table 2.10 Institutional classifications of the three proxies for financial inclusion in this study

1st Index	2nd Index	Accounts from all financial institutions indicator
Commercial Banks base - outreach, usage and cost indicatos	Commercial Banks base - outreach, usage, ease, and cost indicators - includes Beck et al. (2006) survey data	1- Commercial Banks
		2- MFI's
		3-Cooperatives
		4- Credit Unions
		5- Post Offices
2004 - 2011	2004 - 2005	2011

In the meantime, Table 2.10 shows the institutional breakdown of the financial inclusion indices that were constructed and the new proxy of financial inclusion in this chapter. According to the table, the constructed indices contain various financial access, usage and cost indicators from formal financial institutions. However, expanding on the financial inclusion literature, especially Gupte et al. (2012), the new proxy of financial inclusion in this chapter brings a broader aspect to the extent of financial inclusion by adding information from all financial institutions. This new indicators have financial access variables from microfinance institutions, cooperatives, credit unions and post offices.

2.4 Methodology

Constructing an index is always considered a good way to see the performance of a country in terms of the related argument that the researcher studies. It allows for the comparison of the subject across countries and establishing the relative ranking by using minimum and maximum values as the source of comparison (Gupte et al., 2012). We begin this chapter by constructing the indices in order to make a cross-country comparison for financial inclusion levels across the world's countries. In addition to this, by constructing two separate indices, we examine the impact of adding more variables to the index construction process. In accordance with the aforementioned data, we follow the OECD's handbook of constructing composite indicators.

The steps that we used to construct the indices were:

1- Data selection
2- Imputation of missing data
3- Multivariate analysis
4- Normalisation
5- Weighting and aggregation
6- Links to other variables

a. The indices that are constructed with commercial bank indicators
b. The new proxy of financial inclusion: 'Accounts at all financial institutions'

In terms of these measures, we perform a Principal Component Analysis (PCA) for both indices to examine the importance and statistical balance of the indicators used for the index construction. In the meantime, the PCA enables one to see the results of adding more indicators to the construction process. While the indicators are not expressed with the same scales, we decided to normalise the data to render the indicators comparable by using the Min-Max method. Afterwards, the Factor Analysis was used to assign the weights for the individual indicators of the indices. The Factor Analysis Approach will be the first element used in the financial inclusion index construction literature. The next step is using the updated form of the UNDP's Human Development Index method to aggregate the indices.

Finally, we related the index to other particular factors, in order to identify linkages through regressions. In doing so, we examined the factors related to the financial access, such as socio-economic, physical infrastructure and banking sector factors, for the relevant countries. The most important information worth mentioning here is the country-specific factors that we used for finding that the relation between the financial inclusion's indices was totally different from the indicators that were used for constructing the indices themselves.

2.4.1 Imputation of Missing Data

To explore a solid dataset and criticise the outliers, we considered filling in the gaps in the missing parts of the data. The single imputation method – unconditional mean imputation – has been used to determine the missing values, in terms of the World Bank-Income Group Classification and relevant years for the dataset. The formula below has been used in order to achieve a complete dataset:

$$\bar{x}_q^t = \frac{1}{m_q^t} \sum_{recorded} x_{qc}^t$$

In the formula above, $\bar{x}_q^t$ indicates the average values assigned for the individual indicator q, for country c, at time t. Furthermore, x_{qc}^t represents the random variable of the individual indicator, q, for country c, at time t. Meanwhile, m_q^t infers the number of non-missing values on x_q at time t.

2.4.2 Multivariate Analysis

A multivariate analysis must be undertaken in this study in order to consider the general structure of the data, examine its effectiveness and determine the possible methodological methods, such as weighting and aggregation. Principal Component Analysis, which is one of the oldest multivariate analysis techniques, introduced by Pearson (1901), is used as the multivariate analysis in this study. In fact, the main purpose of this method is to reduce the dimensional structure of the data by transforming it to a new set of uncorrelated variables.[12]

However, in this study, we used PCA to compare the statistical importance of the indicators and discuss the possible differences between two indices. With the PCA, we examined whether the indicators were statistically well balanced, how they changed in relation to each other, and how they were associated in the composite indicator. In addition, this study allowed us to assess the importance of individual indicators for the construction of the financial inclusion indices. PCA requires the indicators to be set on the same scale: the sample size must be greater than 50 and the amount of correlation of the indicators must contain two or more amounts of 0.30 or greater.

The overall Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy should be 0.50 or higher; the Bartlett test of sphericity must be statistically significant, determining the importance of the indicators, and evaluating communalities, which means variables, of less than 0.50 must be removed. All of these steps are taken into account in this analysis.

KMO is used to compare the degrees of estimated correlation coefficients and the partial correlation coefficients, where the partial correlations are expected not to be too large (Hutcheson and Sofroniou, 1999). Moreover, the Bartlett's test of sphericity is the test for checking whether the individual indicators in a correlation matrix are correlated or not. It is used in testing the null hypothesis that the individual indicators are uncorrelated (Nardo et al., 2005).

2.4.3 Normalisation

While the indicators that we use for the construction of the financial inclusion index measure various scales of the access, like the measurement of the percentage of income per 1000 adults or per 1000 km2, our data still needed to be normalised. Moreover, the indicators were not expressed with the same scales, so we normalised the data to render the indicators comparable by using the Min-Max method.

[12] See Jolliffe (1986) for details.

In order to smoothen out the different scales and transform the highly skewed indicators, we normalised the dataset by using the Min-Max method for both indices. This process allowed us to make all the different indicators into an equal range between 0 and 1, by subtracting the minimum value and dividing it by the range of the indicators' values.

The formula used for the normalization process is:

$$I_{q_c}^{t} = \frac{x_{qc}^{t} - \min_c\left(x_q^t\right)}{max_c\left(x_q^t\right) - \min_c\left(x_q^t\right)}$$

In the formula above, x_{qc}^{t} implies the actual value of indicator q for country c at time t. $max_c\ x_q^t$ refers to the maximum value of indicator q for country c at time t. Finally, $\min_c\left(x_q^t\right)$ refers to the minimum value of indicator q for country c at time t.

2.4.4 Weighting and Aggregation

Most composite indicators are constructed with an equal weighting method, which is based on giving same weight to all variables, such as the UNDP's Human Development Index. This implies that all the dimensions and indicators used in constructing the composite indicator are equally important for the composite indicator. However, this method may imply unequal weighting among the dimensions and result in an unbalanced structure in the composite indicator (OECD, 2008, pp. 31-32). Since our index, which is a composite one, has groups of dimensions, the use of equal weight might also come up with an unbalanced structure in the index. After doing the PCA and finding the statistical importance of the indicators, we assigned the weights to reflect the indicators' statistical quality in the data, using the factor analysis.

The measurements of the weighting process were as follows:

1. **Checking the correlation structure:** If the correlations of the indictors are weak, it is unlikely that they share certain common factors. This means that there is no multicollinearity problem for the index and indicators measuring different parts of the financial system.
2. **Identification of latent factors:** In order to choose those factors, the points below must be fulfilled.
    a. Factors must have associated eigenvalues that are larger than one.
    b. Factors must explain the overall variance by more than 10%.
3. **Rotation of the factors:** Factors have been rotated to minimise the number of indicators that have a high loading on the same factor.

4. **Constructing the weights from matrix of factor loadings after rotation following the strategy by Nicoletti et al. (2000):** The indicators with the highest squared factor loadings have been grouped into the intermediate composite indicators.

In order to aggregate the indices, the updated form of the UNDP's HDI approach has been used in the process involving our index construction scheme. After assigning the weights according to the importance of the indicators found by the PCA, the relevant formula has been used to construct the index:

$$D_i = \frac{\sum i_1 w_i}{n}$$

In this formula, D_i represents the Dimension *i*, and i_1 refers to indicator one, while W_i implies the corresponding weights of indicator *i*. For the inversely related indicators, which are the indicators of cost and ease dimensions, the formula below has been used:

$$D_i = 1 - \frac{\sum i_1 w_i}{n}$$

Finally, the aggregation formula for the indices: Geometric mean of the final dimensions.

$$FI_c = \prod_{i=1}^{5} D_i$$

2.4.5 Links to Other Variables

As the final step in the construction process of financial inclusion indices following the methodology of this chapter, the aggregated index values need to be linked with some specific variables. This final step is important for exploring the explanatory power of these constructed multidimensional indices. Hence, they can be used as a tool for benchmarking or a performance comparison. In doing so, we check the correlations of our constructed financial inclusion indices and the new proxy of financial inclusion with income and poverty measures separately to check each of their explanatory powers using scatter diagrams. The country-specific factors can be ranged as GDP per capita growth as the proxy of income growth and some specific poverty measures. Three different poverty measurements are used to explore the association of poverty with our financial inclusion indices in this chapter. These are income share held by the lowest 10% headcount poverty ratio, which is calculated at $2 a day as the percentage of population and the infant immortality rate.

In addition to these three proxies of financial inclusion, we explored the correlations of other financial institutions by taking the residuals from 'all financial institutions' variable to the 'formal financial institutions' variable. Taking this difference, we have the opportunity to

distinguish the impacts of other financial institutions, such as micro finance institutions separately.

2.4.6 Rank Correlations between Financial Inclusion Indices

After constructing the indices and exploring their explanatory powers, the steps of the OECD's index construction process are complete. However, in order to prove that the two constructed indices' results are consistent in terms of country ranks, we need to explore an additional analysis. In this sense, Kendall's index of rank concordance estimation is explored to show the consistency of ranks by the two constructed indices in this chapter.

Kendall's index of rank estimation is calculated as follows:

$$KI_t = \frac{Var[\sum_{t=1}^{T} AR(E)_{it}]}{Var[T * AR(E)_{i1}]}$$

where, $AR(E)_{it}$ represents the rank of *i*th country in year *t*. $AR(E)_{i1}$ is the rank of *i*th country in initial year, and T depicts the number of years that are used to construct the indices. The mechanism of the Kendall's rank concordance works similarly to the constructed indices in this chapter. Thus, the value of the index rank concordance ranges between zero and one. The values closer to one means there is perfect agreement between ranks.

2.5 Data: Indicator Sources and Definitions

2.5.1 Data Sources

Since financial inclusion policies have become important for policymakers, collecting such indicators for financial inclusion to gauge the levels of the financial system outreach has gained too much priority. As noted different organisations, have been established or regulated to explore sustainable financial inclusion policies for the poor.

Additionally, the United Nations' Capital Development Fund (UNCDF) published a 'Blue Book' for financial inclusion in 2005. In the meantime, the World Bank Group (WBG) explored Financial Access indicators, which are considered vital for measuring financial inclusion in an economy. These organisations together have led the G20 discussion of financial inclusion for households and SMEs to explore the importance of determining specific indicators to measure the degree of financial inclusion.

Similarly, with the Pittsburgh Summit in September 2009, which was organized by the CGAP and the IFC, the Financial Inclusion Experts Groups (FIEG) was launched. This group explores specific topics to develop broader financial inclusion in economies, such as specific innovative approaches, approving financial services, promoting successful regulatory and policy approaches, financial access, and literacy and consumer protection regulations. During those summits, participating economies are encouraged to publish financial inclusion data periodically. Moreover, they commit to improving the rates of financial inclusion policies. Since these commitments began in recent years, the best way to find data to analyse more indicators of financial inclusion is to start from 2004, as has been done in this paper.

While constructing multidimensional indices as composite indicators, we used various dimensions and indicators, such as the number of branches, deposit and loan accounts, the number of ATMs per million people and the amount of bank credits and deposits per capita, for the computation of the index. Therefore, these indices provide information on different perspectives of financial inclusion, such as outreach, availability, usage and the cost of banking services. Finally, the indices we constructed as single numbers contain information on these indicators and dimensions. If such indicators are applied individually, they just explore partial information on the significance of the system itself. Using these indicators individually may create deceptive results due to the interchangeable nature of some of these instruments, which can be alternatives for the others (Sarma, 2004).

The main problem of constructing such indices is data availability. Data from several sources for each dimension, as well as the indicators for 2004 to 2011, have been collected. The World Bank's 'World Development Indicators' and 'Global Financial Development' and the International Monetary Fund's International Financial Statistics and Financial Access Survey ' databases were used to obtain the data for the availability, accessibility, usage and cost dimensions of the indices.

The World Bank's World Development Indicators was used to obtain the country-specific factors, in order to explore the explanatory powers of the proxies of financial inclusion in this chapter. In order to collect the indicators of demographic and geographic bank accounts and ATM penetrations to construct the indices, the IMFs' International Financial Statistics and Financial Access Survey databases were used. Meanwhile, the World Bank's Global Financial Development Database was used to collect the bank cost income ratio, life insurance premium volumes relative to GDP per capita indicators for the construction of the indices, and private credits extended by deposit money banks and other financial institutions relative to GDP per capita factors, which is the proxy of financial development.

For the second index, the survey data collected by Beck et al. (2006a) were added to the first index indicators, which additionally included affordability, accessibility and the cost of banking services. Additionally, apart from the literature, a life insurance income ratio indicator was added to our index construction's method. By doing this, these new indices showed us the effect of adding more financial sector indicators to the construction of the financial inclusion index and gave us a chance to compare two indices. Due to the restrictions of the relevant survey, we performed the second index for only 58 countries and over two years.

The data that we aggregated from various sources of financial inclusion came with its own restrictions in terms of measuring the range of the financial system in the economy. Specific regulations of financial inclusion and general preferences, using financial services, such as cultural and religious reasons for using or avoiding some particular services for the economy, may lead to inconsistent measures of financial inclusion (Beck et al., 2009).

Since commercial bank-based indicators have been basically used without any consideration for other financial institutions, due to the vast literature and lack of access to such data for that kind of organisation, for the first index indicators, some countries' scores may lead to inconsistencies. For instance, using financial services from microfinance institutions and other formal and informal financial organisations is common in South Asian countries, such as Bangladesh, Malaysia and India. Moreover, in terms of the account penetration, many individuals and firms may have more than one account, thus leading to inconsistent results for index scores as well.

Furthermore, fees and charges of the same financial services may be different. This is because service qualities differ, and not only due to the pricing strategies across countries for the second index. However, this data still helps us to explore the extent of financial inclusion and causes of financial exclusion, and it can provide some hints to removing the barriers of access. Surveys of individuals, firms and sub-groups are considered the best data for measuring the extent of the financial system. Hence, the second index, in which we used the survey by Beck et al. (2006a), would be a good measure of financial inclusion in terms of the data limitations.

2.5.2 The Dimensions and Indicators

This section presents the dimensions and indicators of the indices that were used by us in this paper. Tables 2.11a and 2.11b show a detailed list of these indicators and descriptive statistics for them. In addition, Figures, 2.2 through to 2.16 show a graphic explanation of the variations in terms of the World Bank income classification. Moreover, Tables 2.12a and 2.12b present correlations across all indicators. Three service dimensions, outreach, usage and cost

dimensions, distinguish the first index. The outreach dimension includes the demographic and geographic branch and ATM penetrations, and deposit and credit accounts usage.

Usage dimension encompasses the credit and deposit ratios as a share of income, while the life insurance usage is as the share of income indicators. Finally, the cost dimension refers to the affordability, in terms of minimum balances and fees, which the customers face during use of financial services. Additionally, ease dimension was added to the second index construction, while the new indicators were added to the cost dimension, as illustrated in Table 2.11b.

Table 2.11a Indicators of the first index descriptive statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
Demographic ATM penetration	35.078	42.104	0.01	280.54	N = 1432
		41.218	0.114	240.529	n = 179
		9.065	-16.43	120.266	T = 8
Demographic branch penetration	17.818	18.9	0.29	126.1	N = 1432
		18.657	0.413	112.803	n = 179
		3.291	-7.842	50.54	T = 8
Geographic ATM penetration	41.584	98.005	0.01	997.46	N = 1424
		97.548	0.065	926.343	n = 178
		11.667	-49.69	142.363	T = 8
Geographic branch penetration	23.915	60.136	0.01	612.86	N = 1432
		60.175	0.023	593.698	n = 179
		3.608	-4.213	61.417	T = 8
Deposit accounts per capita	397.633	275.138	2.32	999.52	N = 987
		280.971	12.258	999.52	n = 136
		77.348	49.931	800.442	T = 7.257
Credit accounts per capita	64.265	57.922	0.15	340.93	N = 1432
		56.397	4.191	317.135	n = 179
Credit income ratio	51.873	61.256	0.12	521.07	N = 1432
		60.125	0.35	487.721	n = 179
		12.448	-36.23	157.874	T = 8
Deposit income ratio	62.054	78.347	3.19	875	N = 1432
		77.578	6.764	769.044	n = 179
Life insurance premium volume income ratio	1.702	78.347	3.19	875	N = 1432
		77.578	6.764	769.044	n = 179
Bank cost – income ratio	56.792	24.477	12.79	558	N = 1432
		13.748	25.939	117.925	n = 179

2.5.2.1 Outreach Dimension

The indicators of demographic and geographic branch, ATM penetrations and deposit and credit accounts usage were all used under this dimension. These indicators refer to physical access information for individuals and firms. In terms of the demographic and geographic penetrations, we used ATMs and bank branches per 100,000 adults and per 1000 km^2 respectively. These indicators might be considered as proxies of the distance of customers from their nearest physical bank and ATM outlets. The higher the geographic penetration, the lower the distance and the easier the geographic access (Beck et al., 2005). Similarly, the demographic penetration indicators are the proxy for the average number of clients served by bank outlets. Hence, the higher the demographic penetration, the fewer the potential customers per branch and ATMs are and, therefore, the easier the access will be (Beck et al., 2005).

Table 2.11b Additional indicators of the second index descriptive statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
Locations to open deposit accounts	2.25	0.4	1.21	3.24	N = 116
		0.37	1.38	3.12	n = 58
		0.16	1.81	2.69	T = 2
Locations to submit loan application	3.4	1.02	1.77	5.4	N = 116
		1	2.02	5.2	n = 58
		0.19	2.98	3.83	T = 2
Minimum amount to open checking account	14.51	25.97	0.01	117.43	N = 116
		26.07	0.02	116.91	n = 58
		0.68	11.77	17.26	T = 2
Minimum amount to open savings account	8.71	14.3	0.01	69.12	N = 116
		14.36	0.02	68.69	n = 58
		0.21	7.95	9.47	T = 2
Minimum amount to be maintained checking account	3.89	8.35	0.01	56.09	N = 116
		8.37	0.02	55.99	n = 58
		0.56	-0.1	7.88	T = 2
Minimum amount to be maintained savings account	6.63	12.37	0.01	65.03	N = 116
		12.42	0.02	64.89	n = 58
		0.26	5.73	7.53	T = 2
Minimum amount consumer loans	49.72	71.15	0.11	331.21	N = 116
		71.46	0.17	330.88	n = 58
		0.32	49.1	50.34	T = 2
Minimum amount SME loans	470.95	755.26	4.96	3696.58	N = 116
		758.57	5.42	3696.58	n = 58
		0.51	469.38	472.53	T = 2
Number of documents to open checking account	2.66	1.04	1	4.99	N = 116
		1.03	1	4.7	n = 58
		0.18	2.26	3.06	T = 2

Table 2.11b continued…

Number of documents to open savings account	2.19	0.85	1	4.57	N = 116
		0.84	1	4.57	n = 58
		0.15	1.73	2.65	T = 2
Days to process consumer loan applications	4.22	3.59	0.73	21.43	N = 115
		3.59	0.87	21.07	n = 58
		0.27	3.18	5.27	T = 1.98
Days to process SME loan applications	10.56	8.69	1	43.26	N = 116
		8.73	1	43.19	n = 58
		0.22	10.04	11.07	T = 2
Annual fees savings account	0.6	0.76	0.01	3.65	N =116
		0.76	0.02	3.64	n = 58
		0.06	0.27	0.93	T = 2
Annual fees checking account	3.29	6.12	0.01	27.54	N =116
		6.14	0.03	27.09	n = 58
		0.12	2.83	3.74	T = 2
Fees consumer loans	3.73	4.81	0.15	25.35	N = 116
		4.82	0.34	24.93	n = 58
		0.32	2.57	4.89	T = 2
Fees SME loans	3.07	5.45	0.15	31.35	N =116
		5.46	0.2	30.34	n = 58
		0.42	1.07	5.07	T = 2
Cost to transfer funds internationally	6.67	3.86	0.12	22.42	N = 116
		3.85	0.53	21.21	n = 58
		0.4	5.46	7.88	T = 2
Fees ATM cards	0.16	0.14	0.01	0.7	N = 116
		0.13	0.02	0.65	n = 58
		0.05	-0.02	0.34	T = 2

Additionally, Figures 2.2 and 2.3 illustrate that demographic and geographic ATMs and branch penetrations increase with the level of the economic wellbeing. According to these figures, demographic branch and ATM penetrations are highest within the high-income OECD member economies. On the other hand, geographic branch and ATM penetrations are at their highest within non-OECD high-income countries. Moreover, in terms of account penetrations, deposit and loan accounts are used per 1000 adults for an economy. Figures 2.4 and 2.5 clearly illustrate that deposit and loan accounts and per capita levels tend to go up with economic growth levels across the world.

As can be seen from the graphs, policymakers need to consider their policy agendas in light of these circumstances. Since demographic and geographic branches and ATM penetrations are lowest in low-income countries, these regions need expansionist policies to combat financial exclusion. In relatively poor regions, the main barriers are physical distance and cost of services. Exploring technological and other innovations would help to deal with distance

barriers for people. Furthermore, reducing documentation requirements, the fees of financial services especially for small transactions, withdrawal charges and balance fees are also the best solutions for such regions in making formal financial services more attractive (Beck, Demirguc-Kunt and Honohan, 2009).

Figure 2.2 Indicators of the first index – demographic branch and ATM penetrations

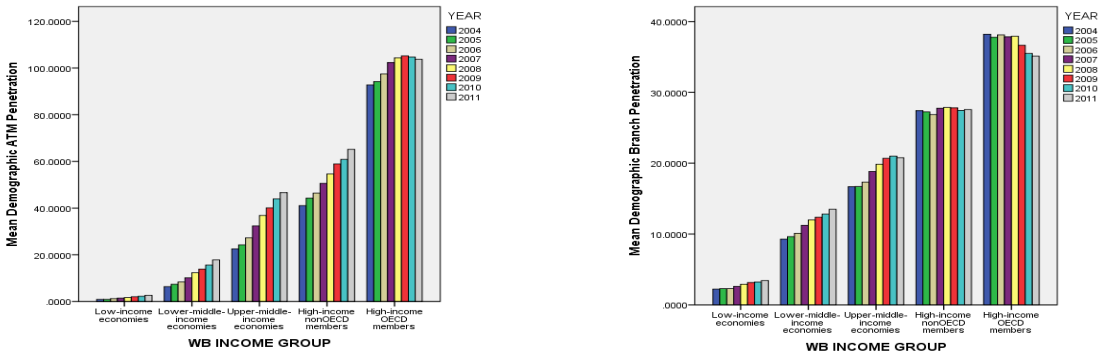
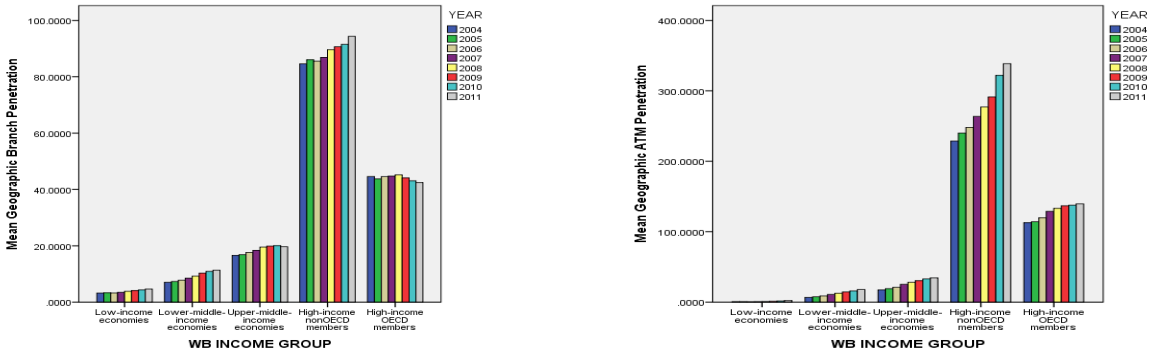


Figure 2.3 Geographic branch and ATM penetrations



2.5.2.2 Usage Dimension

Usage dimension encompasses credit and deposit ratios as the share of income indicators. However, in contrast to studies in the literature, life insurance usage as a share of income indicator is added to the index construction to obtain a broader measurement of the access. The main focus is on bank deposits and loans in terms of the use banking services, as they are mainly the services that banks offer across countries, and it is easy to gather information across the world.

Several new indicators have been added to the second index, such as the usage of banking services for 58 countries, while the data for the first index indicators for 178 countries has been meticulously researched and concisely gathered. All of the indicators along with their correlations are shown in Table 2.11b and 2.12b for the second index. Moreover, Figures 2.4, 2.5 and 2.6 accurately and graphically explain the variations of such indicators in terms of the World Bank income classification. The higher levels of the number of deposit and loan usage refer to broader usage of banking services. However, if they are likely to serve only wealthier individuals and larger enterprises, this may cause a limitation in the use of banking services (Beck et al., 2005). Figures 2.4, 2.5 and 2.6 indicate that deposit and credit income ratios and the usage of the life insurance levels increase with economic development levels across the world. Accordingly, credit income ratio and usage of life insurance indicators are at their highest in non-OECD high-income economies, while deposit income ratios tend to be at their peak in OECD member high-income countries.

According to the graphs, usage of financial services is lowest in relatively poor countries. Therefore, specific attention needs to be paid to these regions by policymakers to boost financial inclusion levels. It is believed that provision of information infrastructures are the main requirement of low-income countries, while enforcement of credit rights are the most important policy needed in high-income countries (Beck, Demirguc-Kunt and Honohan, 2009). Moreover, developing broader competition and openness are amongst the main mechanisms for establishing greater access to financial services. This will encourage various institutions to join the financial system and seek to implement profitable financial services using new information technologies (Claessens, Demirguc-Kunt and Huizinga, 2001; Claessens and Laeven, 2004).

Figure 2.4 Deposit and credit accounts per capita

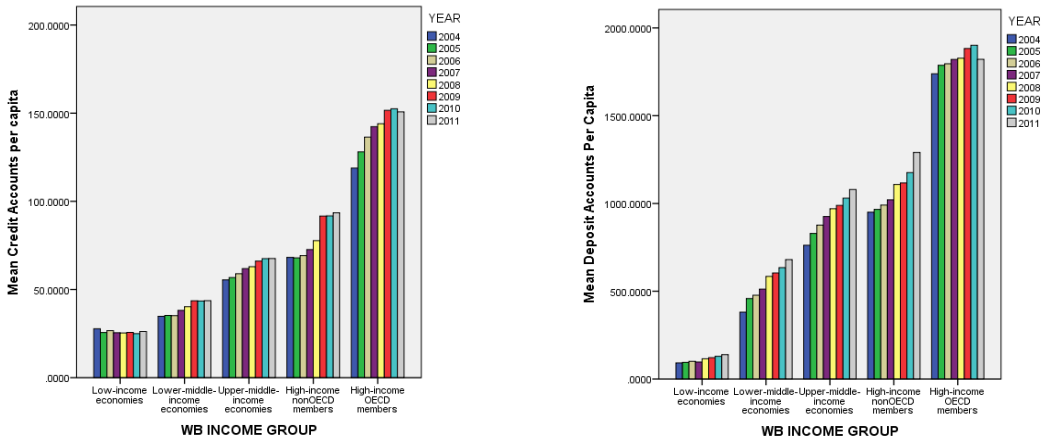
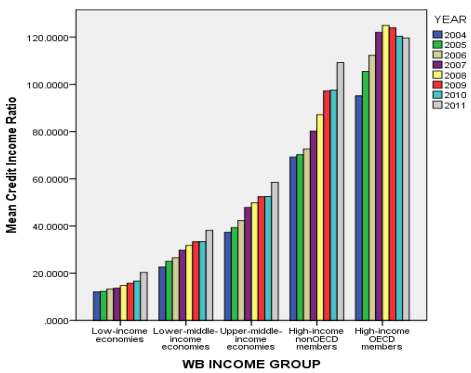


Figure 2.5 Deposit and credit income ratios



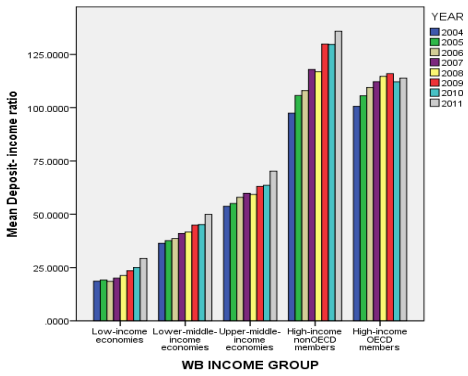
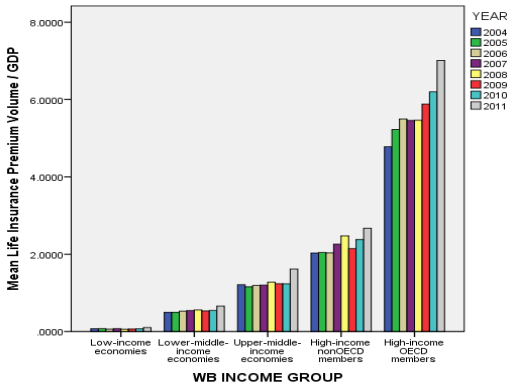


Figure 2.6 Life insurance premium volumes



2.5.2.3 Cost Dimension

Cost dimension has only one indicator in terms of the first index construction, while it has six new indicators for the second index. The banking cost-to-income ratio (%), which is calculated as the total costs as a share of total income of all commercial banks, is the only cost indicator for the first index. As illustrated in Figure 2.7, it is at the highest point in low-income countries, while it is at its lowest in OECD member high-income economies. Accordingly, this ratio decreases with the wellbeing of such an economy. Intuitively, higher rates of banking cost-income ratio levels are inversely related with the levels of economic growth. On the other hand, annual fees savings and checking accounts are relative to GDP per capita, consumer fees and SME loan fees, which are calculated as a percentage of a minimum loan amount, the cost to make international transfers, which is calculated as the percentage of $250 USD, while fees for ATM cards are the new indicators of the second index, as can be seen from Table 2.11b.

Those indicators of cost dimension primarily measure the affordability of banking services around the world. Additionally Figures 2.8 through to 2.10 show the variations of such indicators in terms of the World Bank income classification. As presented by the figures, with

some exceptions, most of the cost indicators decrease with the level of economic growth in such economies. In contrast, consumer fees and SME loan fees are relatively higher in upper middle-income economies and high-income OECD member economies respectively.

In general, policies that eliminate bureaucratic, physical and financial barriers can help to boost the usage of financial services. However, these barriers vary across countries and regions. In relatively poor regions, the main barriers are physical distance and cost of services. Exploring technological and other innovations would help to deal with distance barriers for people. Furthermore, reducing documentation requirements, the fees for financial services –especially for small transactions – withdrawal charges and balance fees would also be the best solutions for such regions to make formal financial services more attractive (Demirguc-Kunt and Klapper, 2012)

Figure 2.7 Bank cost-income ratios

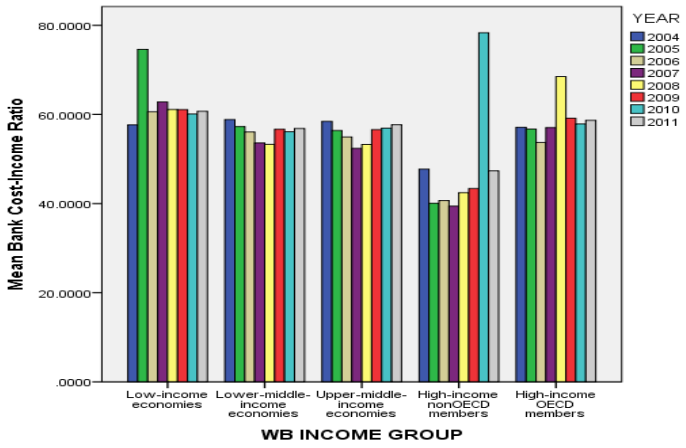


Figure 2.8 Annual fees savings and checking accounts

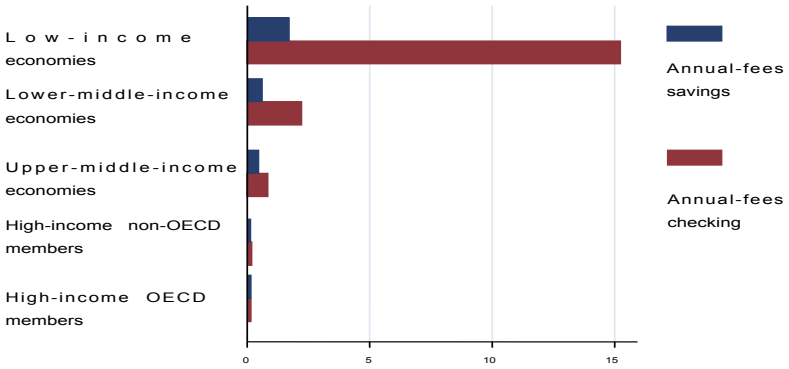


Figure 2.9 Consumer loan fees and SME loan fees

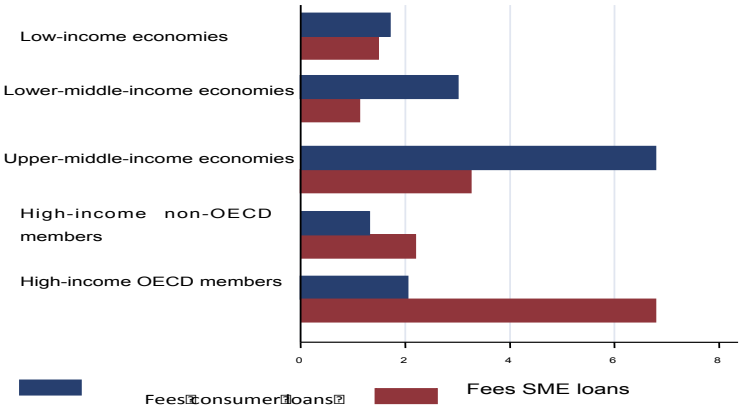
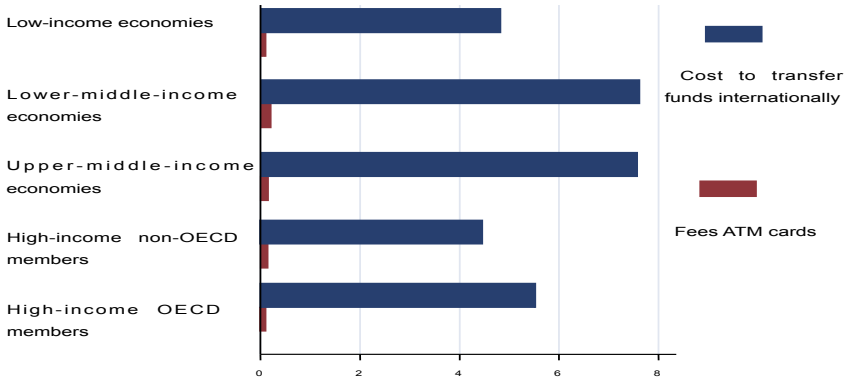


Figure 2.10 Cost to transfer funds internationally and fees for ATM cards



2.5.2.4 Ease (accessibility and eligibility) dimension

Customers can face barriers in using the banking services in regard to finding any outlet to open such accounts without visiting the local branches or the non-branch offices. In the literature, this term is called physical access barriers. Locations to open deposit accounts and submit loan applications indicators are used to measure physical access. There are three options for a place to open or apply for those accounts, such as the headquarters only (1), at headquarters or a branch (2), and at headquarters, branches or a non-branch office (3). Hence, indicators take a value from 1 to 3 based on the place of application (Beck et al., 2006b).

The minimum balances required for opening, checking and saving accounts, and a minimum amount for consumer and SME loans relative to GDP per capita, are indicators, implying the affordability of banking services across countries. On the other hand, the number of documents required for opening, checking and saving accounts, and the number of days to process consumer and SME loan applications are indicators, implying the eligibility of banking services.

Banks demand various verifications for identification to open any account around the world; some of them require more than identification documents (Beck et al., 2006b). In order to measure the different aspects of a banking system, such as accessibility, affordability and eligibility of the banking services, it is necessary to add these indicators to the index construction process.

As explained above, the locations where deposit accounts can be opened and loan applications can be submitted, the minimum amount required for opening checking and savings accounts relative to GDP, the minimum amount to help maintain checking and savings accounts relative to GDP, the minimum amount for consumer and SME loans per capita, the number of documents for opening checking and saving accounts, which are calculated on an out-of-five basis, and, finally, the number of days to process consumer and SME loan applications are all considered the indicators of ease dimension for the second index.

Table 2.11b contains the descriptive statistics of those indicators explained above, while Table 2.12b shows the correlations between them. Similarly, Figures 2.11 through to 2.15 graphically show the variations of such indicators in terms of the World Bank income classification. As can be seen from the figures, except for the locations for opening deposit accounts and submitting loan applications, all of the other cost indicators decrease with the level of economic growth in such economies. They are all typically at their highest levels in low-income economies. In contrast, the locations for opening deposit accounts and submitting loan applications are the highest in the non-OECD high-income economies, which can be expected from an economic perspective.

Figure 2.11 Additional indicators of the second index- locations to open deposit accounts and locations to submit loan application

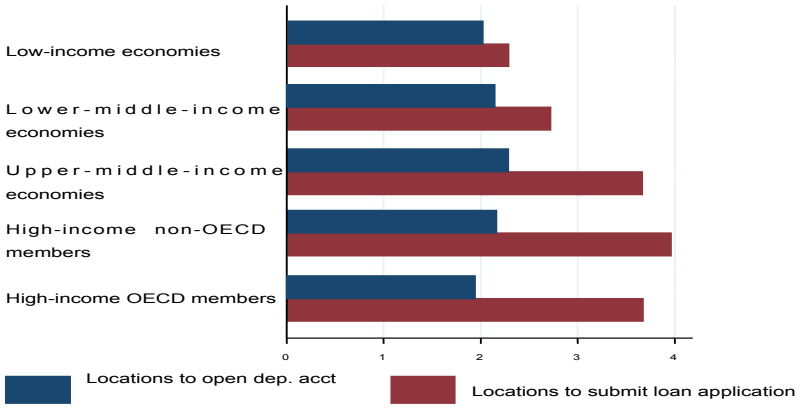


Figure 2.12 Minimum amount consumer and SME loans, and to open checking and savings accounts

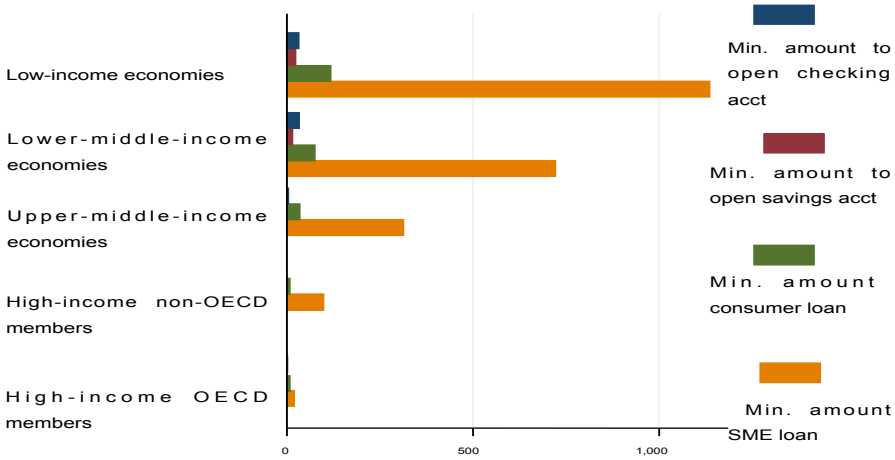


Figure 2.13 Minimum amounts to be maintained savings and checking accounts

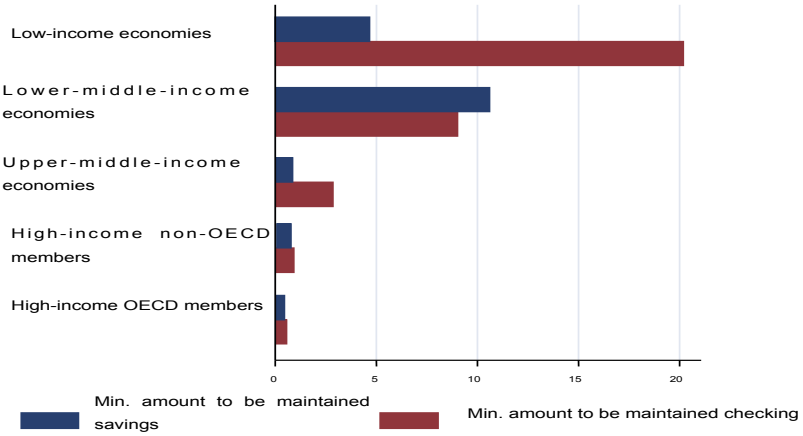


Figure 2.14 Number of documents to open checking and savings accounts

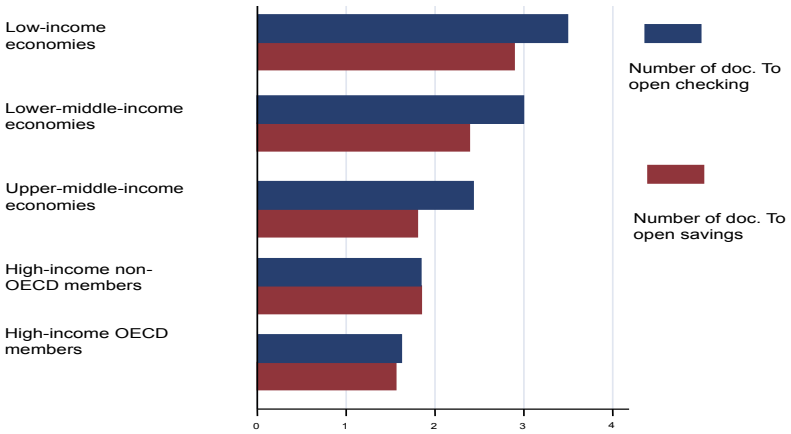
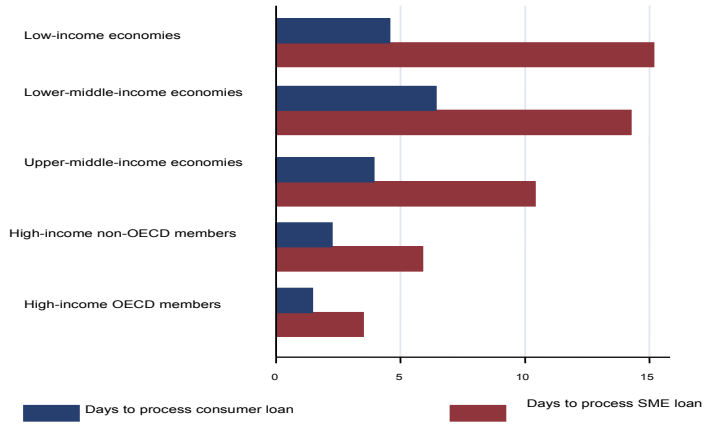


Figure 2.15 Days to process consumer and SME loan applications

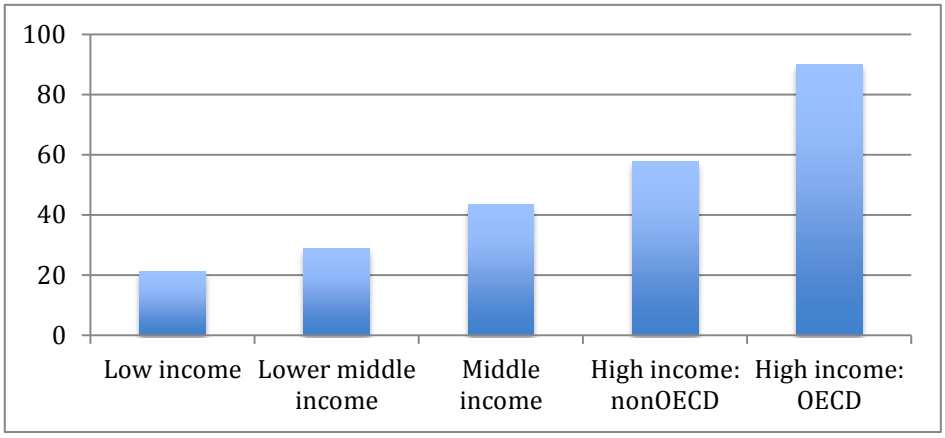


Similar to the previous dimensions, income classifications for each indicator help policymakers to shape their agendas to combat financial exclusion. They might build specific regulations to attract usage of financial services. For instance, studies show that technological innovations help to expand the usage of financial services. For instance, the supply of mobile money in Sub-Saharan Africa expanded the participation in financial services. Hence, it is believed that mobile money and informal savings clubs, which can be used outside the financial system, are good mechanisms to reach people who tend to use informal financial tools (Demirguc-Kunt and Klapper, 2012).

2.5.3 The New Proxy of Financial Inclusion: 'Accounts at All Financial Institutions'

After constructing two indices for the proxy of financial inclusion using commercial bank-based financial access indicators, a new proxy for financial inclusion, which contains financial access measures from other financial institutions, is implemented. This new proxy is necessary to perform a consistent analysis of financial inclusion. Using commercial bank-based financial access indicators only in measuring financial inclusion may lead to some inconsistencies for some specific countries in terms of their financial access levels. For instance, countries like Bangladesh, Malaysia and India predominantly have other financial institutions rather than commercial banks in their financial systems. Therefore, it is necessary to include all financial institutions in the financial inclusion process to get a broader measurement of financial access levels.

Figure 2.16 Income group classifications of all financial institutions indicator



An additional analysis is performed to add the effects of financial services from other financial institutions in terms of the financial access levels of relevant countries. This new proxy is a single indicator that covers financial access levels from other financial institutions, apart from commercial banks. Because of the data constriction, this new data cover only one year for 143 countries. In order to explore the effects of considering financial access indicators from other financial institutions in the financial inclusion measurement for relevant countries, 'Account at a formal financial institution (% age 15+)' indicator is used as the new proxy for financial inclusion. This new indicator was extracted from the World Bank's Global Financial Inclusion 2011 (Global Findex) database.

This new indicator has consistent information with the indicators that are used to construct the indices in terms of countries' income classifications (see Figure 2.16). Other financial institutions, such as micro finance institutions, cooperatives, credit unions and post office services, have higher volumes of account values in high-income countries.

2.5.4 Links to Other Country-Specific Factors

As was explained above, the constructed financial inclusion indices are tested in terms of their explanatory powers as the last step of index construction process. In doing so, the association between these indices and income and poverty measures of countries are explored. These measures can be ranged as GDP per capita growth as the proxy of income growth and income share held by the lowest 10%, the headcount poverty ratio, which is calculated at $2 a day as a percentage of population, and infant immortality rate as the poverty measures. These variables were constructed from the World Bank's World Development Indicators database.

2.6 Empirical Findings

2.6.1 Imputation of Missing Data

After determining the dimensions and the indicators of these dimensions, the imputation of the missing data procedure was performed on the collected data of the financial inclusion indices by using a single imputation method, as described before. This step is essential for providing a completely integrated dataset and to discuss the presence of the outliers existing within it (OECD, 2008). Briefly, the missing parts or gaps of the data have been filled. Unconditional means of imputation are used by means of a single imputation method to determine the missing values in terms of the world bank-income group classification and the relevant years for the dataset.

2.6.2 Multivariate Analysis

At the next stage, a multivariate analysis is performed by using the Principal Component Analysis to compare the statistically determined structure of the data set and discuss the possible differences between the two indices, as described above. There are specific requirements and steps for the PCA, such as 'the appropriateness of sample size, the presence of substantial correlations, the sampling adequacy of individual variables, the sampling adequacy used for setting the variables, by checking Kaiser-Meyer-Olkin measure of sampling adequacy, Bartlett test of sphericity, the latent root criterion for the number of factors to extract, the percentage of variance criterion, evaluating communalities, and finally the cumulative percent of the variance explained' (Hair et al., 2009, p.120). The detailed results of those steps of the PCA are set out as follows:

In order to satisfy the requirements, the individual indicators are first normalised, to be all set on the same scale. As the indicators used in both indices get to increase greatly in number, the second requirement, which requires that the sample size of the data set must be appropriately greater than 50, is typically fulfilled.

The correlation matrices of the individual indicators of the indices are presented in in Tables 2.12a and 2.12b. There are more indicators with high correlation matrices. Therefore, the indices' indicators properly meet the next requirement, which implies that the correlation matrix for the indicators must contain two or more correlations of 0.30 or greater. As shown in Table 2.12a, almost all variables are positively and significantly correlated with each other, except for the bank cost-income ratio. The highest correlation is found between the private credit-income ratio and the credit accounts per capita indicators, with a coefficient value of 0.89.

Table 2.12a Correlation coefficients of the first index indicators

	1	2	3	4	5	6	7	8	9	10
Demog ATM Pnt	1									
Demog Branch Pnt	0.59*	1								
Geog ATM Pnt	0.26*	0.10*	1							
Geog Branch Pnt	0.24*	0.33*	**0.84***	1						
Dep Acct Per Cpt	0.62*	0.45*	0.34*	0.41*	1					
Crdt Acct per Cpt	**0.67***	0.60*	0.19*	0.33*	0.58*	1				
Credit Income Ratio	0.52*	**0.64***	0.21*	0.37*	0.37*	**0.69***	1			
Deposit- income ratio	0.35*	0.52*	0.19*	0.39*	0.25*	0.53*	**0.88***	1		
Life Insr/ GDP	0.47*	0.41*	0.23*	0.31*	0.32*	0.49*	0.70*	**0.69***	1	
Bank Cost-income	0.0004	-0.01	-0.029	-0.005	0.028	0.012	-0.017	-0.027	-0.04	1

*p<0.05

The correlations between the deposit income ratio – the credit income ratio and the geographic branch penetration – geographic ATM penetration follow the values of 0.88 and 0.84 respectively. As argued by Saci and Holden (2008), for the measurement of financial development, the indicators can provide redundant information, due to the high correlation between them. However, the correlations for the second index indicators are not too high. Also, many of these indicators are not significantly correlated with each other, in contrast with the first one.

Despite the fact that the indicators of the second index correlations are not strong, they still meet the correlation requirement of the Principal Component Analysis, which indicates that the correlations must be greater than the value 0.30. While most of the indicators are strongly correlated with each other in the first index, there will be a risk of a multicollinearity problem, which can lead to certain misleading inferences. However, measuring a comprehensive index and using a PCA will overcome this issue.

We performed the Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett test of sphericity, as the next requirements, which suggest that the KMO must be greater than 0.50 and that the Bartlett test must be statistically significant. This step is significant in order to measure whether the sample sizes of the indicators of the indices are adequate for the analysis. The Measure of Sampling Adequacy (MSA) is considered sufficient if the value is 0.90 or higher, meritorious if it is at the 0.80s, middling if it is in the 0.70s, mediocre if it is in the 0.60s, miserable if it is in the 0.50s, and unacceptable if the value is below 0.50 (Hair et al., 2009).

As illustrated in Table 2.13, the results for the indices are as follows: the overall Measure Of Sampling Adequacy (MSA) for the set of variables included in the analysis is meritorious for the first index value, that is 0.833, and the middling value of the second index is measured as 0.752. In each measurement, the indicators that do not satisfy the requirements must be eliminated. In doing so, of the indicators that have MSA values, less than 0.50 have to be crossed out.

Table 2.12b Correlation coefficients of the second index indicators

	1	2	3	4	5	6	7	8	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Demographic ATM penetration	1.00																										
Demographic branch penetration	0.59	1.00																									
Geographic ATM penetration	0.27	0.67	1.00																								
Geographic branch penetration	0.46	0.30	0.62	1.00																							
Deposit accounts per capita	0.62	0.79	0.62	0.49	1.00																						
Credit accounts per capita	0.54	0.57	0.35	0.43	0.58	1.00																					
Credit income ratio	0.70	0.60	0.44	0.58	0.73	0.77	1.00																				
Deposit income ratio	0.48	0.33	0.41	0.68	0.53	0.68	0.78	1.00																			
Life insurance / GDP	0.30	0.55	0.46	0.28	0.54	0.63	0.61	0.34	1.00																		
Locations to open deposit accounts	-0.19	-0.05	-0.10	-0.16	-0.16	-0.14	-0.18	-0.21	-0.07	1.00																	
Locations to submit loan application	0.41	0.50	0.20	0.21	0.43	0.54	0.42	0.31	0.35	0.16	1.00																
Minimum amount to open checking accounts	-0.38	-0.37	-0.19	-0.21	-0.43	-0.41	-0.38	-0.30	-0.26	-0.08	-0.46	1.00															
Minimum amount to open savings accounts	-0.36	-0.39	-0.19	-0.19	-0.45	-0.32	-0.37	-0.20	-0.26	-0.08	-0.41	0.64	1.00														
Minimum amount maintaining checking accounts	-0.26	-0.28	-0.14	-0.14	-0.32	-0.26	-0.25	-0.18	-0.18	-0.07	-0.33	0.62	0.58	1.00													
Minimum amount maintaining saving accounts	-0.32	-0.33	-0.16	-0.15	-0.39	-0.26	-0.32	-0.14	-0.22	-0.13	-0.35	0.56	0.93	0.61	1.00												
Minimum amount consumer loan	-0.36	-0.40	-0.20	-0.18	-0.47	-0.29	-0.32	-0.15	-0.29	-0.02	-0.49	0.36	0.44	0.23	0.44	1.00											
Minimum amount SME loan	-0.30	-0.37	-0.17	-0.06	-0.41	-0.25	-0.29	-0.12	-0.27	0.00	-0.44	0.28	0.41	0.18	0.28	0.44	1.00										
Number of documents to open checking accounts	-0.47	-0.40	-0.18	-0.10	-0.50	-0.26	-0.36	-0.25	-0.24	0.01	-0.07	0.41	0.40	0.23	0.40	0.32	0.34	1.00									
Number of documents to open saving accounts	-0.32	-0.29	-0.14	0.04	-0.35	-0.08	-0.25	-0.09	-0.13	-0.12	-0.09	0.33	0.39	0.18	0.40	0.24	0.42	0.77	1.00								
Days consumer loan	-0.08	-0.08	-0.04	-0.04	-0.10	-0.05	-0.04	-0.03	-0.04	0.17	0.01	0.00	0.23	-0.01	0.27	0.19	-0.03	0.12	0.09	1.00							
Days SME loan	-0.33	-0.42	-0.24	-0.14	-0.46	-0.31	-0.33	-0.17	-0.34	-0.02	-0.37	0.14	0.05	0.11	0.02	0.39	0.43	0.31	0.26	-0.05	1.00						
Annual fees for savings accounts	-0.39	-0.40	-0.19	-0.18	-0.48	-0.25	-0.33	-0.14	-0.21	-0.03	-0.32	0.43	0.60	0.28	0.62	0.57	0.57	0.50	0.46	0.23	0.12	1.00					
Annual fees for checking accounts	-0.38	-0.36	-0.19	-0.18	-0.42	-0.32	-0.35	-0.27	-0.22	-0.14	-0.44	0.48	0.64	0.15	0.65	0.54	0.48	0.47	0.49	0.15	0.18	0.77	1.00				
Fees for Consumer Loan	-0.18	-0.09	-0.08	-0.11	-0.15	-0.17	-0.17	-0.20	-0.09	0.19	0.25	-0.01	-0.01	0.09	0.04	-0.12	-0.11	0.25	-0.04	-0.03	-0.03	-0.03	-0.07	1.00			
Fees for SME loan	0.08	0.22	0.06	0.03	0.24	0.09	0.21	0.14	0.11	0.10	0.37	-0.13	-0.11	-0.08	-0.08	-0.18	-0.20	-0.10	-0.04	-0.02	-0.14	-0.14	-0.13	0.28	1.00		
Cost of International transfers	-0.15	0.02	-0.04	-0.12	-0.17	-0.05	-0.12	-0.05	-0.06	0.14	0.28	0.12	0.04	0.19	0.09	0.02	-0.13	0.08	0.13	0.05	0.01	0.05	-0.08	0.35	0.42	1.00	
Fees for ATM	-0.17	-0.06	-0.03	-0.18	-0.13	-0.10	-0.17	-0.17	0.07	0.10	0.15	0.07	-0.07	-0.05	-0.13	0.03	-0.11	0.12	0.05	0.02	0.11	-0.02	-0.16	0.11	-0.05	0.13	1.00

Note: Marked variables are statistically significant at $p < 0.05$

As seen in Tables 2.14a and 2.14b, the bank cost-income ratio and the geographic ATM penetration indicators from the analysis of the first index are removed, as they cannot meet the KMO requirement. Similarly, in terms of the KMO requirement, the consumer loan fees, international transfer costs and ATM card fees indicators are removed from the analysis of the second index.

Table 2.13 Results of KMO and Bartlett's test
1st Index

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.833
Bartlett's Test of Sphericity	Approx. Chi-Square	6988.656
	df	21
	Sig.	0.000

2nd Index

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.752
Bartlett's Test of Sphericity	Approx. Chi-Square	2312.665
	df	276
	Sig.	0

The next requirement is that the probability associated with Bartlett's Test of Sphericity must be less than the level of significance. In this regard, as seen in Table 2.13, the probability associated with Bartlett's test is found to be $p<0.001$, which meets this requirement for both indices.

Another requirement involves evaluating the communalities, which indicates that the variables that are less than 0.50 must be removed from the analysis.[13]This step is the first adjustment that is made to the factor solution. If there are any variables that have a communality value that is less than 0.50, the variable with the lowest communality needs to be extracted, and the PCA needs to be re-calculated (Hair et al., 2009). As seen Tables 2.15a and 2.15b, for the first index,

[13] 'The communalities represent the proportion of the variance for all of the variables, included in the analysis that is explained or accounted for by the components in the factor solution. The derived components should explain at least half of each original variable's variance. Therefore, the communality value for each variable must be 0.50 or higher' (Baum, 2006, p.135).

the geographic branch penetration indicator does not meet this requirement. Hence, it has been crossed out from the analysis. Similarly, for the second index, SME loan fees indicator is removed from the analysis in terms of the communalities requirement.

Table 2.14a The MSA values of the first index (The overall measure of sampling adequacy)

The KMO measures of sampling adequacy (MSA)	
Demographic ATM penetration	0.727
Demographic branch penetration	0.758
Geographic ATM penetration	0.474
Geographic branch penetration	0.554
Deposit accounts per capita	0.872
Credit accounts per capita	0.866
Credit income ratio	0.772
Deposit income ratio	0.745
Life insurance / GDP	0.917
Bank cost income raito	0.283

Note: Variables that have MSA values less than .50 will be removed from the model

Finally, the most important indicators for the indices are clearly explained at the end of this analysis. In order to gauge the importance of the indicators that remain after all those requirements above are fulfilled, the coefficient scores of the rotated factor loadings corresponding to the indicators of the financial inclusion indices have been carefully checked. The highest factor loadings associated with each indicator are highlighted. The indicators with the highest scores on Factor 1 are considered the most important ones.

Therefore, the indicators of the highest scores on Factor 2 are considered secondary important indicators and so forth. As shown in Table 2.16a, a credit income ratio, deposit- income ratio and a life insurance premium volume/GDP are the primary indicators for the computation of the first financial inclusion index.

Table 2.14b The MSA values of the second index

The KMO measures of sampling adequacy (MSA)	
Demographic ATM penetration	0.727
Demographic branch penetration	0.758
Geographic ATM penetration	0.474
Geographic branch penetration	0.554
Deposit accounts per capita	0.872
Credit accounts per capita	0.866
Credit income ratio	0.772
Deposit income ratio	0.745
Life insurance / GDP	0.917
Locations to open deposit accounts	0.559
Locations to submit loan application	0.777
Minimum amount to open checking accounts	0.766
Minimum amount to open savings accounts	0.692
Minimum amount maintaining checking accounts	0.609
Minimum amount maintaining saving accounts	0.639
Minimum amount consumer loan	0.881
Minimum amount SME loan	0.624
Number of documents to open checking accounts	0.646
Number of documents to open saving accounts	0.608
Days consumer loan	0.744
Days SME loan	0.678
Annual fees for savings accounts	0.74
Annual fees for checking accounts	0.734
Fees for consumer loan	0.422
Fees for SME loan	0.613
Cost to international transfers	0.439
Fees of ATM cards	0.309

Note: Variables that have MSA values less than .50 will be removed from the model

Table 2.15a The communality values of the first index

	Extraction
Demographic ATM penetration	0.739
Demographic branch penetration	0.606
Geographic branch penetration	0.277
Deposit accounts per capita	0.784
Credit accounts per capita	0.729
Credit income ratio	0.9
Deposit income ratio	0.898
Life insurance / GDP	0.692

Extraction Method: Principal component analysis

Note: Variables that have MSA values less than .50 will be removed from the model

On the other hand, the demographic ATM penetration, the demographic branch penetration, the deposit accounts per capita and the credit accounts per capita are the indicators of secondary importance for the first index. In contrast to those indicators above, the geographic ATM penetration, the bank cost-income ratio and the geographic branch penetration were discovered to be the less important indicators for the first index construction.

Similarly, as illustrated in Table 2.16b for the second index, most of the indicators are primary ones for the construction of the index, except for the geographic branch penetration, which is considered to be of secondary importance as an indicator. In contrast to these results, consumer loan fees, fees for ATM cards and the cost of international transfers indicators are found to be of the least importance. To conclude, the indicators of the cost dimension are typically less important for both indices.

Table 2.15b The communality values of the second index

Demographic ATM penetration	0.679
Demographic branch penetration	0.778
Geographic ATM penetration	0.89
Geographic branch penetration	0.711
Deposit accounts per capita	0.818
Credit accounts per capita	0.739
Credit income ratio	0.872
Deposit income ratio	0.82
Life insurance / GDP	0.551
Locations to open deposit accounts	0.627
Locations to submit loan application	0.781
Minimum amount to open checking accounts	0.701
Minimum amount to open savings accounts	0.866
Minimum amount maintaining checking accounts	0.792
Minimum amount maintaining saving accounts	0.878
Minimum amount consumer loan	0.678
Minimum amount SME loan	0.588
Number of documents to open checking accounts	0.852
Number of documents to open saving accounts	0.853
Days consumer loan	0.617
Days SME loan	0.718
Annual fees for savings accounts	0.823
Annual fees for checking accounts	0.832
Fees for SME loan	0.516

Extraction Method: Principal component analysis

Note: Variables that have MSA values less than .50 will be removed from the model

Table 2.16a The coefficient scores of the rotated factor loadings for the first index
*(Determining the importance of the indicators)

Indicators	Components	
	1	2
Demographic ATM Penetration	.273	**.836**
Demographic Branch Penetration	.487	**.615**
Deposit Accounts Per Capita	.063	**.871**
Credit Accounts per capita	.478	**.720**
Credit Income Ratio	**.883**	.357
Deposit- income ratio	**.934**	.148
Life Insurance Premium Volume/ GDP	**.800**	.240

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Table 2.16b The coefficient scores of the rotated factor loadings for the second index
*(Determining the importance of the indicators)

	Component						
	1	2	3	4	5	6	7
Demog_Brnch_Pent	**-.709**	.197	.018	-.198	-.108	-.105	-.273
Demog_ATM_Pnt	**-.764**	.211	-.187	.026	.247	-.019	.231
Geog_ATM_pnt	-.526	.423	.033	-.135	.227	.107	**.593**
Geog_Brnch_Pnt	-.489	**.515**	.319	-.115	-.166	.156	.202
Dep_PC	**-.846**	.246	-.105	-.086	.081	-.055	.114
Crdt_PC	**-.699**	.411	.130	.126	.003	.051	-.215
Crdt/Incm	**-.782**	.432	.109	-.084	-.033	.089	-.212
Dpst/Incm	**-.576**	.523	.281	-.110	-.146	.186	-.262
Life_Insrn/Incm	**-.585**	.328	-.077	.098	.249	.030	.152
Loc_opn_Dpst_AC	.046	-.433	-.093	.230	**.435**	.425	.086
Loc_sub_ loan_App	**-.634**	-.023	-.111	.558	-.068	.185	-.124
Min_amnt_opn_chckng_AC	**.650**	.284	-.332	-.151	-.173	.061	.177
Min_amnt_opn_ svngs_AC	**.697**	.475	-.348	-.096	.034	.111	-.096
Min_amnt_maintnd_chckng_AC	**.480**	.261	-.443	-.273	-.357	.290	.108
Min_amnt_maintnd_chckng_AC	**.647**	.529	-.372	-.069	.009	.137	-.128
Min_amnt_cnsmr_Loan	**.619**	.216	.258	-.204	.311	.121	-.168
Min_amnt_SME_Loan	**.561**	.258	.407	-.025	.179	-.094	-.019
No_docs_chckng_AC	**.600**	.271	.181	.536	-.202	.038	.236
No_docs_svng_AC	.485	.437	.238	**.528**	-.241	-.068	.163
Days_consumer_loan	.298	-.175	.295	-.237	.116	**.584**	-.013
Days_SME_loan	.458	-.164	**.621**	-.105	-.193	.200	.088
Annual_fee_Svng_AC	**.669**	.448	.045	.144	.338	-.070	-.182
Annual_fee_Chckng_AC	**.679**	.434	.020	.104	.318	-.225	-.100
Fees_SME_Loan	-.252	-.008	-.259	**.421**	-.012	.391	-.234

Extraction Method: Principal Component Analysis.

The final interpretation of the Principal Component Analysis found here is adding more indicators to the computation of the financial inclusion index and making it possible in terms of the PCA method. Since the new indicators have low correlations, there is no risk of multicollinearity and double counting for the index construction. Therefore, we can explore more comprehensive measurement of access, using more indicators of financial access in an economy.

2.6.3 Weighting and Aggregation

In order to get all the data set on the same scale, a normalisation process, explained above, is performed. After the normalisation procedure, the weights of all the individual indicators of the indices are assigned by using the factor analysis. The weights to correct the overlapping information between the correlated indicators are as well assigned. This means that the weights are assigned in terms of their statistical importance in the index construction process. After the quality of the individual indicators of the financial inclusion index is measured with the Principal Component Analysis, the weights are constructed using the factor analysis (FA), in order to get the weights aligned with their importance in the previous analysis.

As shown in Table 2.17a and 2.17b, the latent factors, which have eigenvalues bigger than one, are first identified, and the overall variance of more than 10% is then explained. Afterwards, the factors are rotated by the Varimax Method to minimise the number of the indicators that have a large loading on the same factor. Finally, the weights are constructed from a matrix of factor loadings after rotation, following the approach by Nicoletti et al. (2000): the indicators with the highest squared factor loadings are grouped into the intermediate composite indicators.

Table 2.17a Weights of the first index indicators

	Factor Loadings			Squared factor loading			Weights
Indicators	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	
Dem.A.P	0.32	0.797	0.116	0.03	**0.27**	0.01	**0.10**
Dem.B.P	0.532	0.593	0.038	0.09	**0.15**	0.00	**0.06**
Geog.A.P	0.046	0.104	0.959	0.00	0.00	**0.47**	**0.18**
Geog.B.P	0.236	0.152	0.911	0.02	0.01	**0.43**	**0.17**
Dep.A.pC	0.093	0.792	0.329	0.00	**0.26**	0.06	**0.10**
Cred.A.pC	0.513	0.692	0.099	0.09	**0.20**	0.01	**0.08**
Cred.I.R	0.878	0.329	0.123	**0.26**	0.05	0.01	**0.10**
Dep.I.R	0.91	0.117	0.153	**0.28**	0.01	0.01	**0.11**
Life I. I.R	0.785	0.197	0.163	**0.21**	0.02	0.01	**0.08**
Bank C.I.R	-0.239	0.308	-0.08	0.02	**0.04**	0.00	**0.02**
Expl.Var	2.99	2.38	1.95				
Expl./Tot	0.41	0.33	0.27				

After assigning the weights, the index is constructed by the formulas explained above. The final index results can be seen in Table 2.18a. According to these results, the countries' index values are set, as the income classifications do not get greatly alter for both indices. Countries that are in the high-income category have higher inclusion index ranks, while countries that are in lower-middle and low-income category have lower index rates, with some exceptions. Countries like Equatorial Guinea, Barbados, Aruba and Oman have lower financial inclusion rates, while they are considered part of the high-income countries.

Table 2.17b Weights of the second index indicators

D1-Outreach Dimension			
Factor Loading		Sq factor loading	Weights
Indicators	Factor 1	Factor 1	
DBP	0.74	0.12	**0.15**
DAP	0.85	0.16	**0.20**
GAP	0.75	0.12	**0.15**
GBP	0.69	0.10	**0.13**
DAPC	0.89	0.17	**0.22**
CAPC	0.74	0.12	**0.15**
sum	4.66	0.78	

D2-Usage Dimension			
Factor Loading		Sq factor loading	Weights
Indicators	Factor 1	Factor 1	
CAPC	0.95	0.36	**0.41**
DAPC	0.85	0.28	**0.33**
LIPC	0.74	0.22	**0.25**
sum	2.54	0.86	

D3-Ease Dimension									
Factor Loading					Squared factor loading				Weights
Indicators	Factor 1	Factor2	Factor3	Factor4	Factor 1	Factor 2	Factor 3	Factor 4	
1	-0.05	-0.06	-0.05	0.89	0.00	0.00	0.00	**0.72**	**0.22**
2	-0.44	-0.69	0.13	0.22	0.06	**0.21**	0.01	0.04	**0.06**
3	0.76	0.18	0.19	-0.06	**0.18**	0.01	0.02	0.00	**0.05**
4	0.88	0.12	0.25	0.00	**0.24**	0.01	0.03	0.00	**0.07**
5	0.79	0.06	0.01	-0.02	**0.19**	0.00	0.00	0.00	**0.06**
6	0.88	0.06	0.26	-0.02	**0.24**	0.00	0.03	0.00	**0.07**
7	0.37	0.65	0.17	0.06	0.04	**0.19**	0.01	0.00	**0.06**
8	0.20	0.59	0.39	-0.08	0.01	**0.16**	0.08	0.01	**0.05**
9	0.24	0.12	0.88	0.08	0.02	0.01	**0.38**	0.01	**0.12**
10	0.19	0.10	0.90	-0.13	0.01	0.00	**0.40**	0.02	**0.12**
11	0.07	0.53	-0.05	0.47	0.00	**0.12**	0.00	0.20	**0.04**
12	-0.12	0.80	0.27	0.03	0.00	**0.29**	0.04	0.00	**0.09**
Expl.Var	3.25	2.23	2.03	1.09					
Expl./Tot	0.38	0.26	0.24	0.13					

D4-Cost Dimension							
	Factor Loading			Squared factor loading			Weights
Indicators	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	
1	0.95	0.00	0.05	**0.50**	0.00	0.00	**0.18**
2	0.93	-0.07	-0.14	**0.48**	0.00	0.02	**0.17**
3	-0.01	0.68	0.20	0.00	**0.28**	0.04	**0.10**
4	-0.17	0.77	-0.25	0.02	**0.35**	0.06	**0.12**
5	0.05	0.80	0.16	0.00	**0.37**	0.03	**0.13**
6	-0.07	0.03	0.96	0.00	0.00	**0.86**	**0.30**
Expl.Var	1.79	1.70	1.07				
Expl./Tot	0.39	0.37	0.23				

Other common factors for these countries are that they are among the non-OECD high-income group and they are all oil producer countries. Similarly, among the high-income OECD member countries, there are Poland, the Slovak Republic and Hungary, which all have financial inclusion values at a medium category. Luxemburg has the highest financial inclusion values for all the relevant years for the first index. The United Kingdom, Singapore, Japan and Cyprus follow Luxemburg in the first index.

However, the low-income countries of Nigeria, Myanmar, Republic of the Congo and Syria have the lowest conditions for the first index. Since two indices were constructed in terms of the PCA results, all indicators were first used to compute the indices, and then the less important indicators were extracted from the computation to compare the index results. According to these results, extracting less important indicators do not greatly affect the countries' financial inclusion ranks. There is also a high correlation between the ranks in two indices, which is .96.[14]

As can be seen in Table 2.18b, the financial inclusion results of the second index are consistent with the first index results. There are some countries, upper middle-income ones, that have lower financial inclusion rates. These are Algeria, Peru, Albania, Romania and Belarus. Countries' index ranks do not show a great difference in both indices either. One can conclude that using more indicators for the construction of a financial inclusion index does not make a substantial difference in terms of country ranks.

[14] The indices, which are constructed without less important indicators, are not presented in this chapter. However, the author, if needs be, can supply these results.

Table 2.18a First index results by WB income classification

	2004		2005		2006		2007		2008		2009		2010		2011	
COUNTRY/High income non-OECD	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks
Cyprus	0.300	4	0.315	3	0.325	3	0.348	3	0.393	3	0.407	3	0.439	2	0.448	2
Singapore	0.297	5	0.271	7	0.269	8	0.296	6	0.322	5	0.325	4	0.335	4	0.338	4
Malta	0.270	8	0.270	8	0.265	9	0.280	8	0.318	6	0.284	6	0.284	6	0.313	5
China,Hong Kong	0.233	13	0.219	15	0.223	16	0.236	15	0.257	14	0.252	12	0.279	7	0.297	7
Barbados	0.131	34	0.133	31	0.136	29	0.143	29	0.148	29	0.146	32	0.150	30	0.151	30
Bahamas, The	0.124	36	0.120	36	0.126	35	0.138	32	0.146	30	0.145	35	0.139	39	0.150	32
Aruba	0.116	41	0.111	41	0.110	43	0.117	44	0.128	41	0.134	41	0.132	41	0.138	39
China, Macao SAR	0.111	44	0.107	44	0.109	44	0.109	48	0.116	49	0.127	43	0.127	42	0.130	40
Kuwait	0.098	49	0.096	51	0.104	48	0.108	49	0.114	50	0.116	47	0.126	43	0.126	42
Croatia	0.095	50	0.082	56	0.084	55	0.094	55	0.107	56	0.115	48	0.119	46	0.120	46
Brunei Darussalam	0.087	54	0.080	57	0.081	62	0.094	56	0.099	63	0.114	49	0.106	57	0.117	51
Qatar	0.077	60	0.078	60	0.077	65	0.084	67	0.095	65	0.099	63	0.098	65	0.113	55
United Arab Emirates	0.067	70	0.075	62	0.075	68	0.080	73	0.080	79	0.097	66	0.092	70	0.091	74
Oman	0.067	71	0.065	75	0.066	78	0.075	77	0.074	83	0.083	76	0.083	80	0.090	77
Saudi Arabia	0.053	89	0.052	90	0.050	97	0.054	98	0.054	105	0.065	93	0.064	95	0.072	94
Equatorial Guinea	0.017	149	0.018	144	0.020	143	0.022	146	0.023	145	0.020	153	0.016	165	0.018	163
High income OECD																
Luxembourg	0.605	1	0.613	1	0.624	1	0.634	1	0.638	1	0.626	1	0.616	1	0.607	1
United Kingdom	0.365	2	0.363	2	0.390	2	0.404	2	0.449	2	0.409	2	0.400	3	0.400	3
Japan	0.337	3	0.307	4	0.306	4	0.306	4	0.347	4	0.306	5	0.300	5	0.303	6
Switzerland	0.293	6	0.279	5	0.277	5	0.302	5	0.313	7	0.280	7	0.275	8	0.276	8
Belgium	0.281	7	0.276	6	0.273	6	0.285	7	0.298	8	0.272	8	0.271	9	0.272	9
Korea, Rep.	0.259	9	0.238	9	0.271	7	0.277	9	0.285	9	0.270	9	0.265	10	0.258	10
Portugal	0.244	10	0.235	10	0.253	10	0.272	10	0.285	10	0.265	10	0.263	11	0.256	11
Netherlands	0.239	11	0.228	11	0.251	11	0.262	11	0.279	11	0.261	11	0.252	12	0.249	12
Ireland	0.235	12	0.227	12	0.249	12	0.258	12	0.268	12	0.245	13	0.238	13	0.223	13
Spain	0.227	14	0.225	13	0.248	13	0.257	13	0.266	13	0.238	14	0.231	14	0.222	14
Denmark	0.214	15	0.221	14	0.229	14	0.251	14	0.239	15	0.231	15	0.222	15	0.218	16
Canada	0.207	16	0.215	16	0.229	15	0.234	16	0.224	16	0.207	16	0.209	17	0.217	17
Iceland	0.193	17	0.201	17	0.208	17	0.203	17	0.207	17	0.202	17	0.207	18	0.211	18
United States	0.186	18	0.175	19	0.182	19	0.189	19	0.204	18	0.188	19	0.199	19	0.196	19
Italy	0.184	20	0.174	20	0.179	20	0.188	20	0.200	19	0.182	20	0.194	20	0.184	21
Australia	0.183	21	0.172	21	0.174	21	0.180	21	0.191	21	0.180	21	0.177	21	0.180	22
Sweden	0.153	23	0.154	22	0.161	23	0.172	23	0.187	22	0.174	22	0.175	22	0.175	23
Israel	0.151	25	0.147	23	0.158	24	0.166	24	0.178	24	0.169	23	0.170	23	0.171	24
New Zealand	0.148	27	0.146	24	0.156	25	0.163	25	0.171	25	0.162	24	0.160	26	0.166	25
Finland	0.145	28	0.141	27	0.154	26	0.158	26	0.168	26	0.154	27	0.157	27	0.166	26
France	0.143	30	0.136	29	0.144	27	0.153	28	0.162	27	0.145	33	0.145	33	0.149	33
Greece	0.142	31	0.134	30	0.136	30	0.136	33	0.143	34	0.145	34	0.144	35	0.145	36
Austria	0.133	33	0.122	34	0.127	34	0.135	34	0.140	35	0.141	37	0.144	36	0.123	43
Germany	0.120	38	0.117	38	0.123	37	0.134	35	0.139	36	0.127	42	0.120	45	0.117	50
Slovenia	0.117	40	0.108	42	0.120	38	0.118	42	0.123	43	0.120	44	0.115	48	0.113	58
Norway	0.108	45	0.108	43	0.105	46	0.111	45	0.118	46	0.116	46	0.111	51	0.108	63
Czech Republic	0.106	46	0.103	46	0.105	47	0.110	46	0.117	48	0.106	55	0.102	62	0.107	65
Slovak Republic	0.085	56	0.102	48	0.103	49	0.109	47	0.114	51	0.103	60	0.099	64	0.102	67
Estonia	0.084	57	0.084	54	0.086	54	0.091	61	0.102	58	0.096	68	0.097	66	0.096	69
Hungary	0.074	64	0.075	64	0.082	59	0.091	62	0.100	61	0.094	69	0.096	67	0.092	72
Poland	0.069	67	0.067	71	0.074	70	0.083	68	0.099	64	0.090	70	0.089	73	0.054	117

Table 2.18a continued…

	2004		2005		2006		2007		2008		2009		2010		2011	
COUNTRY/Upper middle-income	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks
Lebanon	0.186	19	0.182	18	0.188	18	0.192	18	0.200	20	0.196	18	0.210	16	0.221	15
South Africa	0.162	22	0.146	25	0.167	22	0.174	22	0.183	23	0.161	25	0.168	24	0.190	20
Malaysia	0.153	24	0.144	26	0.141	28	0.156	27	0.161	28	0.157	26	0.162	25	0.157	27
St. Kitts and Nevis	0.150	26	0.136	28	0.135	31	0.143	30	0.145	31	0.152	28	0.154	28	0.155	28
China	0.144	29	0.131	32	0.134	32	0.139	31	0.144	32	0.149	29	0.151	29	0.154	29
Grenada	0.134	32	0.124	33	0.127	33	0.131	36	0.143	33	0.146	30	0.148	31	0.151	31
Panama	0.129	35	0.120	35	0.124	36	0.130	37	0.137	37	0.146	31	0.147	32	0.149	34
Thailand	0.120	37	0.118	37	0.119	39	0.130	38	0.136	38	0.145	36	0.145	34	0.149	35
Seychelles	0.120	39	0.116	39	0.118	40	0.129	39	0.135	39	0.139	38	0.139	37	0.139	37
Jordan	0.111	42	0.112	40	0.117	41	0.123	40	0.132	40	0.136	39	0.139	38	0.139	38
St. Lucia	0.111	43	0.103	45	0.117	42	0.121	41	0.127	42	0.136	40	0.138	40	0.128	41
Chile	0.105	47	0.102	47	0.107	45	0.118	43	0.121	44	0.119	45	0.124	44	0.123	44
Antigua and Barbuda	0.098	48	0.097	49	0.102	50	0.106	50	0.120	45	0.112	50	0.113	49	0.119	47
Latvia	0.092	51	0.097	50	0.097	51	0.101	51	0.117	47	0.109	52	0.111	50	0.118	48
Bulgaria	0.090	52	0.094	52	0.096	52	0.099	52	0.110	52	0.108	53	0.110	52	0.116	52
Namibia	0.083	58	0.078	58	0.083	56	0.098	53	0.107	55	0.106	54	0.109	53	0.115	53
Brazil	0.081	59	0.078	59	0.082	60	0.096	54	0.103	57	0.104	58	0.108	54	0.114	54
Mauritius	0.076	61	0.075	61	0.082	61	0.093	57	0.102	59	0.103	59	0.107	56	0.113	56
Dominica	0.074	62	0.075	63	0.081	63	0.092	58	0.101	60	0.100	61	0.106	58	0.113	57
St. Vincent and the Gre	0.074	63	0.074	65	0.080	64	0.089	63	0.099	62	0.100	62	0.101	63	0.112	61
Jamaica	0.068	69	0.071	68	0.074	71	0.082	70	0.089	70	0.087	72	0.094	69	0.105	66
Tunisia	0.065	73	0.071	69	0.074	72	0.081	72	0.088	73	0.086	73	0.092	71	0.097	68
Lithuania	0.062	77	0.064	76	0.072	74	0.075	76	0.085	75	0.084	75	0.091	72	0.093	70
Maldives	0.061	79	0.064	77	0.070	75	0.073	78	0.085	76	0.081	78	0.089	74	0.090	75
Bosnia and Herzegovin	0.060	82	0.063	80	0.066	77	0.073	79	0.080	78	0.080	80	0.089	75	0.090	76
Montenegro	0.059	83	0.061	82	0.064	79	0.069	82	0.076	80	0.080	81	0.084	78	0.090	78
Costa Rica	0.059	84	0.061	83	0.062	83	0.067	84	0.075	82	0.078	82	0.081	82	0.088	79
Uruguay	0.058	85	0.057	87	0.060	85	0.066	85	0.074	84	0.078	83	0.079	83	0.087	81
Colombia	0.050	93	0.049	93	0.057	88	0.065	87	0.074	85	0.076	84	0.079	84	0.085	83
Russian Federation	0.049	94	0.049	94	0.057	89	0.065	88	0.072	87	0.075	86	0.077	86	0.085	84
Macedonia, FYR	0.049	95	0.049	95	0.054	92	0.063	90	0.071	89	0.073	87	0.077	87	0.084	85
Turkey	0.048	98	0.048	96	0.053	94	0.061	92	0.067	90	0.067	91	0.076	88	0.081	86
Suriname	0.046	99	0.047	97	0.052	95	0.057	93	0.067	91	0.066	92	0.068	91	0.079	87
Romania	0.045	102	0.045	100	0.050	98	0.056	94	0.064	93	0.063	94	0.061	99	0.076	91
Iran, Islamic Rep.	0.045	103	0.045	101	0.048	99	0.054	97	0.064	94	0.057	99	0.060	100	0.074	92
Argentina	0.042	107	0.044	103	0.048	100	0.053	100	0.058	99	0.056	101	0.059	101	0.071	97
Albania	0.040	109	0.042	106	0.046	103	0.053	101	0.056	100	0.052	105	0.058	104	0.067	102
Serbia	0.040	111	0.038	112	0.042	109	0.048	106	0.056	101	0.051	108	0.056	106	0.060	109
Mexico	0.039	113	0.038	114	0.041	111	0.046	108	0.049	109	0.051	109	0.053	111	0.058	110
Botswana	0.038	114	0.037	117	0.038	113	0.044	112	0.048	110	0.050	110	0.051	114	0.058	111
Dominican Republic	0.037	118	0.037	118	0.038	115	0.042	114	0.047	113	0.049	112	0.050	115	0.057	113
Belarus	0.034	121	0.036	119	0.038	116	0.041	115	0.044	116	0.047	115	0.049	116	0.056	114
Algeria	0.034	122	0.033	121	0.038	118	0.040	118	0.044	118	0.046	117	0.045	123	0.051	121
Venezuela, RB	0.033	123	0.032	124	0.037	120	0.039	120	0.041	122	0.043	120	0.042	127	0.048	125
Libya	0.033	124	0.032	127	0.035	123	0.038	121	0.040	124	0.038	128	0.039	128	0.047	127
Kazakhstan	0.033	126	0.028	133	0.032	127	0.037	123	0.039	126	0.036	135	0.038	131	0.046	128
Peru	0.031	128	0.027	134	0.027	135	0.031	132	0.033	134	0.035	137	0.035	137	0.038	135
Azerbaijan	0.026	136	0.024	140	0.026	136	0.030	135	0.033	136	0.033	140	0.031	140	0.033	139
Gabon	0.020	144	0.018	145	0.017	151	0.018	153	0.017	159	0.019	155	0.020	156	0.024	148

Table 2.18a continued…

	2004		2005		2006		2007		2008		2009		2010		2011	
COUNTRY/Lower middle-income	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks
Mauritania	0.089	53	0.088	53	0.086	53	0.092	59	0.110	53	0.112	51	0.118	47	0.122	45
Belize	0.086	55	0.083	55	0.083	57	0.092	60	0.107	54	0.105	56	0.107	55	0.118	49
Fiji	0.072	65	0.074	66	0.083	58	0.089	64	0.094	66	0.104	57	0.105	59	0.113	59
Vietnam	0.070	66	0.071	67	0.076	66	0.086	65	0.094	67	0.097	64	0.104	60	0.112	60
Guyana	0.069	68	0.067	70	0.076	67	0.085	66	0.094	68	0.097	65	0.103	61	0.110	62
India	0.067	72	0.066	72	0.075	69	0.082	69	0.089	69	0.096	67	0.095	68	0.107	64
Vanuatu	0.065	74	0.066	73	0.073	73	0.081	71	0.089	71	0.089	71	0.088	76	0.092	71
Cape Verde	0.063	75	0.065	74	0.069	76	0.080	74	0.088	72	0.085	74	0.085	77	0.092	73
Egypt, Arab Rep.	0.063	76	0.064	78	0.064	80	0.078	75	0.088	74	0.082	77	0.084	79	0.087	80
Tonga	0.061	78	0.064	79	0.064	81	0.072	80	0.081	77	0.081	79	0.081	81	0.087	82
El Salvador	0.061	80	0.061	81	0.062	82	0.070	81	0.075	81	0.075	85	0.078	85	0.077	88
Moldova	0.060	81	0.061	84	0.061	84	0.068	83	0.072	86	0.072	88	0.071	89	0.077	89
Honduras	0.056	86	0.058	85	0.060	86	0.066	86	0.071	88	0.068	89	0.069	90	0.076	90
West Bank and Gaza	0.056	87	0.058	86	0.059	87	0.065	89	0.066	92	0.068	90	0.066	92	0.071	95
Sri Lanka	0.053	88	0.054	88	0.056	90	0.061	91	0.063	95	0.063	95	0.065	93	0.071	96
Samoa	0.052	90	0.054	89	0.054	91	0.056	95	0.062	96	0.063	96	0.064	94	0.067	99
Uzbekistan	0.051	91	0.052	91	0.054	93	0.056	96	0.062	97	0.061	97	0.063	97	0.067	100
Philippines	0.048	97	0.047	98	0.047	101	0.053	102	0.062	98	0.056	100	0.061	98	0.067	101
Indonesia	0.046	100	0.045	99	0.047	102	0.052	103	0.055	102	0.055	102	0.059	102	0.066	103
Kosovo	0.045	101	0.044	102	0.045	104	0.051	104	0.055	103	0.053	103	0.059	103	0.066	104
Nicaragua	0.044	104	0.043	104	0.044	105	0.051	105	0.054	106	0.052	104	0.058	105	0.064	105
Micronesia, Fed. Sts.	0.042	106	0.042	105	0.044	106	0.047	107	0.052	107	0.051	106	0.055	107	0.063	106
Bolivia	0.040	108	0.042	107	0.043	107	0.046	109	0.050	108	0.051	107	0.055	108	0.062	107
Guatemala	0.040	110	0.041	108	0.043	108	0.045	110	0.048	111	0.049	111	0.055	109	0.060	108
Djibouti	0.039	112	0.040	109	0.042	110	0.045	111	0.048	112	0.048	113	0.054	110	0.058	112
Bhutan	0.038	115	0.040	110	0.040	112	0.043	113	0.047	114	0.046	116	0.052	112	0.055	115
Ukraine	0.037	116	0.038	113	0.038	114	0.041	116	0.044	115	0.044	118	0.046	118	0.055	116
Pakistan	0.037	117	0.038	115	0.038	119	0.040	117	0.042	119	0.044	119	0.046	119	0.054	118
Mongolia	0.035	119	0.034	120	0.037	121	0.039	119	0.041	121	0.043	122	0.046	120	0.051	120
Syrian Arab Republic	0.033	125	0.033	122	0.036	122	0.038	122	0.040	123	0.043	123	0.045	121	0.050	122
Georgia	0.030	129	0.033	123	0.035	124	0.037	125	0.039	125	0.042	124	0.045	122	0.050	123
Sao Tome and Principe	0.029	131	0.032	125	0.032	126	0.034	128	0.039	127	0.041	125	0.044	124	0.049	124
Timor-Leste	0.029	132	0.031	128	0.030	129	0.032	129	0.038	128	0.040	126	0.043	125	0.048	126
Paraguay	0.028	133	0.030	130	0.028	132	0.032	130	0.037	130	0.038	127	0.043	126	0.045	129
Swaziland	0.028	134	0.028	131	0.027	133	0.031	133	0.036	131	0.037	129	0.038	132	0.042	131
Ghana	0.025	137	0.026	135	0.027	134	0.029	136	0.035	132	0.037	130	0.037	133	0.039	133
Solomon Islands	0.024	139	0.026	136	0.025	137	0.028	137	0.033	135	0.037	132	0.036	134	0.039	134
Morocco	0.024	140	0.025	138	0.023	140	0.028	138	0.031	138	0.037	133	0.036	135	0.038	136
Marshall Islands	0.024	141	0.023	141	0.021	141	0.027	139	0.029	139	0.036	136	0.035	136	0.037	137
Zambia	0.021	142	0.019	143	0.019	144	0.025	141	0.028	140	0.034	139	0.034	138	0.034	138
Papua New Guinea	0.020	145	0.017	146	0.019	145	0.024	142	0.027	141	0.032	141	0.033	139	0.032	140
Iraq	0.019	147	0.017	148	0.018	146	0.024	143	0.027	142	0.028	142	0.028	141	0.032	141
Nigeria	0.018	148	0.017	149	0.017	149	0.023	144	0.026	143	0.026	144	0.027	143	0.031	143
Sudan	0.016	153	0.016	150	0.017	150	0.020	149	0.023	147	0.025	145	0.025	144	0.028	145
Armenia	0.015	155	0.016	151	0.016	152	0.019	151	0.021	148	0.021	150	0.024	147	0.027	146
Cameroon	0.012	158	0.012	156	0.016	153	0.018	152	0.021	150	0.020	152	0.021	151	0.024	151
Yemen, Rep.	0.011	160	0.011	162	0.011	160	0.014	157	0.019	155	0.019	154	0.020	153	0.023	153
Lesotho	0.011	161	0.010	164	0.009	166	0.013	160	0.014	162	0.019	156	0.020	154	0.023	154
Lao PDR	0.009	167	0.008	168	0.009	168	0.009	167	0.012	166	0.017	161	0.015	167	0.015	168
Angola	0.008	170	0.008	170	0.007	171	0.009	168	0.009	169	0.010	170	0.012	169	0.015	169
Congo, Rep.	0.006	175	0.002	179	0.004	177	0.005	176	0.007	173	0.009	173	0.010	173	0.014	171

Table 2.18a continued…

	2004		2005		2006		2007		2008		2009		2010		2011	
COUNTRY/Lower-income	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks	INDEX	Country Ranks
Bangladesh	0.051	92	0.051	92	0.051	96	0.054	99	0.054	104	0.058	98	0.063	96	0.072	93
Zimbabwe	0.049	96	0.039	111	0.038	117	0.037	124	0.044	117	0.047	114	0.051	113	0.070	98
Liberia	0.042	105	0.037	116	0.034	125	0.036	126	0.042	120	0.043	121	0.048	117	0.053	119
Kenya	0.034	120	0.032	126	0.031	128	0.036	127	0.037	129	0.037	131	0.039	129	0.043	130
Nepal	0.032	127	0.031	129	0.028	130	0.031	131	0.035	133	0.036	134	0.038	130	0.040	132
Mozambique	0.030	130	0.028	132	0.028	131	0.030	134	0.032	137	0.035	138	0.027	142	0.031	142
Ethiopia	0.027	135	0.026	137	0.024	138	0.025	140	0.025	144	0.027	143	0.025	145	0.030	144
Haiti	0.025	138	0.024	139	0.024	139	0.022	145	0.023	146	0.023	146	0.024	146	0.027	147
Gambia, The	0.021	143	0.022	142	0.021	142	0.022	147	0.021	149	0.023	147	0.023	148	0.024	149
Burundi	0.020	146	0.017	147	0.018	147	0.021	148	0.020	151	0.022	148	0.021	149	0.024	150
Togo	0.017	150	0.016	152	0.018	148	0.019	150	0.020	152	0.021	149	0.021	150	0.023	152
Mali	0.017	151	0.016	153	0.016	154	0.017	154	0.019	153	0.020	151	0.020	152	0.022	155
Guinea	0.016	152	0.014	154	0.014	155	0.017	155	0.019	154	0.018	157	0.020	155	0.022	156
Malawi	0.015	154	0.013	155	0.014	156	0.016	156	0.017	156	0.017	158	0.019	157	0.022	157
Burkina Faso	0.014	156	0.012	157	0.013	157	0.014	158	0.017	157	0.017	159	0.019	158	0.021	158
Sierra Leone	0.012	157	0.011	158	0.012	158	0.014	159	0.017	158	0.017	160	0.018	159	0.020	159
Benin	0.011	159	0.011	159	0.012	159	0.013	161	0.015	160	0.017	162	0.017	160	0.020	160
Cambodia	0.011	162	0.011	160	0.011	161	0.013	162	0.014	161	0.015	163	0.017	161	0.019	161
Tajikistan	0.010	163	0.011	161	0.011	162	0.012	163	0.014	163	0.014	164	0.017	162	0.019	162
Niger	0.010	164	0.010	163	0.011	163	0.012	164	0.014	164	0.014	165	0.016	163	0.017	164
Kyrgyz Republic	0.010	165	0.010	165	0.010	164	0.009	165	0.013	165	0.013	166	0.016	164	0.017	165
Central African Republic	0.009	166	0.009	166	0.010	165	0.009	166	0.010	167	0.012	167	0.015	166	0.016	166
Uganda	0.009	168	0.009	167	0.009	167	0.009	169	0.010	168	0.010	168	0.013	168	0.016	167
Tanzania	0.009	169	0.008	169	0.009	169	0.008	170	0.009	170	0.010	169	0.012	170	0.014	170
Comoros	0.008	171	0.008	171	0.008	170	0.007	171	0.007	171	0.009	171	0.011	171	0.013	172
Myanmar	0.008	172	0.008	172	0.006	172	0.007	172	0.007	172	0.009	172	0.011	172	0.012	173
Rwanda	0.007	173	0.006	173	0.006	173	0.006	173	0.007	174	0.008	174	0.009	174	0.010	174
South Sudan	0.007	174	0.006	174	0.005	174	0.006	174	0.007	175	0.008	175	0.008	175	0.009	175
Chad	0.005	176	0.006	175	0.004	175	0.006	175	0.007	176	0.006	176	0.007	176	0.008	176
Madagascar	0.004	177	0.004	176	0.004	176	0.005	177	0.006	177	0.006	177	0.005	177	0.007	177
Congo, Dem. Rep.	0.003	178	0.003	177	0.003	178	0.004	178	0.005	178	0.005	178	0.004	178	0.006	178
Afghanistan	0.002	179	0.002	178	0.002	179	0.001	179	0.002	179	0.005	179	0.002	179	0.004	179

Table 2.18b Second index results by WB income classification

Country and Region	Index	Country Ranks
High-income non-OECD		
Malta	0.69	1
Denmark	0.69	2
France	0.52	11
Greece	0.5	13
Croatia	0.48	14
Czech Republic	0.48	15
Germany	0.46	16
Hungary	0.4	22
High-income OECD		
Switzerland	0.67	3
Korea, Rep.	0.66	4
Spain	0.63	5
Belgium	0.62	6
Australia	0.62	7
Israel	0.56	8
Sweden	0.52	12
Slovak Republic	0.45	18
Slovenia	0.38	24
Upper-middle-income		
Lebanon	0.56	9
South Africa	0.55	10
Chile	0.46	17
Brazil	0.42	19
Bulgaria	0.41	20
Jordan	0.41	21
Bosnia and Herzegovina	0.38	23
Lithuania	0.38	25
Turkey	0.36	27
Mexico	0.34	28
Belarus	0.32	31
Colombia	0.31	32
Romania	0.3	36
Albania	0.3	37
Dominican Republic	0.29	38
Peru	0.25	45
Algeria	0.24	46

Table 2.18b continued…

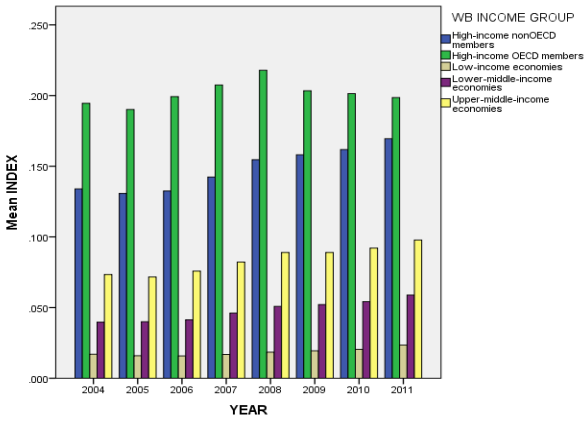
Country and Region	Index	Country Ranks
Lower-middle-income		
Tonga	0.37	26
India	0.34	29
Indonesia	0.33	30
Moldova	0.31	33
Egypt, Arab Rep.	0.31	34
Sri Lanka	0.31	35
Bolivia	0.27	39
Philippines	0.27	40
Pakistan	0.26	43
Georgia	0.22	47
Ghana	0.22	49
Swaziland	0.22	50
Nigeria	0.19	51
Armenia	0.18	52
Cameroon	0.12	55
Low-income		
Bangladesh	0.27	41
Kenya	0.27	42
Zimbabwe	0.25	44
Ethiopia	0.22	48
Malawi	0.18	53
Mozambique	0.15	54
Madagascar	0.12	56
Sierra Leone	0.12	57
Uganda	0.12	58

Source: Author's own calculations.

Finally, Figures 2.17a and 2.17b show the graphical explanation of the final values of the constructed financial inclusion indices. Figure 2.17a explores the index results with a time trend amongst the income groups of countries. Accordingly, the first index results seem highest in high-income OECD member countries. The results slightly increase over the years except for 2008 for high-income OECD countries and upper-middle income countries. These decreases in financial inclusion levels might be explained by the recent global financial crisis. It seems the effects of the crisis are tangible for high-income and upper-middle income countries in terms of financial inclusion. Moreover, Figure 2.17b shows the financial inclusion index results of the top10 countries by years. The same cycle in 2008 can easily be seen from the first index graph. After 2008, financial inclusion values tend to increase for almost all the countries.

Figure 2.17a Financial inclusion index results

1st Index



2nd Index

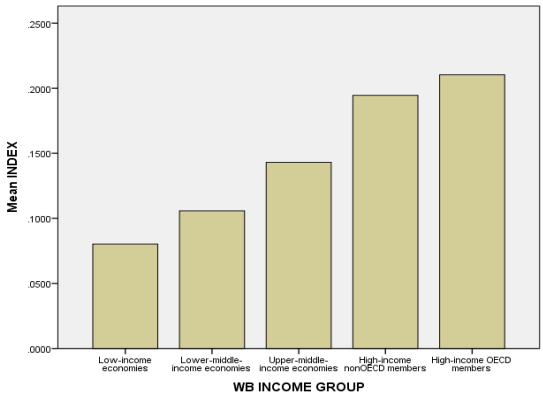
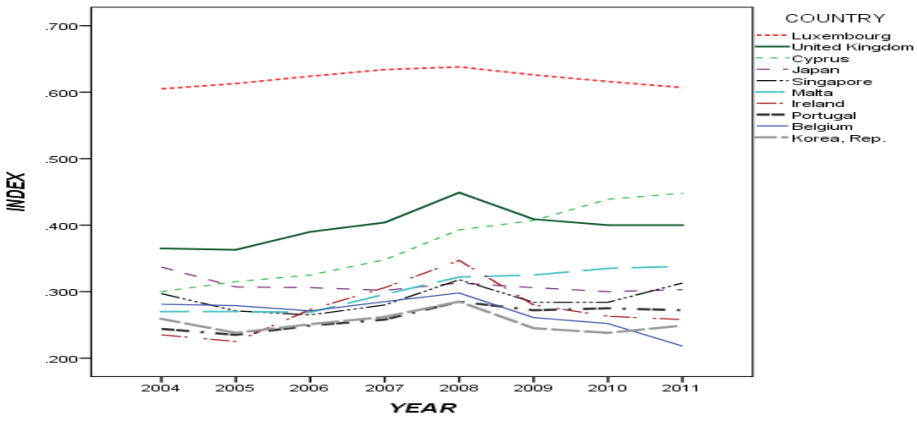
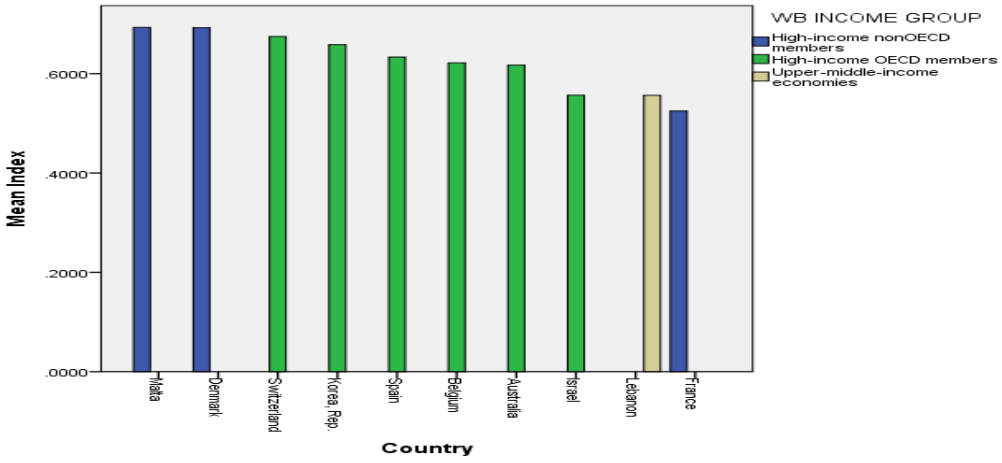


Figure 2.17b Financial inclusion index results – top 10 countries

1st Index



2nd Index



Unlike these results, which are consistent with the income levels of countries, our indices have some limitations in terms of measures of financial deepening. High-income countries like USA, Germany, and France, where the measures of financial deepening are high, exhibit relatively low financial inclusion levels on our measure. Hence, the correlation between our indices and the measures of financial deepening is not very well correlated in terms of these developed countries. In doing so, the reasons of these limitations need to be explained along with the proper solutions for the future works.

As it can be seen from the figures 2.9 and 2.10, consumer loan fees, SME loan fees, and cost to transfer funds internationally indicators seem relatively high in high-income OECD member countries. In particular, these indicators seem to have higher values in the relevant countries above. Since our measure is a multidimensional index, which contains various indicators in the construction process, above indicators might cause the lower levels of financial inclusion for the countries such as USA, Germany, and France. Another main reason of these low levels of financial inclusion might be related to the demographic and geographic situations of these countries. Since we use per population and per square kilometre measures for the particular indicators such as geographic and demographic branch and ATM penetrations in our indices, the higher demographic and geographic levels of such countries might cause the lower levels of financial inclusion. The last and most important reason of these limitations might be the outliers in the data. Exploring the reasons of possible outliers might allow us to understand the weak correlation between our measures and countries financial deepening levels.

2.6.4 Links to Other Variables

The constructed indices and the new proxy of financial inclusion are linked to some country-specific variables for evaluating their explanatory power. In addition to these three proxies of financial inclusion, we explored the correlations of other financial institutions by taking the residuals from the 'all financial institutions' variable to the 'formal financial institutions' variable. Taking this difference, we have the chance to distinguish the impacts of other financial institutions, such as micro finance institutions, separately.

The correlations between four different proxies of financial inclusion and macroeconomic country factors are explored using scatter diagrams with the country's three letter ISO identification labels in this section. It is also important here to emphasise that these country-specific variables are different from the ones used in constructing the indices. This last step of the construction process is also considered to be the sensitivity check of the indices.

Figure 2.18 Correlates of financial inclusion proxies against GDP per capita levels (average)

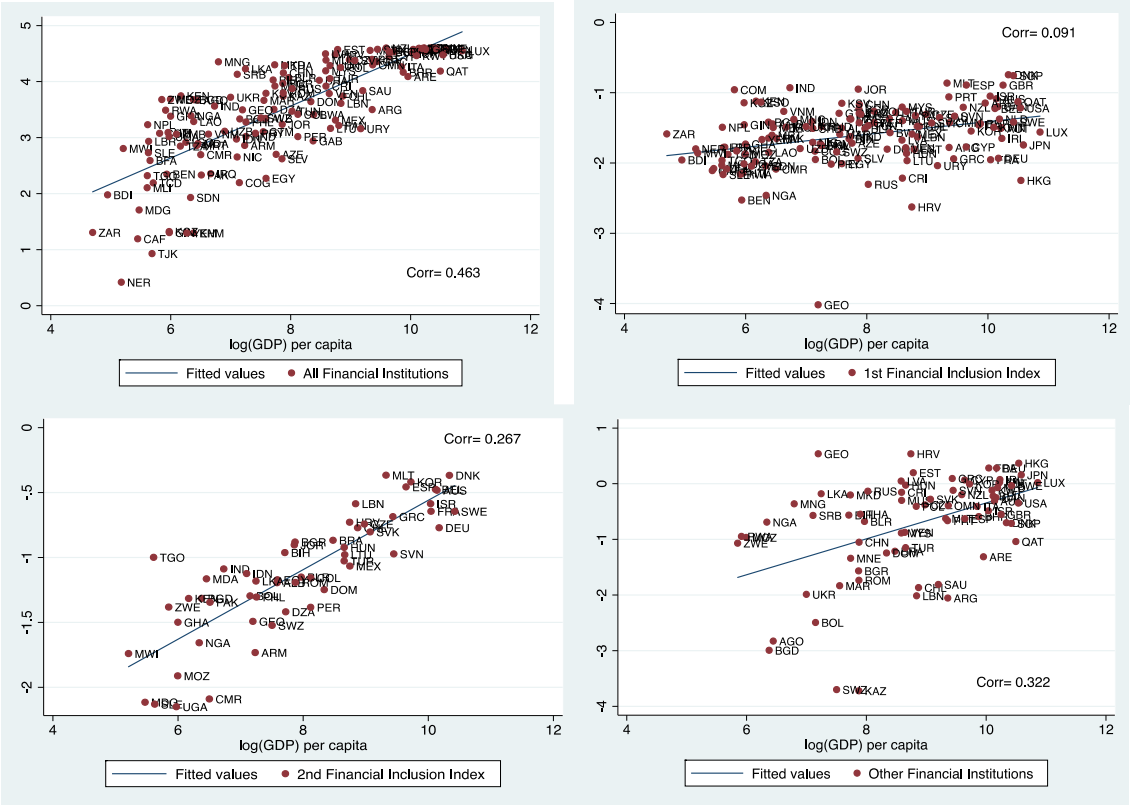
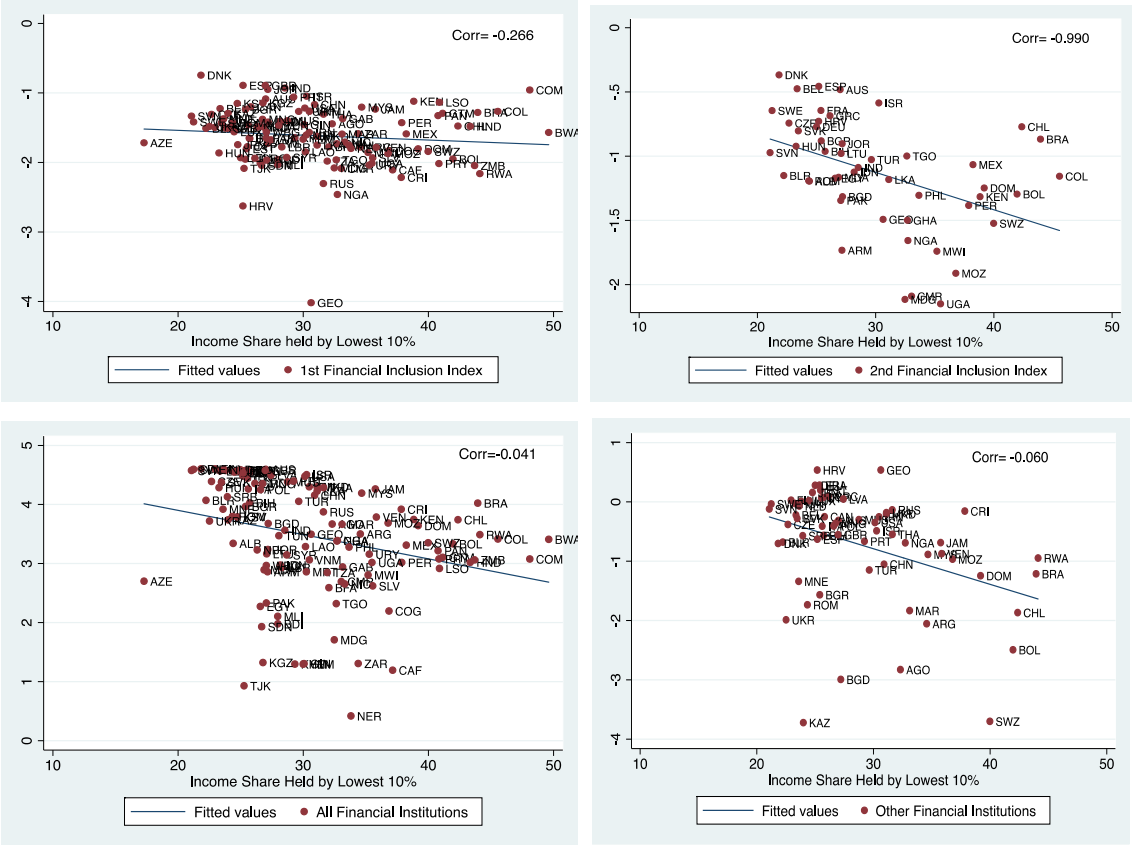


Figure 2.18 explores the correlations of the first index, the second index, and the access indicators from the all financial institutions indicator, and access to the other financial institutions as the residuals with GDP per capita. Accordingly, the second index, which has the most comprehensive multidimensional constructed index in the literature so far, seem to have better correlation with GDP per capita levels amongst the proxies. Moreover, when we add access indicators from other financial institutions to the financial inclusion measurement, it seems the new measurement also has a holistic association between the income levels of the countries. Similarly, when we take the residuals to see the association of other financial institutions separately, the correlation is still holistic with income levels. All the proxies of financial inclusion above have a positive correlation with GDP per capita levels as the proxy of income.

The amounts for the correlation are as follows: 0.2762, 0.7493, 0.7302 and 0.6773respectively. As can be seen from the correlation amounts, the constructed second financial inclusion index has a better association with income levels. It can be concluded that the second index, which is one of the most comprehensive financial inclusion indices in the literature, has better explanatory power amongst the proxies of financial inclusion. These results were economically expected and consistent with those obtained in Barr (2004), Kempson and Whyley (1998) and

Connolly and Hajaj (2001), which showed that financial system exclusion takes place for low-income groups in the economy.

Figure 2.19 Correlates of financial inclusion proxies against income share indicator (average)

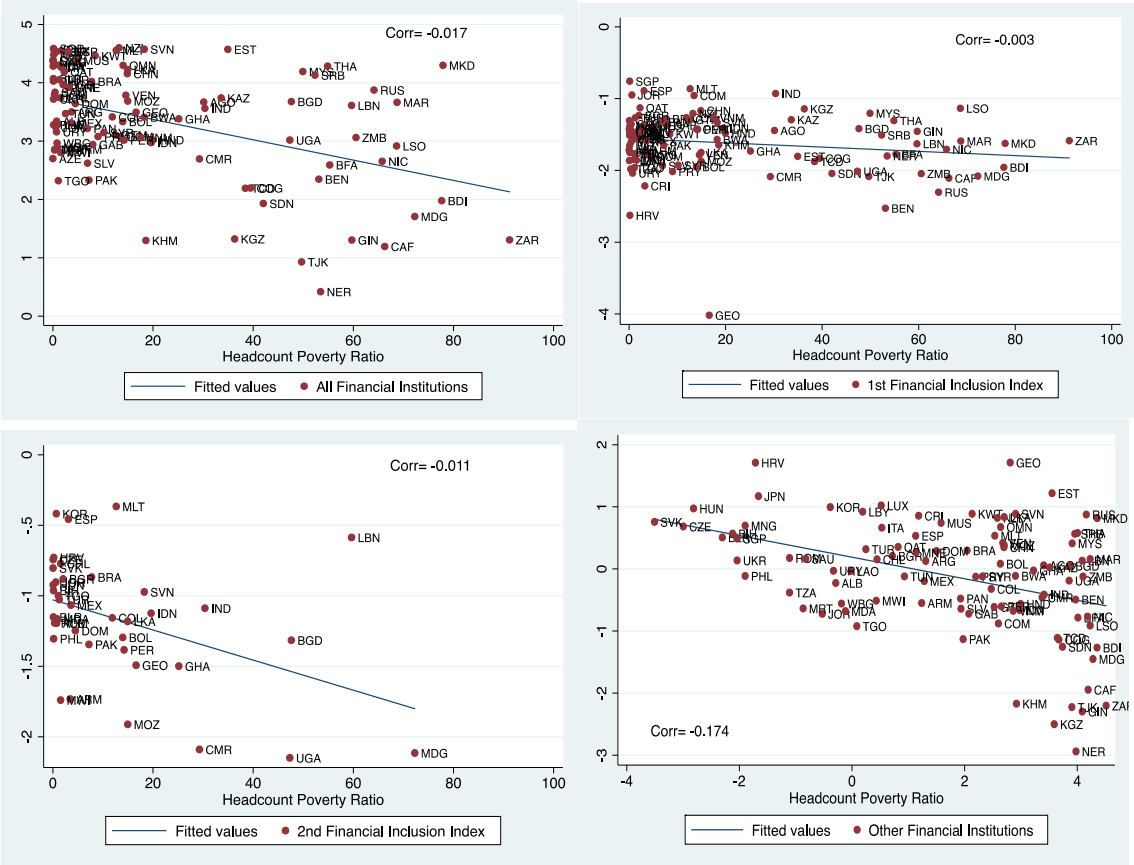


Similarly, Figure 2.19 indicates the correlations of the proxies of financial inclusion in this chapter, with income share held by the lowest 10% as the proxy of poverty. Graphs using ISO country label codes explore the correlations of the first index, the second index and the access indicators from all financial institutions indicators, along with the residuals as impacts of other financial institutions with poverty levels of countries respectively. According to the scatter diagrams above, results seem not that much stronger than the income share levels of countries.

On the other hand, the second index, which has the most comprehensive multidimensional constructed index in the literature, has a better correlation than the first index in terms of income share levels. In the meantime, the new proxy of financial inclusion, which includes access indicators from all financial institutions, is also well associated with the income share levels. Again, all the proxies of financial inclusion outlined above have negative correlations with the income share indicator. Accordingly, countries that have higher financial access rates seem

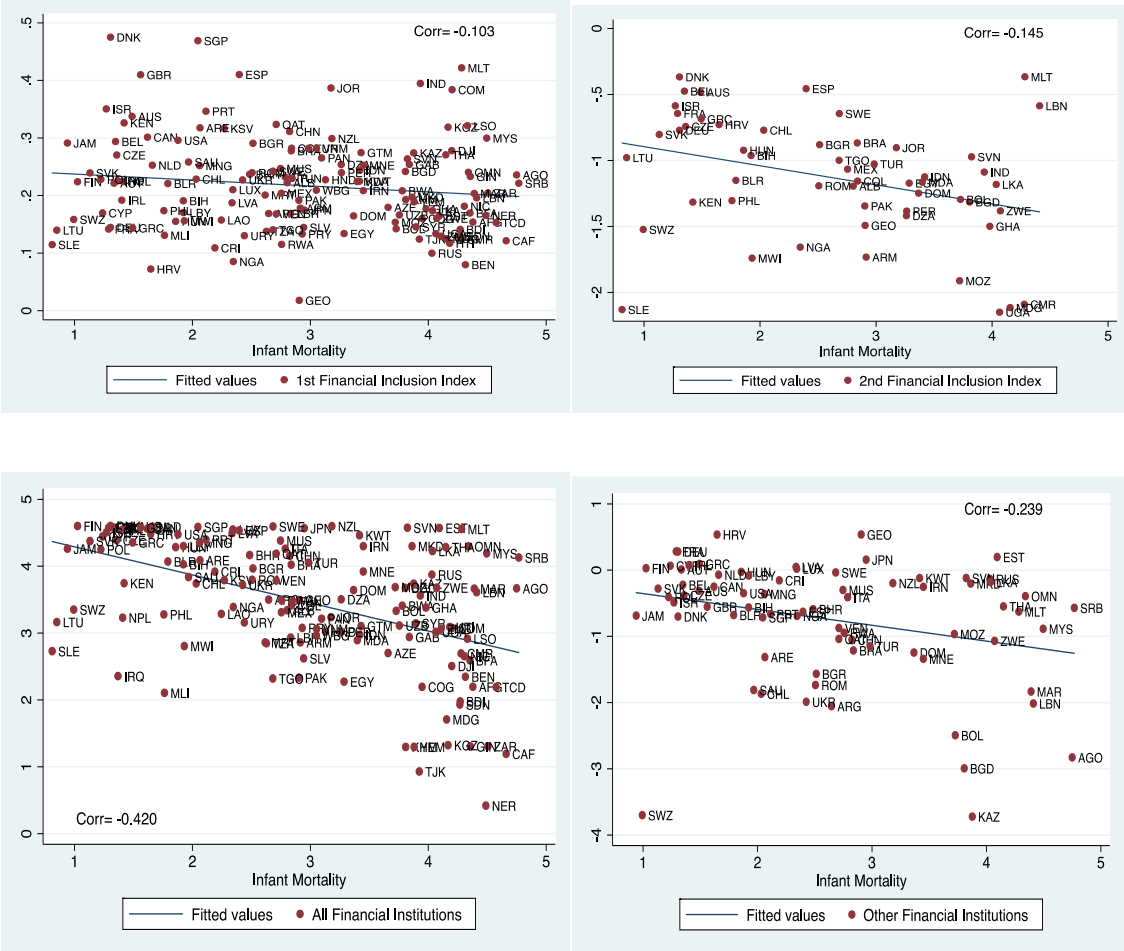
related to poverty levels. The amounts for the correlations are -0.0459, -0.1248, -0.2556 and -0.1849 respectively.

Figure 2.20 Correlates of financial inclusion proxies against headcount poverty indicator (average)



Moreover, Figure 2.20 explores the association between the proxies of financial inclusion and headcount poverty ratio indicator. According to the results, the second financial inclusion index and all financial institutions indicators seem to have relatively better association with poverty. The amount of correlations support this argument as they are found to be -0.3499, -0.6543, -0.4228 and -0.3937 respectively.

Figure 2.21 Correlates of financial inclusion proxies against infant mortality indicator (Average)



Similarly, the correlations of the final measure of poverty in this chapter, which is the infant mortality rates of the countries, is explored in Figure 2.21. Accordingly, following the previous results, the constructed second financial inclusion index has the relatively highest correlation with immortality rates. The amounts of correlations are found to be -0.2429, -0.7033, -0.4437 and -0.4212 respectively. The negative correlation of poverty measures with our proxies of financial inclusion was economically expected. Higher levels of financial access are related to lower levels of poverty measures of economies.

These results are consistent with the literature so far. For instance, Chibba (2008a, 2008b, 2008c) and the World Bank (2008) have suggested that financial inclusion may promote pro-poor growth and help to reduce poverty. Similarly, Jones (2008) explored the importance of credit unions for relieving poverty in Britain. Hanning and Jansen (2010) also defended the notion that financial inclusion may help to reduce poverty levels.

Overall, these results show that the second index constructed in this chapter, which is claimed to be the most comprehensive and holistic financial inclusion index in terms of the number of indicators used in the construction process, has more holistic explanatory power than its peers.

2.6.5 Rank correlations between financial inclusion indices

As was explained above, as a robustness check for the constructed index results, we explored the rank correlation between two indices of financial inclusion in this chapter, performing Kendall's index rank of concordance estimation method. Table 2.19 tabulates the results of the method. Accordingly, in both 2004 and 2005, the ranks between the two indices were significantly and positively associated. It can also be concluded that the cross-sectional dispersion of the ranks of the indices did not diminish over two years. There is also evidence of stability amongst the ranks of the indices.

Table 2.19 Kendall's index of rank concordance for two indices

Year	Kendall's Index	Significance
2004	0.5928	0.000
2005	0.7204	0.000

2.7 Conclusion

In this chapter an attempt to examine the construction methods of the financial inclusion index was made by using the OECD's Handbook on Constructing Composite Indicators. For this purpose, first the extent of financial inclusion was measured by comparing economies and regions over time and constructing two indices. Various analyses were used as steps for constructing the financial inclusion indices, such as a Principal Component Analysis, factor analysis and normalisation. Finally, as the last step of index construction process, exploring their correlations with some country-specific income and poverty measures, we tested their explanatory powers.

One of the contributions of this paper is to help to analyse two types of indices used in the financial inclusion literature. By constructing these indices, the impact of adding more dimensions to the index construction process was explored, and the extent of financial inclusion rates across the world was shown and explained. Adding an eight-year time trend for the first index is another contribution of this chapter. With this study, adding a time trend allows us to see the progress of financial inclusion levels over time and how it has affected or has been affected by other factors.

Another main contribution of this chapter is to add other financial institutions as the third proxy of financial inclusion to the financial inclusion analysis. Access indicators from microfinance institutions, cooperatives, credit unions and post offices, along with the formal bank indicators, make this study more comprehensive than its peers so far. Therefore, this chapter develops the arguments of the studies by Gupte et al. (2012) and Beck et al. (2007 and 2008) in terms of adding time trends, more countries and access indicators from other financial institutions to the financial access measurements and regressions.

The results of the indices are as follows: The credit income ratio, deposit-income ratio and life insurance premium volume/GDP were found to be the primary indicators for the first index. In contrast to those indicators, geographic ATM penetration, bank cost-income ratio and geographic branch penetration were found to be the less important indicators for the first index construction. Similarly, most of the indicators are primary one for the construction of the index, except for the geographic branch penetration, which was found to be an indicator of secondary importance for the second index. On the other hand, consumer loan fees, ATM card fees, and the cost of international transfers indicators were found to be the indicators of the least importance.

Moreover, these results show that adding more indicators to the computation of financial inclusion index is feasible. Therefore, a more comprehensive measurement of access can be explored, using more indicators of financial access in an economy. However, countries index values, in terms of income classification, did not significantly change for either index.

Luxemburg has the highest values for all relevant years for the first index. The United Kingdom, Singapore and Japan are the second highest countries respectively in terms of the first index. However, the low-income countries of Nigeria, Myanmar, the Republic of Congo and Syria have the lowest financial inclusion values for the first index. It was also found that high-income countries have high financial inclusion ranks, while lower-middle and low-income countries have low rates, with some exceptions. Countries like Equatorial Guinea, Barbados, Aruba and Oman have lower rates, although they are considered among the non-OECD member high-income countries.

The results of the second financial inclusion index are consistent with the first index results. The countries index ranks did not reflect much difference for either index either. The results of Kendall's index of rank concordance support this argument by exploring the rank correlation of both indices for the relevant years. Using more indicators for the construction of the indices does not make a substantial difference in terms of country ranks. In the meantime, since the first index was constructed with fewer dimensions and indicators, and it was less comprehensive to

measure all aspects of the financial system, it has significant advantages, such as exploring time trends across countries and containing more countries, in terms of the data availability.

Adding more variables that represent different aspects of the financial system was found to be statistically significant, as it makes the index measurement more extensive. Construction of the second index is convenient to use in terms of measuring the degree of the financial inclusion and making a comparison across economies. However, construction of such an index has disadvantages, like comparing fewer countries and across fewer years because of the data limitations. Exploring the correlations of the proxies with some specific income and poverty measures, we found that all the proxies of financial inclusion were associated with income and poverty measures in this chapter. As explored in the final step of index construction process, the second financial inclusion index was found to have relatively better explanatory power than its peers in this chapter.

Finally, the inferential outcome for the index construction analysis is that using the process of the second index construction is superior to the first index method in terms of doing a comprehensive analysis to explore the levels of access, while the first index method is better than the second one in terms of making comparisons across nations, considering more countries and exploring the time trend, and using more years for the index.

Since the results show that adding new indicators of financial inclusion to the index construction process do not have any detrimental effect on the index and also can make it more comprehensible, new indicators that represent different aspects of financial inclusion can be used in future works. Additionally, this study should be further expanded by adding information on more countries, organisations, and years to the index construction process in order to get more comprehensive indices. In particular, collecting data from other formal and informal financial institutions and micro finance institutions into the measurement plays a vital role in making a fair comparison across countries, since some countries mostly use those kinds of services rather than commercial banks. In addition, using household base surveys ensures getting detailed information on the usage of formal and informal services.

Similarly, electronic or virtual systems are starting to be considered more for banking services. Specifically, almost all banks have started to use Internet and mobile banking services. Therefore, in order to explore financial access, gathering the usage of such data is important. Unfortunately, the data availability problem for these services remains big obstacle for this measurement. Policymakers or researchers should analyse the reasons for financial exclusion and how to extinguish these factors in the first place. The voluntary and involuntary reasons

should be deeply identified and researchers should also discuss proper policy solutions for these factors.

Since these indices help to design and evaluate new policy interventions for policymakers, it is important for researchers to focus more on this area. As a consequence, it would help to improve the process of building new policies in order to explore broader inclusive inclusion in an economy. While running regressions to examine the association between a financial inclusion index and other country-specific factors to measure the strength of the index and to explore the determinants of financial inclusion, the causal relationships and the directions of causality between them should be carefully checked. In the meantime, it is important to examine the impact of financial inclusion on country-specific factors, such as income distribution and poverty.

Chapter 3 The Effects of Financial Inclusion on Poverty

3.1 Introduction

There were 1.2 billion people living on less than $400 per year in the world in 1998. The poorest share of the population in an average economy was receiving less than 6% of the GDP in the 1990s. Meanwhile, more than half of the world was living on less than $2 a day. Approximately one billion people lived on less than $1 a day in 2001. However, the poverty gap is decreasing each year. Evidence shows that the income growth of the poorest segments was greater than the average GDP growth in countries with well-developed financial systems, in the 1980 to 2000 period (Beck, Demirguc-Kunt and Levine, 2004). The empirical economic growth literature focuses more on boosting average GDP per capita policies. For instance, Besley and Burgess (2003) argued that in order to reach the Millennium Development Goal and therefore reduce poverty, 3% of GDP per capita growth is required.

The association between finance and poverty reduction is a long-standing debate in the economic literature. Scholars and politicians have paid considerable attention to the finance-poverty nexus. As one of the earlier economists to investigate this, Schumpeter indicated that financial sector development through the banking system leads to economic growth by savings allocation. In the meantime, financial sector development has an indirect effect on poverty reduction through its contribution to economic growth (World Bank, 2001, p.6). Moreover, most of the existing studies show that financial development has a direct effect on poverty alleviation as well.

The empirical studies suggest that increasing the supply of financial services, which particularly targets disadvantaged groups and the poor, can directly lead to poverty reduction (Jalilian and Kirkpatrick, 2002). In order to reach this goal, more competitive financial markets allowing greater access to all segments in the economy are required (Rajan and Zingales, 2003). However, some other analyses question the impact of financial sector development on poverty alleviation. Since poor households are the most disadvantaged groups who mostly use informal services and family connections for capital, any potential boost in the formal financial sector will be helpful for only the rich groups in an economy (Bourguignon and Verdier, 2000).

There are remarkable differences in usage of formal financial services in developed and developing countries. The number of adults with an account at a financial institution is double that of developed countries (Beck et al., 2007a). Generally, the direct association between financial sector development and poverty reduction can be explained by the broader access to financial services for all segments of the society and specific services for poor and disadvantaged groups (Holden and Prokopenko, 2001; Odhiambo 2009).

Therefore, financial development may directly contribute to poverty alleviation by improving access opportunities for the poor, eliminating the causes of market failures, and strengthening the productive assets of the poor in developing countries (Jalilian and Kirkpatrick, 2005). The barriers of a financial market, such as asymmetric information, are considered among the fundamental causes of poverty by restricting poor and disadvantaged groups from accessing them (Stiglitz, 1998). Moreover, financial exclusion can be considered one of the main causes of poverty, implying that poverty results in a decrease in the level of demand for financial services while financial exclusion results in poverty. Thus, both financial inclusion and poverty have a bidirectional causative relationship (Bhandari, 2009).

For the past three decades, four billion people have been considered as financially excluded. In other words, four billion people live without an account with formal financial services and do not even have access to these services (Chibba, 2008c). The common reasons for financial exclusion are lack of enough money to pay for the expenses of banks and accounts, as well as the physical distance of bank branches from them. Financial and social exclusion are considered to be among several causes of poverty. Lack of access to financial services, such as not having a bank account or credit or not being able to save, which in turn leads to lack of investment in physical capital, and, finally, low or no investment, reduces productivity and eventually leads to lack of welfare in an economy (Honohan, 2006; Claessens, 2005).

In this context, policymakers and global institutions, such as the G20, are now focusing more on financial inclusion as a policy to achieve more inclusive growth. Poor, low-income earners and even small-scale entrepreneurs and micro-enterprises can benefit from financial inclusion, especially in developing countries, through enhancing money management, access to financial services at a fair cost and finding a safe place to have saving opportunities. Microfinance is believed to be the most holistic tool of financial inclusion to combat poverty around the world, especially in some specific developing and low-income areas, such as Bangladesh, where the Grameen Bank model was established, Bolivia and sub-Saharan Africa. Moreover, it is considered one of the most important development programmes around the world for poverty reduction (Van Rooyen et al., 2012).

Microfinance developed in importance after the early 1980s, and its fame has spread from less developed world to high-income countries in years. Countries like Bangladesh have been the host of microfinance institutions. Microfinance has a range of services for reaching its goal. The most common tools are small-scale credit and savings for individual clients and small and medium-scale entrepreneurs, such as micro-credit, micro-savings and money transfers. Other important services provided by microfinance institutions are investment and awareness-raising training for clients to get sustainable outcomes.

Microfinance is politically considered as redistribution and the emergence of a new self-investment opportunity tool to reduce poverty. However, contrary to the evidence on the positive impacts of microfinance for participants, the total benefit on general poverty levels in economies tends to be small. This is because the scale of transactions of microfinance institutions is not big enough to improve aggregate poverty levels in an economy. Moreover, since these institutions are in low-income economies, where low economic growth exists, increasing the rates of borrowing causes only incomes redistribution among people rather than furthering economic growth for the economy as a whole (Khandker, 2005).

Despite numerous studies that both empirically and theoretically examine the association between financial development and poverty, the studies investigating the effect of financial inclusion and poverty reduction are rare in the literature. Thus, this chapter aims to fill this gap by examining the association between financial inclusion as access to commercial banks and other financial institutions separately and poverty reduction, using a panel data from both developing and developed countries for the period 2004 to 2011.

Adopting the specifications laid down by Beck et al. (2004), this chapter examines the financial inclusion-poverty nexus by exploring various measures and concepts of both financial access and poverty. Exploration of the impacts of both commercial bank-based access and access to microfinance institutions, cooperatives and post offices on poverty reduction is the main contribution of this chapter. Since poverty is a multi-faceted concept, and there is no single definition of poverty, we use different measures for poverty in this chapter. As another contribution of this chapter, in order to capture various aspects of poverty, we use the income share held by lowest 10%, a headcount poverty ratio of $2 a day and the infant mortality rate as the proxies of poverty.

As mentioned above, the present study examines the drive to financial inclusion as the access, ease and use of bank accounts, such as savings, deposit, and credit accounts, and insurance services, along with the barriers to access to these commercial bank accounts in one single index. In addition to the commercial bank-based indices of financial inclusion, this chapter uses access to all financial institutions indicators to explore the impacts of financial inclusion on poverty reduction. Simply, following Beck et al. (2004), this chapter seeks to examine whether financial access, in terms of both constructed commercial banks-based financial inclusion indices and microfinance institutions, is pro-poor.

The findings suggest that there is a significant linkage between the financial access of both commercial banks (formal banks) and microfinance (other financial institutions) and income distribution related, health-related and absolute poverty definitions. In particular, our results

stress that financial inclusion has a positive impact on the poorest by boosting the growth of the income share of the lowest segments quintile. Furthermore, our results suggest that countries with better financial access levels in terms of both commercial banks and microfinance have had more reductions in infant mortality rates. Finally, we find that financial inclusion, in terms of both the commercial bank-based and microfinance access is strongly related to absolute poverty measures. In doing so, greater financial inclusion levels are associated with larger reductions in the percentage of the people living on less than $2 a day.

All these results of the measures of financial inclusion are robust in controlling for reverse causality and simultaneity bias. Meanwhile, they are also robust in controlling for various macroeconomic stability factors, such as GDP per capita growth, inflation, trade openness, and government expenditure. These control variables do not alter the results when they enter the regressions.

This chapter is conducted as follows: Section 2 discusses financial inclusion and poverty by determining and comparing the concepts. Section 3 identifies and compares the relevant literature on the association between financial inclusion and poverty. Section 4 determines the indicators that are used in this chapter and shows their sources. Section 5 indicates the empirical methodologies that are used to examine the association between financial inclusion and poverty in this chapter. Section 6 presents the empirical results of the models that are performed in this chapter, and, finally, section 7 provides a conclusion.

3.2 Financial Inclusion and Poverty Reduction

In recent years, specifically over the two decades, poverty definitions have become more sophisticated. The main argument on causes of poverty relies on the deprivations that affect people's livelihoods. The basic materialist belief, which is adopted by most of the poverty reduction studies, defines poverty as being unable to compensate for the basic needs of human life, such as food, shelter and clothing. Many scholars have debated the materialist definition of poverty and the mechanisms of deprivations recently. Under the materialist view, there are two main conditions of poverty. First, having a constant income under the poverty line in terms of income, consumption and expenditure, and, second, falling under the income, consumption and expenditure poverty line after suffering severe deprivation (Matin and Hulme, 2003). Furthermore, it is obvious that poor segments in the society fear taking risks to undertake investment for social and economic reasons. In other words, risk exposure prevents them building up new opportunities to increase their means. Thus, it can be concluded that risk exposure is one of the main reasons for poverty. However, it is important to distinguish between the poor and the poorest of the poor. Since the poorest segments of society require more severe

and direct actions to recover from poverty, these groups need to be treated separately by policymakers. Moreover, financial market barriers are also considered among the main reasons for poverty (Stiglitz, 1998).

Studies of financial inclusion and microfinance's effect on poverty reduction have adopted and explored various measures of poverty. For instance, the sizes of small loans are used as a proxy of poverty in many microfinance studies. This indicator infers that the smaller the loan, the poorer the borrower. Meanwhile, Khandker & Faruqee (2001) defined poverty as people who own less than half an acre of land. Moreover, Khandker (1998) defined poverty as consumption based on the nutritional requirements of borrowers in Bangladesh. He defined the poorest of the poor as per household consumption being less than 80% of Tk 5,270 in Bangladesh. Furthermore, Gibbons and Meehan (2002) explored two-folded poverty definitions for the poor and the poorest. Poor segments are defined as households with income that is amongst the top 50% of the poverty group, as officially constituted in countries. Meanwhile, the poorest are defined as households with income in the bottom 50% of the poverty group.

Financial inclusion has become more important, particularly for the economies of developing countries after the recent global financial crises and the ongoing food and energy crisis. As a result, a complementary and incremental approach to financial inclusion has gained importance more than on any other occasion in recent history. In the meantime, in most developed countries, especially after the latest financial crisis, there are many people who now need to pay more attention to specific regulations. For example, mature formal banks usually require detailed documentation even for small-seized loans, more detailed business plans and collateral in order to release loans for new entrepreneurs.

There are four key factors that are required to enhance financial inclusion and strengthen the financial inclusion-poverty reduction nexus. These are private sector development, financial literacy, micro finance and other specific financial institutions and public sector support (Chibba, 2009). These factors allow financial inclusion policies to offer sufficient solutions to combat poverty. For example, in providing public or private sector support, commercial banks, which have been unwilling to deal with low-income groups, started to play a critical role in financial inclusion and have been considered a source of addressing financial inclusion in recent decades. They started to offer new services to low-income earners, as well as the poor, throughout the world (Chibba, 2009). Also, in order to enhance inclusive financial systems, government policies play a vital role in this transformation. For instance, two leading commercial banks have provided new business opportunities to serve the unbanked in Guatemala (Gwinner et al., 2006).

Furthermore, the advocates of financial inclusion support the idea that broader access to financial services can effectively resolve the problems of poverty, foster entrepreneurship and increase the productivity of the poor, particularly in developing countries. Broader access to such services as saving accounts and credit services may also provide investment opportunities for productive activities for poor and disadvantaged groups. This includes education, start-ups and small-sized entrepreneurship. Without any access to these services, disadvantaged groups will have to face their own destinies with limited opportunities (Demirguc-Kunt and Klapper, 2013a). Additionally, access to efficient financial services, such as credit, may reduce the risk of the poor in terms of any shock situation in the absence of savings and insurance (Eswaran and Kotwal, 1990).

The efforts to support the poor using financial tools can be traced back to 15th century Italy and England. There were pawnshops built to weaken the usurious services provided by Jewish bankers in Italy. Meanwhile, charitable loan funding services used bequests in Britain. Similarly, Jonathan Swift's 'industrious tradesman' model was established to provide microcredits to the poor in Dublin in the 1720s. Unlike today's microcredits schemes, Swift's model required two liable co-signers to be found for each client to get the microcredits. This model spread to a large amount of Irish households until the 19th century. The German credit cooperative movement, which is considered the inspirer of today's microfinance institutions, was first established to cover the losses of big crisis in the 1850s in Germany. There has been lots of demand for microfinance products in world history; however, there is no evidence of a systematic decrease in poverty as a result of these tools till the arrival of Muhammad Yunus' Grameen Bank (Roodman, 2012).

This new microfinance scheme offers loans and small credits to be extended to groups of borrowers, especially women, who take the responsibility of each other's loans individually. In doing so, an auto control system emerges amongst borrowers to repay the loans. This system is believed to lower the quality of financial products, but is still necessary to reach the targets of the services. It creates competition and innovation, which are believed to reduce interest rates. Apart from the general impacts of microfinance, such as poverty reduction and women empowerment, it has further impacts on people's livelihoods by building income-generating industries that provide various services to poor households (Roodman, 2012).

In the 1990s, poverty reduction, especially in dealing with the poorest households, gained much importance and was debated at international summits. The OECD's International Development Goals and the Millennium Development Goals were established to mitigate poverty reduction during this period. As aforementioned, microfinance is believed to be a holistic and powerful tool to combat poverty. However, many scholars, in terms of reducing extreme poverty, have

challenged the concept of microfinance. The poorest segments of society live without microfinance services around the world. There are many studies that have explored the impacts of microfinance on poverty reduction, and found positive and negative impacts (Murdoch and Haley, 2002).

Some evidence shows that microfinance has positive effects on poverty reduction, while others criticise its impact, especially for the poorest of the poor segments. The evidences show that microfinance meets the conditions of the Millennium Goals. This means that microfinance has had positive impacts on people living on less than $1 a day, children's primary school enrolment, gender equality and women's empowerment, reducing infant, child and maternity mortality rates, and increasing health services access. A big amount of supportive studies stress the positive impacts of two main sources, income increase and vulnerability reductions for the poor. Meanwhile, studies that show evidence of impacts on health, nutrition and primary school enrolment are relatively lower (Wright, 2000; Khandker, 1998, 2001). In terms of excessive transaction and information costs, providing microfinance may be a burden to governments. Most of the microfinance programmes still depend on benefactor subsidies. Hence, the sustainability of these services is questioned. In doing so, the focus of benefactors and policymakers has shifted to the sustainability and affectability of microfinance institutions. It is estimated that only between 1% and 2% of all MFIs in all countries around the world are financially sustainable. Furthermore, 8% of MFIs are estimated to be profitable. 20% of all MFIs, which are mainly NGOs, are considered not yet sustainable but have the capacity to be profitable in the short term. The rest of the MFIs in the world, which are smaller organisations, depend on subsidies and do not have the capacity to be profitable in the near future (Hermes and Lensink, 2011).

The incomes of the poor are relatively inconsistent and unpredictable compared to others who have steady income. Poor people's livelihoods depend on their physical health situation and therefore are more fragile (Roodman, 2012). The reasons and solutions of the main problem of the poor segments are explained in Table 3.1 below. The reasons for the poor's lack of access vary. They include the social and physical distance from formal financial services, lack of education and asymmetric information. Social and physical distance can be explained as the locations of mainstream financial organizations' retail outlets. Low-income people, who live in relatively more isolated areas, have problems accessing financial services, as they are denied the use of financial services by these organisations. The mechanism behind this social and financial exclusion is lack of capital, unemployment and the cost for mainstream institutions of supplying small transactions (Beck, Demirguc-Kunt and Honohan, 2009).

These kinds of barriers are quite detrimental to those who want to start up new businesses or manage basic needs, such as education or health, with their limited budgets. These are mostly disadvantaged groups, such as young people, women, migrants and people from ethnic minorities. In order to have appropriate services for these types of groups, policymakers should use the financial inclusion tools that have been pointed to in this study.

As can also be seen from Table 3.1, generally low-income people and many micro entrepreneurs do not demand high amounts of loans; they just require small amounts of credit, which can serve their basic needs, and small investment plans. However, these types of loans are quite costly for big financial institutions, such as high street banks (Kempson and Whyley, 1998). In order to provide sufficient financial services to increase the living standards of poor and disadvantaged groups, appropriate policies, such as feasible organisational designs and technologies, which reduce costs, are needed (Gonzalez-Vega, 1994).

According to Table 3.1, one of the biggest reasons for poor people remaining poor is the economic and financial risk exposure. Poor people fear risks a lot to be able to undertake investments; thus, they exclude themselves from the mainstream financial system. One of the main targets of inclusive financial inclusion policies is to reduce this risk exposure on the poor to combat poverty. At this point, the importance of microfinance institutions as the most effective tool of financial inclusion is striking. In order to overcome those issues, credit officers for these specialised microfinance institutions knock on the doors of the poor.

However, not only do the poor need more attention by policymakers, but also middle-class groups need specific financial policies to contribute to the system. MFIs alone are not enough to create an inclusive financial system; other financial institutions, such as postal saving banks cooperatives, and consumer credit institutions are also necessary to reach this goal. Therefore, financial inclusion policies should not only focus on the improvement of efficiency and access of financial services for the poor and SMEs, but also include all underserved and disadvantage groups in society (World Bank, 2008). In order to provide efficient MFIs as a financial inclusion policy, policymakers should consider three important aspects, scale, depth and cost. Financial services should be provided to all segments of society; targeting the extremely poor segments only does not make much of a contribution to overall growth. Moreover, policymakers should lower the lending and delivery cost of these services (Hulme, 2006).

Table 3.1 Ways to increase impacts of microfinance

Main Problem	Causes	Solutions
A- Poorer/more disadvantaged people generally do not participate in microfinance programmes	1. Credit and savings groups exclude people they think won't be able to repay 2. Poorer/more disadvantaged people exclude themselves because they fear not being able to repay and of being stigmatized by the group 3. Loan and savings conditions are often inappropriate for poorer people. These include: · time-consuming frequent meetings · restrictions on loan use · short repayment and grace periods · limited access to savings	· Encouraging groups to include poorer members · Alternative guarantee systems for individual loans e.g. guarantors; use of household assets such as bicycles or plant pots as collateral · Asses building and training schemes to give poorer people skills, capital and confidence to participate · Training of staff so that arrangements for default do not drastically impoverish borrowersLess frequent meetings—not more than once a month · Loan use should be flexible and include 'consumption' loans · Flexible repayment and grace periods, tailored to borrowers' circumstances and activities · Flexible access to savings (i.e. short notice periods, not need to leave credit group)
B- Poorer more disadvantaged people generally increase their incomes less than betteroff people	1. Lack of skills, knowledge and social networks to make most of investment 2. Lack of initial capital and small loan size limits scope of investment 3. Markets often get overcrowded with too many similar enterprises	· Training to increase skills and knowledge and create own social networks · Asset building programmes related to microfinance scheme · Greater flexibility in loan size · Training, research and evelopment, improved technology and assistance in accessing new markets to enable borrowers to develop a wider range of enterprises
C- Failed enterprises can lead to impoverishment	1. Insufficient advice given to borrowers/misreading of market 2. Tough penalties for late repayment and default	Risk can never be eliminated. However it can be reduced and the consequences of a failed investment mitigated by: · Proper advice and assistance in identifying opportunities · Arrangements for rescheduling and repayment schedule according to borrowers' capacity
D- Microfinance can lead to increased inequality between 'better-off' – 'poor and poorest'	1. Exclusion of poorest 2. Greater capacity of better-off to benefit	· Ensure that support services are open to poorest even if they don't participate in microfinance programme · Try to harness potential of microfinance for collective action, as well as benefits to individuals and households
E- Men use loans made to women	1. Not enough loans are available to poor men 2. Men have better income-generating opportunities 3. Men and women see loan as household resource 4. Men resent women's independent access to resources	· Increase availability of loans to poor men · Training for women to enhance economic opportunities · Awareness raising to change attitudes towards women, cash and work · Support services for women to reduce particular constraints they face e.g. childcare · Accept this takes place and hold men responsible from repayment
F- Tensions within households may be increased	1. Men's status threatened by women's greater financial contribution 2. Workloads increased but may be inequitably shared 3. Stress of meeting repayments	· Awareness raising (as above) · Support services (asabove) · Rescheduling repayments · Ensuring loan is not beyond borrowers' capacity to repay at onset
G- Increases in income not translated into improvements in welfare	1. Attitudes to particular issues e.g. lack of knowledge of nutrition; discrimination against girls	· Education and awareness raising to address particular issue

Source: Table is derived from Marcus, Porter and Harper (1999, pg. 33-35).

As argued by Hulme and Maitrot (2014), microfinance institutions in South Asia no longer perform with a moral compass. They stressed that microfinance in South Asia started to work

like the mainstream financial systems in North America and Europe, which mainly focus on financial performance profitability rather than social outcomes. They have failed to help the poorest of the poor in that region by focusing only on financial performance and daily or monthly repayment targets. There is much misleading information on microfinance carried by the Western media, which present microfinance as the magical tool to combat poverty. But microfinance institutions have conceptual and technical problems in practice. Especially after the neo-liberalisation of finance over the last two decades, the UK and the US, for example, have changed the concepts and targets of financial institutions. Financial institutions no longer protect and care for their clients following this shift. Their focus has shifted more onto the profitability of the services. Similarly, the microfinance institutions, which were built to combat poverty by improving the economic and social standards of poor people, have shifted their concerns more to financial performance. There is a cycle of pressure in this context, from the managers of these institutions through to the loan officers and finally to the clients. The clients, of course, are the most vulnerable part of this cycle, especially women (Hulme and Maitrot, 2014).

In order to overcome these problems and return the microfinance and its main aim to combat poverty, some solutions have been proposed. Rather than just closing down microfinance institutions, they need to be modified to help poor segments, which was why they were created in the first place. Moreover, microfinance institutions are better solution than informal moneylenders in any case. If the market is left to informal lenders, it may result in the worst scenario for both the market and clients. Another solution might be encouraging central banks to provide and push MFIs to decrease their costs and be transparent to their clients. The final solution could be challenging the founders and directors of leading MFIs to re-structure the concepts of microfinance services by mainly focusing on social performance and removing the pressure on branch employees to maximise their targets (Hulme and Maitrot, 2014).

Many empirical analyses so far suggest that these kinds of analyses attract policymakers to devise financial inclusion policies (Demirguc-Kunt and Klapper, 2013a). Additionally, this study allows us to identify the degree to which certain groups have been excluded from the formal financial system in the economies. We noted the importance of providing specific regulations for disadvantaged groups in an economy by constructing a single index, together with the range of barriers to banking services, such as price exclusion, condition exclusion and marketing exclusion. Here, price exclusion infers that financial services are provided quite expensively by formal institutions; conditional exclusion implies that the conditions of the existing financial products are not appropriate for the poor, and, finally, marketing exclusion implies that mature formal financial institutions are unwilling to provide the poor with their

services (Collard, Kempson and Whyley, 2001). This index shows the extent of financial inclusion at a point of time in an economy as a single figure between zero and one. Such an index will also help policymakers to provide sufficient regulations for areas and groups that need more attention in terms of financial inclusion.

Furthermore, as the main contribution of this chapter, we added access indicators from all financial institutions, including microfinance institutions, cooperatives and post offices into our impact analysis in order to examine the impacts of finance access by both commercial banks and other financial institutions on poverty reduction.

3.3 Related Work

The association between finance and poverty reduction has been assessed extensively in the literature. However, researchers have mostly focused on the association between poverty alleviation and financial development in terms of the finance-poverty nexus. Hence, a considerable amount of literature contains specific empirical and theoretical analyses on this nexus. Studies that brought original contributions to the literature used bunch of financial variables and tested whether financial development matters for poverty. Some others that also made original contributions to literature explored the mechanisms of financial development though enhancing poverty reduction such as inclusive financial systems and holistic levels of financial access. As the main mechanism to achieve financial development, financial access is widely assessed in terms of its impacts on poverty reduction. In this sense, microfinance services, which are the main tools of financial access (financial inclusion) policies to combat poverty, are extensively examined in the literature so far. Studies that examine all these arguments above are discussed in this section.

There are many empirical studies that examine the finance-poverty nexus in the literature. Dollar and Kraay (2002) argued that financial development, as a public policy target, raises the average income of people. Thus, they empirically investigated the association between growth in overall incomes and the incomes of the poor for the past four decades. The results show that the incomes of the poor increased evenly with average incomes. Therefore, the policies and institutions that cause an increase in average incomes raise the incomes of the poor. Overall, Dollar and Kraay claimed that liberal economic policies might lead to an increase in the incomes of the poor. In the meantime, Sharma, Didwania and Kumar (2011) argued that inclusive growth plays a vital role in reducing poverty rather than increasing GDP alone for India.

Moreover, Jalilian and Kirkpatrick (2002) argued that financial development leads to poverty alleviation in less developed countries. The policies of inclusive financial sector development

may help in reaching poverty alleviation targets in developing countries. Similarly, Clarke, Xu and Zou (2003) explored the association between financial development and poverty alleviation. In doing so, they are found that higher financial sector development comes with decreasing poverty rates in relevant economies. Honohan (2003) showed that finance-intensive growth, which is measured by financial depth, is negatively and significantly related to headcount poverty. Financial depth is considered to be associated with increases in the lowest income quintile's income share across economies, as assessed by Beck, Demirguc-Kunt and Levine (2007b).

Moreover, the association between financial sector development and poverty reduction is found to be similar in the literature, with some exceptions in Ghana. Financial development does not Granger-cause savings, but it reduces poverty. Also, it is positively associated but insignificant with regard to poverty reduction. In addition, saving mobilisation resulted in Granger-cause poverty reduction in Ghana. The reasons for this result can be examined as financial sector development effects, which are positive but insignificant for poverty reduction, and savings, which are not channelled to the pro-poor sectors. Also, co-integration between financial development and poverty reduction has been found in the long run in Ghana (Quartey, 2005).

Similarly, Odhiambo (2009) analysed the dynamic causal association between poverty alleviation, economic growth and financial developments in South Africa in order to identify the leading sector for poverty reduction. The findings of the study show that economic growth causes financial development, which in turn leads to poverty reduction.

Although several studies have been conducted to explore the association between financial development and poverty reduction in terms of the finance-poverty nexus, there are few studies to empirically or theoretically investigate the effects of financial inclusion in terms of formal bank access, on poverty reduction. However, studies that examine the impacts of financial inclusion on poverty extensively considered microfinance institutions as a powerful tool to combat poverty.

The literature empirically and theoretically suggests that financial inclusion can lead to poverty reduction and promote pro-poor growth (Chibba, 2008a, 2008b, 2008c; World Bank, 2008). Chibba (2007 and 2008b) suggested that financial inclusion is considered the new frontier in international development and poverty reduction in terms of inclusive development literature. In order to measure the extent of financial inclusion, determining the barriers of financial access is vital. Disadvantaged groups such as low-income households, immigrants and ethnic minorities are mostly financially excluded, particularly in the developed countries that have a well-

developed banking system (Barr, 2004; Kempson and Whyley, 1998; and Connoly and Hajaj, 2001).

As aforementioned, enhancing broader access to financial services, particularly for the disadvantaged groups and the poor, by focusing on credit and risk insurance services, increases the productivity of targeted groups and enables them to get involved into the financial system (World Bank, 2001, p. 75). Building particular financial services for the poor also improves their overall life quality by creating sufficient saving provision, credit and insurance facilities. In addition, financial exclusion takes place where unemployment or informal sector employment is high (Buckland et al., 2005, and Kempson and Whyley, 1998).

Studies showed that children of financially included households, who are, more likely to stay in school longer than those of financially excluded houses, are still financially excluded. Furthermore, broader access to formal financial services such as credit, savings and income improvements for disadvantaged groups tend to reduce the number of child labourers (UN, 2013). Similarly, Dupas and Robinson (2009, 2011), and Ashraf et al. (2010) indicated in their field experiments that an increase in the levels of access to savings accounts or simple informal savings technologies for people increases their consumption, productivity, income and investment in preventive health levels. Hannig and Jansen (2010) discussed how financial inclusion might lead to financial development, economic growth and poverty reduction. Therefore, increasing access to finance for the poor might have a positive effect on their living standards.

As a stronger tool of financial inclusion, microfinance has sustainable impacts on poverty. It helps to reduce poverty by increasing the living standards of clients. This attracts and convinces policymakers, NGOs and even individual benefactors to support the services of microfinance institutions. However, it is important to make these impacts clear to fully understand the context. There are still questions on the impacts of microfinance on extreme poverty, long-term sustainability and the cost of using such services (Hermes and Lensink, 2011).

There are specific policy tools that can achieve financial inclusion in different economies, such as microfinance institutions, credit unions, post offices and mobile banking services. Numerous studies show the efficacy of these policy tools in groups of different countries. Jones (2008) examined the role of credit unions in combating poverty in terms of financial inclusion policies in Britain. The study indicated that credit unions are the most successful weapon among other financial services in reducing poverty. Hence, in the late 1980s, the British government started to support credit unions more in order to achieve poverty alleviation and provide strategic services for the disadvantaged segments in society.

There are various empirical analyses that examine this association in the literature. Leyshon and Thrift (1995) and Kempson and Whyley (2001) found that people residing in rural areas and neighbourhoods isolated from urban financial areas tend to be financially excluded. This shows that geographic barriers are important for describing financial exclusion. Furthermore, Karlan and Zinman (2007) analysed the behaviour of declined loan applicants who were offered loans later as an experiment in South Africa. The results of the experiment showed that the treated applicants showed substantial progress in earning more, thus overcoming poverty. Overall, Karlan and Zinman have argued that promoting access to credit, particularly short-term loans, helps to improve people's welfare.

Pitt and Khandker (1996) examined the impact of microfinance on the wellbeing of people in Bangladesh using household survey data from 1991 to 1992. They argued that access to microfinance services might lead an increase in consumption expenditure. This impact is more obvious in women clients' loans. Dunford (2006) and Littlefield, Morduch and Hashemi (2003) also supported the argument that financial access may lead to income growth and reduce poverty by increasing the income-generating activities of clients. Khandker (2005), examined both the participant and aggregate level effects of microfinance on poverty in Bangladesh, finding that the impacts of microfinance are perceived more for the poorest of the poor. They argue that at the village level, increasing the access of microfinance has positive effects on poverty reduction, especially for women participants. Using the same household survey data, Chemin (2008) found that increasing access to microfinance services might lead to increases in the labour supply and school enrolment. Moreover, Dalla Pellegrina (2011), using a household survey from Bangladesh, compared the impacts of microfinance, banking loans and informal credits on investment rather than only focusing on income, consumption or education. This paper found that microfinance loans help to boost non-agricultural working capital expenditure, whereas bank loans increase agricultural fixed assets. Hence, they claimed that in terms of long-term investments, bank loans are more sustainable than microfinance.

In contrast, Becchetti and Castriota (2011) explored the impacts of microfinance before and after the tsunami in Sri Lanka in 2004 by examining both the victims and the non-victims of the disaster. Accordingly, they stressed that access to services from microfinance institutions was among the main tools for triggering income growth and reducing income inequality. Especially after the disaster, microfinance loans helped borrowers to recover their situations and reduce the income gap between victims and non-victims. Hence, they claim that this study is a good source for proving the efficacy of microfinance as a recovery tool that can be used by policymakers and NGOs. Hanmer and Naschold (2000) empirically explored the attainability of DAC International Development Targets. They claimed that along with the positive impacts of

economic growth, other country-specific indicators, such as income inequality and government policies, might have important effects on poverty reduction and human development levels. They argued that labour-intensive growth, such as agricultural growth, is more successful for poverty alleviation than any other measures of growth.

Many scholars defend the suggestion that financial inclusion helps achieve good opportunities for the poor and improves social inclusion in an economy. Therefore, it can be a good weapon for policymakers to overcome poverty. The advocates of the effects of financial inclusion on poverty reduction have been examined so far. However, there are some conflicting results on those effects in the literature. Bhandari (2009) claimed that financial inclusion, marked by the growth in the bank accounts of commercial banks, is not significantly related to poverty reduction in the segments that are below the poverty line in India. Bhandari noted that financial inclusion registered as growth in commercial bank accounts is not significantly associated with changes in the population in India that is below the poverty line. Overall, Bhandari argued that promoting access to banking services and making it available to everyone in society does not contribute to poverty reduction in India. Instead, building inclusive financial systems strategies that are financially and socially sustainable should be the priority for poverty alleviation.

One of the main arguments on the impacts of microfinance on poverty relies on the concept of extreme poverty. Some researchers defend the notion that microfinance also has inclusive impacts on the livelihoods of the poorest. However, others claim that microfinance fails to alleviate extreme poverty. For instance, Banerjee et al. (2015) empirically examined the impacts of a multifaceted graduation programme on extreme poverty for six countries. This programme is conceptually different to microcredits in many ways. Therefore, these kinds of programmes do not force people to repay credits. The programme provides many opportunities to clients in the form of complementary loans, training and individual support programmes that include cash consumption support, providing saving accounts, and giving information on health. Performing baseline surveys at the end of the programme, they measured the outcomes on clients' consumption, household assets, financial inclusion levels, and household income, physical and mental health, and even political involvement. They found there were significant effects for this programme on participants' wellbeing even three years after the programme. In doing so, they claim that the graduation programme may help to increase the income and consumption levels of extremely poor households.

Moreover, using a cross-sectional survey data of 434 clients of MFI's from Mexico, Biosca, Lenton and Mosley (2011) empirically explored the participation choices and impacts of some specific voluntary non-financial services on the monetary poverty outcomes of clients. They found that the decision about participation varies according to the characteristics of clients.

Moreover, non-financial services have a positive impact on poverty for relatively poorer borrowers. Similarly, unlike this piece of evidence, microfinance has been found to be relatively cheaper and successful in terms of poverty alleviation for those groups close to the poverty line compared to other anti-poverty policy tools. However, it was found to be ineffective in reducing extreme poverty in regard to the labour market and infrastructural measures (Mosley, 2010).

Meanwhile, as mentioned above, the impacts of microfinance services on poverty reduction have also been questioned. The fundamental challenges and shortcomings of MFIs' effects on poverty reduction in the literature rely on some specific topics, such as lack of scale, that MFIs are not serving all the disadvantaged in society, lack of supply for larger microenterprises, high lending costs, mature MFIs paying less attention to the poor, the and impacts on the poorest segments in society (World Bank, 2008; Honohan, 2004; Cull et al., 2007). Thus, despite the potential direct and indirect effects of broader access to financial services on poverty and any potential contribution to development, there is some evidence that suggests that micro-credits, as a policy tool of financial inclusion, do not have a significant effect on poverty reduction and, in some cases, can have a detrimental impact on the poor (Hulme and Mosley, 1996).

Scully (2004) and Simanowitz (2002) questioned the substantial impacts of financial access on poverty reduction. They argue that microfinance fails to deal with extreme poverty. Thus, microfinance programmes intentionally exclude the poorest of the poor. There are various reasons for this situation. First, a lack of confidence and education of the poorest people may cause this to happen. They generally choose not to use such services because they do not want take risks on future investments. Second, since the group-lending programmes of microfinance institutions require cooperation from all members of a group, other members might exclude poorest clients. Third, microfinance institutions staff may want to avoid providing loans to poorest clients because they see it as too risky. Fourth, the structure and mechanisms of the microfinance programmes themselves may cause the exclusion of the poorest clients. Generally, the requirements for the usage of such services are too onerous for such clients (Ciravegna, 2005; Hulme and Mosley, 1996; Mosley, 2001; Marr, 2004). Using a survey data constructed by means of a village-banking programme in Peru, Copestake et al. (2005) examined the direction of the impacts of microfinance services. They found that relatively wealthy clients benefited more from the services rather than extreme poor clients. Furthermore, using a randomised approach, Coleman (1999, 2006) explored the impacts of microfinance in Thailand. The results showed that the impacts of microfinance services only worked for wealthier borrowers.

Roodman and Morduch (2009) re-examined the study of Pitt and Khandker (1998), which is one of the most influential microcredit impact studies in the literature. They empirically tested Pitt and Khandker's outcomes that showed the positive impacts of microcredit on poverty. They

claimed that the original outcomes are altered when they drop the outliers in the data or use a robust linear estimator. Overall, using mixed process maximum likelihood models as the new estimation technique, they claimed to disprove the findings of Pitt and Khandker (1998), who stressed microcredit, tends to reduce poverty. Meanwhile, Mosley and Hulme (1998) explored the impact of microfinance on poverty and checked its effect in terms of MFI design specifications, using 13 microfinance institutions in seven developing countries. They stressed that as borrowers' household income increased, their income, consumption and asset positions, and investment opportunities developed for all institutions they examined. Moreover, the impacts of microfinance programmes are high for more substantial financial institutions than less substantial institutions. The impacts of the programmes that the institutions offer for borrowers are higher for relatively less poor clients than poorer clients. These programmes mainly contain microcredit and skill trainings in practice. They are mostly cost effective services, but they fail to reach the poorest of the poor because of the mechanisms they use. In order to overcome this issue, new lending methods that specifically target the poorest borrowers need to be used. More flexible insurance, savings and loan services conditions should be provided to reach the poorest people (Montgomery, 1996; Rutherford, 1996).

Matin and Hulme (2003) examined the impacts of the IGVGD programme, which was established to reach those in extreme poverty in Bangladesh. This programme aims to overcome extreme poverty by combining livelihood protection and promotion mechanisms at the same time. They claimed that these kinds of mixed programmes are major ways of combating extreme poverty. According to the results, in order to achieve the targets of the programme, some mechanisms needed to be adapted. The reduction of extreme poverty process is not linear; thus, the range of livelihood protection tools, such as complementary grants, emergency credits and health insurance services need to be supplied for the poorest clients. Since the speed of extreme poverty reduction varies for the poorest borrowers, programmes should be flexible in considering each client's situation. Direct limited transfers generate healthy human capital and create investment opportunities for the poorest, but in order to deal with all types of extreme poverty examples, transfers should be developed. In order to help them to generate their own livelihoods, material and financial transfers are also vital sources.

Another criticism of microfinance relates to its impact on women. Since, women are considered the most important and reliable source for combating poverty within households, most microfinance services directly target them. However, this does not work properly in practice. Experiments have shown that some of female clients are forced to hand over the money to men. Hence, women are held responsible for repaying the loans that are consumed by their partners or husbands (Goetz and Gupta, 1996). For instance, Manji (2010) looked at the links between

access to financial services and poverty reduction established in his paper, which essentially analyses the policy advice of the UK White Paper on International Development report, in terms of gender equality and access to land. The results showed that expanding access to credit services, particularly on behalf of women who are mostly vulnerable in developing countries, would be beneficial in terms of gender equality on access to land issues. However, Manji argued that it is difficult to find the link between the promotion of financial inclusion and the asserted aim of international development to combat poverty.

In their systematic review analysis Van Rooyen et al. (2012) explored the impacts of micro-credit and micro-savings tools on people's wellbeing in sub-Saharan Africa. They checked the impacts of these services on people's income, consumption expenditure and assets, and non-financial outcomes, such as health, food, education and job creation. The evidence showed both beneficial and harmful results for micro-credit and micro-saving services on people's wellbeing. They stressed that high quality papers bring less positive evidence than medium quality papers with regard to the impact of microfinance on poverty. For instance, high quality papers showed that microfinance might increase poverty, decrease the levels of child education and discourage women entrepreneurship. In contrast, these services have positive effects on food security and nutrition. The evidence shows that there are positive impacts of micro-credit and micro-savings for health, food security and nutrition. In contrast, the impacts of such services on education and the general income of the poor vary across clients and regions. It can be concluded that the impacts are obvious for the immediate needs of the poor, such as providing health, food and clothing. However, these impacts are not clear for more complex macro factors such as the poor's human capital (Van Rooyen et al., 2012).

Furthermore, Hamid, Roberts and Mosley (2011) stressed that there is an obvious positive impact of micro-credit on poverty reduction, but adding micro health insurance, as a new tool of micro-credit schemes does not show the same impacts. Micro health insurance tools were found to have a positive relationship between the poverty measures that are used in this paper, but it is still too early to have certain outcomes for these tools using the current data. However, they claimed that micro health insurance services have a clear significant positive association and importance for food sufficiency.

Finally, Roodman (2012) argued that microfinance services with small loans for poor clients do not have any positive impact on clients' wellbeing. However, financial services that offer clean water and electricity are vital for the poor to adapt in modern life. In order to achieve the holistic impacts of microfinance on poor clients, he made some suggestions to providers of microfinance services. First, he suggested that policymakers, donors and investors of microfinance should avoid extending credits to the poorest of the poor. Second, in order to

prevent bubbles, they should be reasons for investing more on microcredits for the poor. Third, relatively safer services, such as insurance, savings and money transfers, were the best tools to reduce poverty. Finally, developing new technologies to reduce the cost of service supply was another major development for microfinance services to consider in combating poverty.

3.4 Data

In this chapter, the annual panel data, which covers the period 2004 to 2011 for 143 developed and developing countries of the world, is described. Since this chapter seeks to explore the potential impacts of financial inclusion on poverty reduction, poverty and financial inclusion are the main variables in the model. Additionally, the set of variables devised by Beck et al. (2004) was used to control the poverty-financial inclusion nexus.

3.4.1 Data Sources and the Definitions of Variables

3.4.1.1 Poverty

In recent years, poverty definitions have become more complex. The main argument on causes of poverty relies on the deprivation that affects people's livelihoods. The basic materialist belief, which is adopted by most of the poverty reduction studies, defines poverty as being unable to compensate basic needs of human life such as food, shelter and clothing. Under this philosophy, there are two main conditions of poverty. First, having a constant income under the poverty line in terms of income, consumption and expenditure. Second, falling under the income, consumption and expenditure poverty line after severe deprivations (Matin and Hulme, 2003). Thus, there are different levels and measures of poverty; therefore there is no academic consensus on definition of each poverty measure in the literature. Meanwhile, since poverty is a multi-faceted context, it is not possible to give a single definition of poverty. As was suggested in the World Bank's World Development Reports there are various measurements that explore the different aspects of poverty, as explained above (Murdoch and Haley, 2002).

Extracting poverty data is difficult for a large number of countries, particularly developing countries. This is because most countries, especially developing ones, began to gather data in the late 1990s, and most of the existing data did not contain annualised data. Some researchers have used datasets, which imply both income and headcount aspects for the poor, while others have used income per capita to represent poverty reduction in the literature.

In adopting the specifications devised by Beck et al. (2004), this chapter examines the financial inclusion-poverty nexus by exploring various measures and concepts of both financial access

and poverty. Since poverty is a multi-faceted concept, we use different measures for poverty in this chapter. As another contribution of this chapter, in order to capture various aspects of poverty, we use, a headcount poverty ratio of $2 a day, income share held by the lowest 10% (and 20%), and infant mortality rate as the proxies of poverty.

'*Growth of Headcount poverty ratio at $2 a day as the percentage of population*' is used in this chapter as one of the measures of poverty. This proxy of poverty gives the share of the population who lives on less than $2 a day, which is calculated using the World Bank's 2005 international prices. Therefore, this data is extracted from the World Bank World Development Indicators database. Following the method by Dollar and Kraay (2002), we use this indicator as the *growth of headcount poverty ratio* by calculating the log difference of the last and first values of the headcount ratio and dividing this outcome by the number of years. Using a longer time frame might cause some problems for this data, such as crises and business cycle fluctuations. However, using an eight-year time frame might alter any potential influences, such as outlier effects, financial crises and business cycles.

Growth of Income share held by lowest 10% (and 20%) variables, which are calculated as the percentage share of income by subgroups of population, are used as the second proxy of poverty in this chapter. This data is also extracted from the World Bank World Development Indicators database. Similarly, we use the *growth of the lowest income quintile* by calculating the log difference of the last and first values of headcount ratio and divide this outcome by the number of years in this chapter. We use this indicator to examine how financial inclusion affects the poorest quintile in each country.

Finally, in order to add a health-related poverty measurement, we add changes in infant mortality to our analysis in this chapter. This proxy infers infants who die before they reach one year of age. It is also extracted from the World Bank World Development Indicators database. This measure of poverty will allow us to test the social effects of financial inclusion.

3.4.1.2 Financial Inclusion

In order to predict the effects of financial inclusion on poverty, we use two main proxies of financial access in this chapter. The first proxy is the index of financial inclusion, which was constructed by the author in the first chapter for the period 2004 to 2011. This index of financial inclusion is identified as the usage of formal financial services supplied by commercial banks. In other words, it is the growth in deposits, checking, savings and loan accounts of commercial banks for households and SMEs. Since data were aggregated from different sources for each dimension of financial inclusion index, it has its own restrictions in terms of the extent of the

financial system in those economies. Specific regulations and the general preferences of using financial services, such as cultural and religious reasons to either use or avoid some specific services for an economy, may lead to inconsistent measures of financial inclusion (Beck et al., 2009).

In the meantime, as mentioned above, we have only used commercial bank-based indicators and did not consider other financial institutions because of the vast literature and lack of access to such data for other financial institutions for the index. This situation may lead to inconsistencies for some countries' scores in the index. Countries such as Bangladesh, Malaysia and India mostly use other financial institutions, such as microfinance institutions. Therefore, our banking based indicators of the index scores may give inconsistent results for those countries. After explaining these restrictions for the index data, it can be claimed that this data still allows us to explore the extent of financial inclusion, reasons of financial exclusion, as well as provide some hints to remove the barriers of access. As a composite indicator, our index also allows us to investigate how financial inclusion levels vary across countries, using specific dimensions and indicators of these dimensions in the construction process as explained in the previous chapter. These dimensions indicate the effects of the barriers to financial inclusion, such as geographic, demographic and cost barriers of access. In doing so, the index measures many aspects of financial inclusion in economies.

Since the index captures the use, ease, access and cost of the financial services, it can be claimed that it indicates both the supply and demand side of financial services, which is an important aspect of such an analysis in terms of contribution to the literature. The index is constructed as a composite indicator between [0, 1], using these dimensions above. In this range 'zero' means absolute exclusion, while 'one' means absolute inclusion. In order to construct such an index for financial inclusion, data availability is considered as the main challenge. As mentioned above, data was collected from different sources for each dimension and the indicators of these dimensions for the years from 2004 to 2011.

As one of the main contributions of this chapter, and as a robustness test for the results of commercial bank-based financial access impact on poverty, we also use a second proxy for financial inclusion to explore the effects of financial services on other financial institutions, such as microfinance on poverty. In doing so, a second analysis is performed to add the effects of financial services from both conventional banking outreach and access to other financial institutions on poverty.

Therefore, a new set of data for financial inclusion, which contains the indicators of financial services from other institutions like microfinance ones, is used in the second analysis. This new

proxy of financial inclusion is calculated by taking the difference of formal financial institutions from all financial institutions. The World Bank's Global Financial Inclusion (Global Findex) Database 2011 is the source of all financial institutions indicators. However, despite the multidimensional financial inclusion index in the first model, this new model consists of a single indicator for the proxy of financial inclusion because of the data availability problem.

3.4.1.3 Other Control Variables

Following the study by Beck et al. (2004), some specific variables have been used in order to control the relationship of the poverty-financial inclusion in this chapter. GDP per capita growth levels are added to the right-hand side of the equation as an additional explanatory variable to investigate the indirect impact of financial inclusion on poverty reduction, which comes from income growth. The World Bank WDI 2013 database is used to collect the data of the per capita income growth variable. Moreover, in order to control the relationship between the financial inclusion and poverty in the model, some additional control variables are considered, such as general government final consumption expenditure (% of GDP), inflation, trade openness, legal origin and political stability.

The data on general government final consumption expenditure, inflation and trade openness are extracted from the World Bank Development Indicator (WDI) 2013. Trade openness here is calculated as imports plus exports as a share of GDP for the model. With regard to political stability, as explained above, the World Bank's Worldwide Governance Indicator (WGI) database's political stability index, which lies between -2.5 and 2.5, is used. The high values of this index represent higher stability, while small numbers indicate lower stability rates for government.[15] Moreover, data on time-invariant variable legal origin is constructed from the CIA World Factbook. The legal origin variable is used to control the models in terms of the constitutional means of the countries. There are five constitutional groups in this category: Civil, Common, Islamic, Customary and Mixed Law. Finally, we use the World Bank's continental dummies to control for the geographical classification of the results.

3.4.2 Summary Statistics and Correlations

Table 3.2 explains the summary statistics and correlations of the data. The first table presents the summary statistics of the data, while the second table presents the pair-wise correlations of the variables. Accordingly, all financial inclusion measures that are used in this chapter seem

[15] This index is used to capture the possibility that the government will be weakened or faced with certain critical situations, such as getting overthrown by unconstitutional means. This can be done through politically motivated violence or terrorism in the relevant country.

negatively and significantly correlated with the poverty definitions except for the income share indicators of poverty. Meanwhile, these outcomes are consistent with the literature so far. The first financial inclusion index, as the proxy of financial access, seems to have relatively better associations with our poverty measures. Moreover, proxies of financial inclusion seem to have relatively bigger correlations with the health definition of poverty, which is defined as infant mortality rates.

Table 3.2 Descriptive statistics and correlations

3.2A:

Variable	Obs	Mean	Std. Dev.	Min	Max
Growth of Headcount Poverty	99	0.095	0.195	-0.567	0.984
Infant mortality	141	31.038	28.678	2.250	117.710
Growth of Income Share lowest 20%	61	0.130	0.060	-0.049	0.353
Growth of Income Share lowest 10%	64	0.110	0.062	-0.075	0.390
1st Financial Inclusion Index	143	0.217	0.081	0.018	0.475
2nd Financial Inclusion Index	56	0.363	0.154	0.117	0.693
All financial Institutions Access	143	46.120	31.691	1.522	99.737
Other Financial Institutions Access (Residuals)	143	0.000	0.894	-2.938	1.713
GDP per capita growth	118	2.799	3.740	-7.290	18.690

3.2B:

	Growth of Headcount Poverty	Infant mortality	Growth of Income Share lowest 20%	Growth of Income Share lowest 10%	1st Financial Inclusion Index	2nd Financial Inclusion Index	All financial Institutions Access	Other Financial Institutions Access
Growth of Headcount Poverty	1.000							
Infant mortality	0.841***	1.000						
Growth of Income Share lowest 20%	-0.085	0.075	1.000					
Growth of Income Share lowest 10%	0.107	0.216	0.202	1.000				
1st Financial Inclusion Index	-0.375*	-0.437*	0.278	0.223	1.000			
2nd Financial Inclusion Index	-0.337*	-0.306***	0.007	0.067	0.161***	1.000		
All financial Institutions Access	-0.153***	-0.099***	0.007	0.389	0.078***	0.731***	1.000	
Other Financial Institutions Access	-0.092***	-0.248***	0.200	0.092	-0.492	0.364***	0.707***	1.000
GDP per capita growth	-0.209	0.039	0.468*	0.070	0.619	0.147	-0.056	-0.580

***, **, and * show significance levels at 1, 5, and 10% respectively

Furthermore, correlations between the four different proxies of financial inclusion and macroeconomic country factors were explored using scatter diagrams in the previous chapter. It is also important here to be clear that these country-specific variables are different from the ones used in constructing the indices. These diagrams allow us to examine the data in terms of

potential outliers in them. These graphs explore the correlations in the first index, the second index and the access indicators from all financial institutions indicators, along with the residuals as correlations of other financial institutions with the poverty levels of the countries concerned. According to the diagrams, the results are not strong enough to claim a perfect correlation between financial inclusion measures and the income share levels of the countries. However, the commercial bank-based financial inclusion indices have a relatively better association with the income share of the lowest quintile with the correlations of -0.352 and -0.227 respectively.

On the other hand, the second index has better correlation than the first index in terms of income share levels. In the meantime, the access indicators from all financial institutions variables also have a good correlation with the income share levels. Meanwhile, all the proxies of financial inclusion above have negative correlations with the income share indicators. Accordingly, countries that have higher financial access rates are associated with poverty levels. Countries such as Azerbaijan, South Africa, Kazakhstan and Bangladesh can be considered as outliers in the data.

Regarding the association between the proxies of financial inclusion and headcount poverty, the graphs show that the other financial institutions and all financial institutions indicators seem to have a relatively better association with poverty, with the correlations of -0.923 and -0.942 respectively. Meanwhile, the Democratic Republic of the Congo, Armenia and Georgia can be considered as outliers in the data.

Similarly, the correlations with the infant mortality rates are highest for the second financial inclusion index as the proxy of financial inclusion is -0.780. In the meantime, South Africa, Croatia, Lebanon, Malta and Swaziland are considered as outliers in the infant mortality data. These results are economically expected and consistent with the literature. Higher levels of financial access are associated with lower levels of poverty measures of economies. For instance, as was argued in Chibba (2008a) and by the World Bank (2008), financial inclusion might promote pro-poor growth and help to reduce poverty.

3.5 Methodology

Adopting the model specifications devised by Beck et al. (2004), we first perform OLS regressions to explore the association between our financial inclusion measures and poverty definitions. Then, in order to overcome the possible inconsistencies using OLS regressions, such as unobserved heterogeneity and dynamic endogeneity, we use instrumental variables estimations in this chapter. Using the empirical estimations of Beck et al. (2004), we test our

financial inclusion measures in terms of their explanatory powers and impacts on poverty reduction.

3.5.1 Ordinary Least Squares Estimations

We start our analysis using cross-country estimations to explore the linkage between our proxies of financial inclusion and three main poverty measurements separately by averaging the data over the relevant years. We use the following equation:

$$(y_{i,t} - y_{i,t-n})/n = \alpha + \beta' FI_{i,t} + \beta'_2 X_{i,t} + \varepsilon_{i,t} \qquad (1)$$

In this equation, $y_{i,t}$ is either the logarithm of the (i) headcount poverty ratio as the proxy for poverty for country *i* in period *t*, (ii) income share held by lowest 10% and 20% for country *i* in period *t*, or (iii) infant mortality rate for country *i* in period *t*. $FI_{i,t}$ represents the proxies of financial inclusion: (i) the constructed financial inclusion indices, (ii) all financial institutions access indicators, and (iii) other financial institutions (MFI's)[16] for country *i* in period *t*. This indicates whether financial inclusion has any differential effect on poverty measures beyond its impact on income growth. Hence, for example, a positive association means the poorest 10% quintile benefits more from financial inclusion in this model. Finally, $X_{i,t}$ is the set of other explanatory variables.

In this model, we use three main measures of poverty, as described before. Meanwhile, in order to explore the impacts of different measures of financial inclusion, we use three main measures of financial inclusion as the explanatory variables in the model specifications. We first explore the impact of financial inclusion on income share held by the lowest 10% and 20% definitions of poverty by using this poverty definition as the dependent variable in the relevant regressions. Headcount poverty and infant mortality measurements are used as the dependent variables respectively. As was explained before, income share and headcount measures of poverty are used to explore the distributional change in the economies. Meanwhile, the infant mortality measure of poverty is used to explore the health-related dimension of poverty in this chapter.

Following Beck et al. (2004), we control for macroeconomic policies and country-specific factors in the estimations. Specifically, we control for inflation rates, government final consumption expenditure and political stability rates as indicators of macroeconomic stability to

[16] We construct this value by separating 'formal financial institutions' from 'all financial institutions' indicator. Thus, we get access to microfinance institutions as a residual. Finally, we use this new indicator to explore the impacts of access to microfinance institutions on poverty reduction by regressing the residual on the definitions of poverty in this chapter.

control for the macroeconomic situation, trade openness, which shows the sum of exports and imports as the share of GDP to control for the international openness of a country. Furthermore, following Beck et al. (2004) and Dollar and Kraay (2002), in order to determine the distributional effect of increasing access to both formal and all financial services, we regress the income growth of the lowest quintile on GDP per capita growth and financial inclusion measures in this chapter. Thus, in order to fulfil the conditioning information, we control for GDP per capita growth in the estimations. This allows us to distinguish the distributional effect of financial inclusion measures from the impact of aggregate growth. Meanwhile, we control for the potential effects of GDP per capita growth on the dependent variables that are used in this chapter. Finally, we use the World Bank's continental dummy variables as regressors to control for the geographical classification in the models.

The main contribution of this chapter is to explore the impacts of other financial institutions, especially microfinance institutions, on poverty reduction. Since we were unable to find proper data that cover all types of countries in terms of microfinance institutions, we use the residuals of our finance inclusion index and all financial institutions variables to explore this impact.

3.5.2 Instrumental Variables Estimations

After exploring the financial inclusion-poverty nexus using ordinary least squares regressions, we broaden our analysis by exploring the exogenous component of financial inclusion in this section. The association between financial inclusion and poverty definitions might be driven by reserve causation, which is also called the endogeneity problem. Therefore, in order to examine the robustness of the results, we use instrumental variables (IV) regressions and mitigate the endogeneity concerns. As was done in the previous model specifications, we used measurements of financial inclusion and explored their impacts on three different poverty definitions. Meanwhile, as the main contribution of this chapter, we explored the impacts of other financial institutions, such as microfinance institutions, along with our financial inclusion indices.

By implementing the IV estimation method using our data, which contained 143 countries over the period 2004 to 2011, the potential inconsistencies that might arise using OLS specifications were eliminated. OLS specifications have other inconsistencies apart from reverse causality issues. Furthermore, even if we use two-stage least square regressions and instruments, the endogeneity problem of explanatory variables cannot be controlled (Beck et al., 2007). Meanwhile, the OLS estimations are biased if the explanatory variables are not strictly exogenous and the time dimension is small, as our variables and model are.

Therefore, to examine the robustness of the results, we used IV specifications to explore the exogenous component of financial access. Adapting the specifications devised by Beck et al. (2004)'s, we used the legal origin of economies and religious diversification of people in the country as instrumental variables. Following previous empirical works, such as those of Beck and Levine (2005), Beck et al. (2003, 2006) and Levine (2006), we use the above-mentioned exogenous national characteristics that affect financial inclusion. These studies have demonstrated that there is a correlation between financial inclusion and a country's legal origin and dominant religion.

Particularly, these papers, both empirically and theoretically, claim that legal origin classification might explain cross-country differences in financial development. For instance, the law and finance theory suggest that common law-tradition countries have obtained greater levels of private property rights and support for financial development than civil law-tradition countries (Beck et al., 2003). Beck et al. (2003) suggested that countries that have lower religious populations tend to have higher levels of financial development than countries that have higher levels of religious populations.

Poverty measures variables as the dependent variable, and the financial inclusion proxies as the explanatory variables are all same as the previous model. In the meantime, other control variables are also the same as in the previous model. We added the instrumental variables to the model to mitigate the endogeneity concerns of the results. The valid instruments allow us to eliminate some part of the X endogenous variables that are uncorrelated with u. This part can then be used to estimate the impact of the change in X variables on the Y dependent variable. Finally, the results are interpreted as the impacts of explanatory variables on the dependent variables according to the results of the second stage regressions.

The legal origin variables are used to control the models in terms of a country's constitutional means. There are five groups in this category: Civil Law, Common Law, Islamic Law, Customary Law and Mixed Law. Religion variables are percentages of Muslim, Catholic and other religions. Finally, the continental dummies infer the geographical subdivision of the country. We use the World Bank's geographical regions classification in this section as follows: East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, South Asia and sub-Saharan Africa. The details of these variables are determined in the data section above. Meanwhile, the definitions and the sources of variables are also explored in the appendix. Overall, in adopting these specifications, we tested our financial inclusion measures in terms of their explanatory powers and compared our results with previous studies.

Previous studies claim that countries of sub-Saharan Africa and Latin America perform more poorly than countries of other continents, even after controlling for many control variables. Accordingly, including continent dummy variables may cause some serious problems. For instance, they do not represent a clear economic explanation of why such countries have a bad performance in terms of legal institutions and property rights (Easterly and Levine, 1997). However, in this chapter, we use continent dummy variables to control for the geographic classification of countries and, unlike the literature, they do not alter the results of the main explanatory variables in the model.

3.6 Empirical Results

3.6.1 The Distributional Effect of Financial Inclusion

As was explained above, by adopting the specifications devised by Beck et al. (2004), this chapter seeks to examine the effects of financial inclusion in terms of access to both formal and all financial institutions on poverty reduction using three main definitions of poverty. Hence, this chapter first explores the associations between these measures using ordinary least square estimates, then examine the impact of financial inclusion on poverty definitions using IV estimation model. As the formal banking access, we use constructed financial inclusion indices in the previous chapter.

Moreover, in order to explore the effects of other financial institutions' access on poverty, we used access indicators form all financial institutions, which cover 143 countries around the world. Since it is difficult to find proper data that can be used to explore the access to microfinance institutions, cooperatives and post offices, we used the data of all financial institutions to explore the effects of these institutions on one single indicator. However, we did manage to explore the effects of specific institutions, by separating 'formal financial institutions' from 'all financial institutions'. This process allowed us to examine the effects of, for example, microfinance institutions as a residual on poverty definitions in this chapter.

In order to capture all aspects of poverty, we used income distributional, health-related and absolute definitions of poverty in this chapter. Therefore, there are separate regression equations for each measures of poverty. We started exploring the associations between our financial inclusion measures and income distributional poverty definitions. Table 3.3A and 3.3B show the results for financial inclusion and income share held by the lowest 10% and 20% variables respectively. The model specifications (1), (2), (3) and (4) are OLS regressions while specifications (5), (6), (7), and (8) are IV regressions.

According to Tables 3.3A and 3.3B, all financial inclusion measures are statistically significantly associated with income share held by the lowest quintile variables. The results suggest that financial inclusion is pro-poor in terms of formal and other financial institutions, such as microfinance. Specifically, commercial bank-based access and access to other financial institutions have positive impacts on the growth of the income share held by the lowest quintiles, even after controlling for income growth. Hence, it can be concluded that the growth in the lowest income quintile is faster in countries with more financial access levels. This association is robust to control for other macroeconomic stability variables and endogeneity in this chapter. There are four specifications for each dependent variable in the tables, and each dependent variable is regressed using both OLS and IV estimation models.

Hence, the income share held by the lowest 10% variable is regressed with four different measures of financial inclusion and various macroeconomic stability control variables. These control variables and regressions are adopted from previous studies. Hence, using constructed financial inclusion indices and microfinance institutions as the main contribution of this chapter, we test the arguments in the literature to assess whether our financial inclusion measures appropriately reflect what we intent to measure. All of the model specifications suggest that all financial inclusion measures are statistically significant with growth in the income share of the lowest quintile. In particular, the first financial inclusion index and access to other financial institutions' proxies of financial inclusion enter insignificantly in the OLS regressions. However, they are found to be significantly and positively associated with the income growth of the lowest 10% in the IV regressions.

The rest of the proxies of financial inclusion enter significantly and positively in both the OLS and the IV regressions. Similarly, the first financial inclusion index enters insignificantly in the OLS regressions, but is significant and positive in the IV regressions for the income growth of the lowest 20%. Meanwhile, access to all financial institutions variable enters significantly and positively in the OLS regressions, but is insignificant in the IV regressions for the 20% quintile.

Meanwhile, all of the results suggest that the association is not due to endogeneity or simultaneity bias. Using the instrumental variables with the IV estimation methods and extracting the exogenous component of the financial inclusion allow us to control for reverse causality and/or simultaneity bias. The validation tests of the instruments suggest that the instruments are valid and, thus, they are jointly used in the first-stage regressions. The OIR test suggests that the instruments are not related to the dependent variable. Moreover, the first stage f-test suggests that the instruments are jointly significant in the endogenous variable.

Moreover, as was explained in the previous section, we can distinguish the growth and distributional effects of financial inclusion on the poorest quintile by regressing the income growth on the lowest income quintile on the general GDP per capita growth and financial inclusion measures. Thus, it can be suggested that the coefficient of the measures of financial inclusion explore any distributional effect of financial access on the growth of the poorest income quintiles. As can be seen from Table 3.3A, the positive and significant coefficients indicate that financial inclusion has beneficial effects on the income growth of the lowest 10%. Since the overall GDP per capita growth is found to be statistically insignificant in Table 3.3B, it is not possible to distinguish the growth effect of financial inclusion from the distributional effect in terms of the income growth of the lowest 20%. Accordingly, the significant and positive sign of financial inclusion indicates that there is a distributional effect of commercial bank-based access on the poorest income quintile.

The distributional effect of financial inclusion is also economically relevant as the results in Table 3.3A support this case. For instance, the results stress that the average income of the poor in Turkey might grow by 3% rather than 2% annually during the period 2004 to 2011 if they had the same financial access levels as Singapore. We calculate this by taking the difference of the log regressors of the financial inclusion values of these countries and multiplying them with the coefficient in column (2). In this sense, policymakers should take this kind of research seriously when they are considering their policy agendas. They should consider more incremental policies on financial access in terms of both formal and other informal financial institutions.

The results in this section also show the importance of access to other financial institutions, mainly microfinance institutions, for poverty reduction. Accordingly, the results of the second financial inclusion index, which is the broader financial inclusion index constructed in the previous chapter, and access to microfinance institutions are found to be relatively better associated with the growth of lowest income quintiles.

Robustness tests suggest that most of the control variables are also found to be statistically significantly associated with the income growth of the poorest quintile, with some exceptions. More importantly, the existence of the control variables does not alter the results of financial inclusion measures on the income growth of the poorest quintile. In order words, the results of financial inclusion are robust for various sensitivity tests in this section. GDP per capita growth, trade openness, government expenditure and political stability control variables are found positively and significantly associated in both estimation models.

Table 3.3 Financial inclusion measures and income share of the lowest quintile

3.3 A: Income share of the lowest 10%

The dependent variable is the growth of the income share held by lowest 10% over the period 2004 to 2011. We take the average values of the indicators to perform the ordinary least squares estimations. Model specifications (1), (2), (3), and (4) are OLS regressions while specifications (5), (6), (7), and (8) are IV regressions. Regression equations are determined in the methodology section above. Specifications that are performed with IV estimations also report the F-test for the validation of the instruments, F-test for the first stage regressions, OIR test and R-squared from the first stage regression equations. We use legal origin and religion indicators as the instruments to mitigate the endogeneity concerns in the results. Variables above the line indicate 2nd stage IV regressions results, while variables below the line indicate 1st stage IV regression results. We also use World Banks' regional classification continental dummies as regressors. These are East Asia and Pacific, Europe and Central Asia, Latin America & the Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa. Using these instruments, the results show that the association between financial access and poverty measures are not due to reverse causation and/or simultaneity bias. The specification tests suggest that these instruments are valid and they jointly and significantly enter in the first-stage regressions. Moreover, the OIR test suggests that the instruments are not associated with the dependent variables beyond their impact through financial access indicators or other control variables. Finally, robust Standard Errors are clustered by country. ***, **, and * show significance levels at 1, 5, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Growth of Income Share lowest 10%	Growth of Income Share lowest 10%	Growth of Income Share lowest 10%	Growth of Income Share lowest 10%	Growth of Income Share lowest 10%	Growth of Income Share lowest 10%	Growth of Income Share lowest 10%	Growth of Income Share lowest 10%
1st Financial Inclusion Index	0.016				0.160**			
	(0.097)				(0.254)			
2nd Financial Inclusion Index		0.391*				0.596*		
		(0.548)				(0.589)		
All financial Institutions Access			0.004**				0.006*	
			(0.002)				(0.005)	
Other Financial Institutions Access				0.128				0.394**
				(0.146)				(0.258)
GDP per capita growth	0.011	0.035*	0.023**	0.014	0.027*	0.100	0.002	0.127*
	(0.016)	(0.058)	(0.013)	(0.013)	(0.021)	(0.122)	(0.024)	(0.088)
Inflation	0.015*	0.015*	0.026***	0.123	0.039***	0.026*	0.033***	-0.695*
	(0.010)	(0.059)	(0.009)	(0.125)	(0.014)	(0.020)	(0.010)	(0.395)
Trade Openness	0.001	0.009**	0.001	0.001	-0.001	0.004**	0.001	0.001
	(0.001)	(0.004)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.007)
Government Expenditure	0.005	-0.091**	-0.001	0.014	0.010	0.056**	0.004	0.049
	(0.012)	(0.047)	(0.012)	(0.026)	(0.015)	(0.028)	(0.004)	(0.119)
Political Stability	0.300***	0.654***	0.214***	0.284**	0.170*	0.306***	0.188**	0.254
	(0.080)	(0.233)	(0.079)	(0.124)	(0.101)	(0.119)	(0.096)	(0.725)
Constant	0.478	3.415***	0.253	0.768*	1.745**	1.927***	0.107	1.027
	(0.361)	(0.864)	(0.229)	(0.466)	(0.756)	(0.774)	(0.356)	(1.346)
				First Stage				
Civil Law					0.178	-0.350*	-0.001	0.099
					(0.125)	(0.184)	(0.178)	(0.137)
Common Law					0.354	0.239	0.098	0.023
					(0.164)	(0.310)	(0.172)	(0.234)
Islamic Law						-0.464**	0.054	0.209
						(0.225)	(0.234)	(0.170)
Catholic					-0.068	-0.246	0.155	0.161
					(0.275)	(0.193)	(0.211)	(0.203)
Muslim					0.650*	-0.178	0.518**	0.494**
					(0.323)	(0.229)	(0.248)	(0.239)
Otherreligions					0.230	0.074	0.690**	0.486**
					(0.288)	(0.298)	(0.348)	(0.238)
Estimation Method	OLS	OLS	OLS	OLS	IV	IV	IV	IV
R-squared	0.288	0.459	0.334	0.305	0.296	0.410	0.358	0.677
F- Test					0.000	0.000	0.000	0.000
F-Test (First Stage)					12.042	13.937	18.424	11.752
OIR Test					0.458	0.318	0.123	0.449
Observations	66	49	62	62	65	48	62	62

However, the GDP per capita growth variable is insignificant for the income growth of the lowest 20%. In particular, income growth enters significantly and positively in columns (2), (3),

(5) and (8), but is insignificant for the rest of the regression equations. Inflation enters positively and significantly in both OLS and IV regressions except for column (8).

Inflation is found to be significantly and negatively associated with the income growth of the lowest 10% in column (8) in the IV regressions. These results suggest that monetary instability has a detrimental influence on the lowest income share more than the average person in a country. Moreover, trade openness enters significantly and positively in both the OLS and IV regressions in columns (2) and (6) only. Similarly, political stability enters significantly and positively in both the OLS and IV regressions, except in column (8).

Finally, government consumption expenditure enters significantly and negatively in the OLS regressions, but is positive in the IV regressions. These results demonstrate that other macroeconomic stability indicators, such as trade openness, political stability and government expenditure, have distributional effects on the growth of the lowest quintile while controlling for the level of financial access.

Furthermore, in terms of income growth of the lowest 20%, trade openness, government expenditure, and political stability variables enter significantly and positively in both the OLS and IV regressions. These results suggest that trade openness, government expenditure and political stability variables have also distributional effects on the growth of the lowest 20% quintile while controlling for the level of financial access. However, inflation enters significantly and negatively in both OLS and IV regressions. This result suggests that monetary instability even has detrimental effects on the lowest 20% quintile more than the average person in a country.

Most of the instrumental variables enter insignificantly in the IV regressions for the income growth of the lowest 10%. Specifically, Civil and Islamic Law as the legal origin of the countries enter significantly and negatively only in column (6). Muslim and Other religions instruments enter significantly and positively in columns (5), (7) and (8). Meanwhile, Civil Law and Common Law, as countries' legal origin, and Muslim and Other religions, as countries' common religion, enter significantly and positively for the income growth of the lowest 20% only in columns (5) and (7) respectively. However, Islamic Law, as counties' legal origin, and Catholic groups, as countries' common religion instruments, enter significantly and negatively only in column (6).

Table 3.3 B: Income share of the lowest 20%

The dependent variable is the growth of the income share held by lowest 20% over the period 2004 to 2011. We take the average values of the indicators to perform the ordinary least squares estimations. Model specifications (1), (2), (3), and (4) are OLS

regressions while specifications (5), (6), (7), and (8) are IV regressions. Regression equations are determined in the methodology section above. Specifications that are performed with IV estimations also report the F-test for the validation of the instruments, F-test for the first stage regressions, OIR test and R-squared from the first stage regression equations. We use legal origin and religion indicators as the instruments to mitigate the endogeneity concerns in the results. Variables above the line indicate 2nd stage IV regressions results, while variables below the line indicate 1st stage IV regression results. We also use World Banks' regional classification continental dummies as regressors. These are East Asia and Pacific, Europe and Central Asia, Latin America & the Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa. Using these instruments, the results show that the association between financial access and poverty measures are not due to reverse causation and/or simultaneity bias. The specification tests suggest that these instruments are valid and they jointly and significantly enter in the first-stage regressions. Moreover, the OIR test suggests that the instruments are not associated with the dependent variables beyond their impact through financial access indicators or other control variables. Finally, robust Standard Errors are clustered by country. ***, **, and * show significance levels at 1, 5, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Growth of Income Share lowest 20%	Growth of Income Share lowest 20%	Growth of Income Share lowest 20%	Growth of Income Share lowest 20%	Growth of Income Share lowest 20%	Growth of Income Share lowest 20%	Growth of Income Share lowest 20%	Growth of Income Share lowest 20%
1st Financial Inclusion Index	0.011				0.231*			
	(0.067)				(0.198)			
2nd Financial Inclusion Index		0.407*				0.696*		
		(0.473)				(0.609)		
All financial Institutions Access			0.090*				0.300	
			(0.060)				(0.267)	
Other Financial Institutions Access				0.245*				0.243*
				(0.110)				(0.158)
GDP per capita growth	0.016	0.077	0.009	0.011	0.021	0.027	0.003	0.015
	(0.015)	(0.074)	(0.015)	(0.016)	(0.020)	(0.032)	(0.015)	(0.066)
Inflation	-0.071	-0.007	-0.020***	-0.027**	-0.225**	0.005	-0.035**	-0.261**
	(0.093)	(0.022)	(0.007)	(0.013)	(0.107)	(0.023)	(0.015)	(0.133)
Trade Openness	0.001	0.004**	-0.001	0.001*	0.001	0.003**	0.001	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Government Expenditure	0.017*	0.024*	0.017*	0.003	0.002	0.045*	0.007	0.007
	(0.009)	(0.015)	(0.010)	(0.013)	(0.016)	(0.026)	(0.017)	(0.014)
Political Stability	0.175***	0.100	0.148***	0.156**	0.107*	0.120	0.081	0.184**
	(0.060)	(0.106)	(0.058)	(0.078)	(0.068)	(0.097)	(0.093)	(0.086)
Constant	1.448***	2.013***	1.154***	1.933***	2.355***	2.933***	0.412	1.649***
	(0.271)	(0.033)	(0.249)	(0.241)	(0.620)	(0.804)	(0.907)	(0.344)
First Stage								
Civil Law					0.383**	-0.176	-0.001	0.182
					(0.168)	(0.151)	(0.178)	(0.175)
Common Law					0.658***	0.145	0.098	
					(0.262)	(0.045)	(0.172)	
Islamic Law					0.145	-0.395***		0.164
					(0.254)	(0.146)		(0.422)
Catholic					0.072	-0.245*	0.155	0.289
					(0.219)	(0.143)	(0.211)	(0.599)
Muslim					0.311	-0.227	0.518**	0.510
					(0.246)	(0.186)	(0.248)	(0.603)
Otherreligions					0.241	0.100	0.690**	0.660
					(0.333)	(0.182)	(0.348)	(0.620)
Estimation Method	OLS	OLS	OLS	OLS	IV	IV	IV	IV
R-squared	0.183	0.362	0.286	0.346	0.216	0.329	0.233	0.311
F- Test					0.000	0.000	0.000	0.000
F-Test (First Stage)					19.345	18.119	17.215	13.144
OIR Test					0.935	0.636	0.879	0.259
Observations	65	53	60	51	65	52	59	51

These results are also consistent with the previous studies. For instance, Beck et al. (2004, 2007) stressed that financial development has positive effects on the income growth of the poorest quintile. Odhiambo (2009) found that economic development causes financial development and financial development leads to poverty reduction in South Africa. Similarly, in the case of India, Sharma, Didwania and Kumar (2011) argued that inclusive growth plays a vital role in reducing poverty rather than increasing GDP alone. In the meantime, unlike these results, which suggest that inflation is not significantly associated with poverty, Akhter and Daly (2009) found that there is a negative and significant relationship between inflation and poverty.

Meanwhile, the results of the access indicator from other financial institutions, such as microfinance, are also consistent with the literature. We found a statistically significant association with microfinance and poverty reduction in terms of income growth of the poorest quintile. Mosley and Hulme (1998) explored the impact of microfinance on poverty and stressed those borrower households' income, consumption and asset positions increase. Khandker (2005) argued that the impacts of increased access of microfinance are perceived more for poorest of the poor, especially on female participants.

Unlike these results, Mosley (2010) suggest that microfinance is relatively cheaper and successful in terms of poverty alleviation for those groups close to the poverty line compared to other anti-poverty policy tools. However, it is found to be ineffective in reducing extreme poverty with regard to the labour market and infrastructural measures. As discussed above, the impacts of microfinance on the poorest quintile is a controversial topic and is still debated in the literature.

3.6.2 The Social Effect of Financial Inclusion

In this section, we regress our explanatory financial inclusion measures and same control variables on the health-related definition of poverty, infant mortality. The goal of using this indicator is to measure the social effects of financial inclusion on poor segments in society. The assumption behind this analysis is that poor people tend to spend some part of their increased assets, which are held by reaching financial access in terms of commercial banks and microfinance, on reducing infant mortality in their households. In doing so, Table 3.4 indicates the results of OLS and IV regressions for infant mortality rates. Accordingly, all financial inclusion measures are associated with infant mortality reduction in both the OLS and IV regression equations. Measures of financial inclusion are regressed separately in each column and they enter statistically significantly and negatively in the estimation models. As was argued above, all of these results are robust to reserve causality and simultaneity bias. Therefore, the results suggest that financial inclusion is associated with reductions in infant mortality.

In the meantime, since the OIR and the F-tests are significant and cannot be rejected, the relationship between access to financial services for both commercial banks and microfinance institutions and reducing infant mortality does not come from reverse causality. Furthermore, the negative relationship between our financial inclusion measures and infant mortality is even robust for various sensitivity tests in this section. We start to control for GDP per capita to check for the effect of income growth, inflation, government expenditure and political stability to control for countries' macroeconomic stability, and, finally, trade openness to control for a country's openness. While all significant control variables are negatively related with infant mortality, these results do not alter the negative relationship between our financial inclusion measures and infant mortality.

The first stage f-test of the IV regressions suggests that the instruments are jointly significant in the endogenous variable. Hence, we can conclude that all instruments are valid in the IV regressions. Most of the instruments enter insignificantly in the IV regressions for the infant mortality regressions. In particular, Common Law, as the legal origin of the countries, enters significantly and positively only in column (5). Meanwhile, Islamic Law, as counties' legal origin, and Muslim group, as countries' common religion, enter significantly and negatively in columns (6), (7), and (8) respectively.

The results in this section complement the previous studies in the literature. For instance, the principal study referred to in this chapter, that of Beck et al. (2004), suggests that financial development is associated with infant mortality reduction. Improving on their work, we assessed this relationship by checking the effects of access to financial services for both formal and informal financial institutions, such as commercial banks and microfinance institutions. We found that our measures of financial inclusion are associated with reductions in infant mortality. Meanwhile, Becchetti and Castriota (2011) explored the similar impacts of microfinance before and after the tsunami in Sri Lanka in 2004.

They argued that access to microfinance services triggered the income growth of the poor. Immediately after the tsunami, microfinance loans helped borrowers to recover their situations. In this sense, we might claim that these outcomes are substantial sources on proving that microfinance is a recovery tool that can be used by policymakers and NGOs.

Table 3.4 Financial inclusion measures and infant mortality

The dependent variable is infant mortality rate over the period 2004 to 2011. We take the average values of the indicators to perform the ordinary least squares estimations. Model specifications (1), (2), (3), and (4) are OLS regressions while specifications (5), (6), (7), and (8) are IV regressions. Regression equations are determined in the methodology section above. Specifications that are performed with IV estimations also report the F-test for the validation of the instruments, F-test for the first stage regressions, OIR test and R-squared from the first stage regression equations. We use legal origin and religion indicators as the instruments to mitigate the endogeneity concerns in the results. Variables above the line indicate 2nd stage IV regressions results, while variables below the line indicate 1st stage IV regression results. We also use World Banks' regional classification continental dummies as regressors. These are East Asia and Pacific, Europe and Central Asia, Latin America & the Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa. Using these instruments, the results show that the association between financial access and poverty measures are not due to reverse causation and/or simultaneity bias. The specification tests suggest that these instruments are valid and they jointly and significantly enter in the first-stage regressions. Moreover, the OIR test suggests that the instruments are not associated with the dependent variables beyond their impact through financial access indicators or other control variables. Finally, robust Standard Errors are clustered by country. ***, **, and * show significance levels at 1, 5, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Infant Mortality	Infant Mortality	Infant Mortality	Infant Mortality	Infant Mortality	Infant Mortality	Infant Mortality	Infant Mortality
1st Financial Inclusion Index	-0.602***				-1.311**			
	(0.148)				(0.593)			
2nd Financial Inclusion Index		-1.383***				-1.288***		
		(0.211)				(0.415)		
All financial Institutions Access			-0.663**				-0.933***	
			(0.110)				(0.298)	
Other Financial Institutions				-0.602***				-0.998***
				(0.142)				(0.392)
GDP per capita growth	-0.035**	-0.055**	0.013	-0.023*	-0.033**	-0.061***	0.009	0.017
	(0.014)	(0.027)	(0.012)	(0.013)	(0.016)	(0.025)	(0.013)	(0.015)
Inflation	0.043***	0.369***	0.328***	0.023**	0.041**	0.440***	0.206	0.006
	(0.011)	(0.126)	(0.111)	(0.011)	(0.012)	(0.151)	(0.192)	(0.022)
Trade Openness	-0.001	0.001	-0.002***	-0.003***	0.001	0.001	-0.002***	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Government Expenditure	-0.021	-0.052**	-0.005	-0.017	-0.010	-0.054*	0.002	-0.009
	(0.021)	(0.022)	(0.015)	(0.018)	(0.024)	(0.030)	(0.017)	(0.017)
Political Stability	-0.532***	-0.155*	-0.199**	-0.263***	-0.547***	-0.139*	-0.095	-0.098
	(0.105)	(0.092)	(0.091)	(0.104)	(0.101)	(0.092)	(0.129)	(0.179)
Constant	1.657***	1.256**	4.718***	3.059***	0.211	1.298*	5.811***	3.205***
	(0.495)	(0.515)	(0.522)	(0.350)	(1.301)	(0.783)	(1.257)	(0.384)
First Stage								
Civil Law					0.138	-0.212	-0.103	-0.1
					(0.106)	(0.162)	(0.145)	(0.177)
Common Law					0.430**	0.120	0.002	-0.207
					(0.166)	(0.101)	(0.010)	(0.173)
Islamic Law					0.321	-0.424**	-0.091	0.121
					(0.234)	(0.160)	(0.167)	(0.045)
Catholic					-0.163	-0.25	-0.443	-0.419*
					(0.218)	(0.186)	(0.279)	(0.223)
Muslim					-0.151	-0.006	-0.592*	-0.583**
					(0.249)	(0.188)	(0.327)	(0.268)
Otherreligions					-0.131	-0.241	-0.087	-0.078
					(0.214)	(0.202)	(0.294)	(0.244)
Estimation Method	OLS	OLS	OLS	OLS	IV	IV	IV	IV
R-squared	0.583	0.827	0.725	0.648	0.516	0.828	0.701	0.599
F- Test					0.000	0.000	0.000	0.000
F-Test (First Stage)					13.067	17.685	18.357	11.802
OIR Test					0.143	0.161	0.115	0.201
Observations	109	48	109	109	109	48	109	109

3.6.3 Absolute Poverty measure and Financial Inclusion

Finally, the last measure of poverty, growth of headcount ratio, is used to explore the impacts of financial inclusion on poverty reduction in this section. This indicator is used to test the effects of financial inclusion measures on absolute poverty measures. We regressed the growth of the headcount poverty ratio on our financial inclusion measures and same control variables that are used in the previous estimations. We explored the effects of financial inclusion on poverty in terms of both commercial bank-based financial access using financial inclusion indices and access to other financial institutions, such as microfinance institutions. Moreover, as the main contribution of this chapter, in order to explore the direct effects of microfinance institutions, we used an additional variable that was calculated taking the difference between 'formal financial institutions' and 'all financial institutions' variables. This new variable is called 'other financial institutions' in this chapter.

As shown in Table 3.5, after controlling for the country-specific factors that were explained above, almost all model specifications indicate that financial inclusion, in terms of accounts from both commercial and other financial institutions measures, is negatively and statistically significantly associated with absolute poverty measures, with some exceptions, in this section. Hence, these results suggest that the levels of financial access to commercial banks, microfinance institutions and other financial institutions are associated with poverty reduction.

In particular, the first financial inclusion index, access to all financial institutions, and access to other financial institutions proxies of financial inclusion enter insignificantly in OLS regressions, but significantly and negatively in IV regressions. Only the second financial inclusion index enters significantly and negatively in both OLS and IV regressions, with the coefficients of -0.610 and -1.083 and the significance levels of 1% and 5% respectively. As was explained above, all the results of the financial inclusion measures are robust for reversing causality and simultaneity bias. Thus, we can conclude that the relationship between financial access to both commercial banks and microfinance institutions and an absolute poverty measure is not due to reverse causality.

The negative relationship between financial inclusion measures and absolute poverty is robust for several sensitivity tests. In this sense, the results of the main variables hold when we control for GDP per capita growth, inflation and trade openness. Moreover, we also control for government expenditure and political stability. These additional control variables also do not alter the main results in this section. GDP per capita as the income growth indicator enters significantly and negatively in both OLS and IV regressions. Hence, according to Table 3.5, the linear relationship between the growth rate of the shares of population below the $2 a day

variable as the proxy of poverty and log GDP per capita levels are strong when we control for reverse causality using instrumental variables.

Table 3.5 Financial inclusion measures and headcount poverty

The dependent variables is headcount poverty ratio $2 a day over the period 2004 to 2011. We take the average values of the indicators to perform the ordinary least squares estimations. Model specifications (1), (2), (3), and (4) are OLS regressions while specifications (5), (6), (7), and (8) are IV regressions. Regression equations are determined in the methodology section above. Specifications that are performed with IV estimations also report the F-test for the validation of the instruments, F-test for the first stage regressions, OIR test and R-squared from the first stage regression equations. We use legal origin and religion indicators as the instruments to mitigate the endogeneity concerns in the results. Variables above the line indicate 2nd stage IV regressions results, while variables below the line indicate 1st stage IV regression results. We also use World Banks' regional classification continental dummies as regressors. These are East Asia and Pacific, Europe and Central Asia, Latin America & the Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa. Using these instruments, the results show that the association between financial access and poverty measures are not due to reverse causation and/or simultaneity bias. The specification tests suggest that these instruments are valid and they jointly and significantly enter in the first-stage regressions. Moreover, the OIR test suggests that the instruments are not associated with the dependent variables beyond their impact through financial access indicators or other control variables. Finally, robust Standard Errors are clustered by country. ***, **, and * show significance levels at 1, 5, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Growth of Headcount Poverty	Growth of Headcount Poverty	Growth of Headcount Poverty	Growth of Headcount Poverty	Growth of Headcount Poverty	Growth of Headcount Poverty	Growth of Headcount Poverty	Growth of Headcount Poverty
1st Financial Inclusion Index	-0.138				-0.400*			
	(0.159)				(0.440)			
2nd Financial Inclusion Index		-0.610*				-1.083**		
		(0.353)				(0.563)		
All financial Institutions Access			-0.006				-0.087*	
			(0.025)				(0.050)	
Other Financial Institutions				-0.349				-0.527*
				(0.136)				(0.361)
GDP per capita growth	-0.544***	-0.140**	-0.908***	-0.139***	-0.477***	-0.121**	-0.951***	-0.126***
	(0.191)	(0.060)	(0.700)	(0.039)	(0.193)	(0.054)	(0.114)	(0.039)
Inflation	0.029**	0.395*	-0.274**	0.584***	0.023*	0.406*	0.436***	0.944***
	(0.014)	(0.275)	(0.118)	(0.181)	(0.017)	(0.269)	(0.145)	(0.289)
Trade Openness	0.001	-0.001	-0.002	-0.001	0.003	-0.001	-0.008	-0.001
	(0.002)	(0.003)	(0.008)	(0.001)	(0.002)	(0.003)	(0.008)	(0.002)
Government Expenditure	-0.022	0.011	-0.109	0.008	-0.005	0.039	-0.176	-0.012
	(0.017)	(0.028)	(0.076)	(0.012)	(0.025)	(0.035)	(0.102)	(0.016)
Political Stability	0.312*	-0.291***	0.442***	0.232	0.436*	0.292***	0.477	0.098
	(0.169)	(0.101)	(0.541)	(0.161)	(0.231)	(0.102)	(0.745)	(0.211)
Constant	0.179	-0.636	1.883	-0.241	-1.410	-1.614*	-2.025	-0.966
	(0.492)	(0.745)	(2.164)	(0.463)	(1.570)	(1.047)	(2.590)	(0.591)
			First Stage					
Civil Law					-0.111	-0.212	-1.257	0.099
					(0.331)	(0.162)	(5.227)	(0.137)
Common Law					-0.33	0.120	-5.023	0.209
					(0.354)	(0.023)	(6.895)	(0.170)
Islamic Law					0.123	-0.424**		
					(0.231)	(0.160)		
Catholic					-0.511	-0.25	-3.399***	-0.324*
					(0.374)	(0.186)	(3.709)	(0.187)
Muslim					-0.536	-0.006	-3.193***	-0.486**
					(0.448)	(0.188)	(0.781)	(0.238)
Otherreligions					-0.126	-0.241	-2.640**	0.007
					(0.427)	(0.202)	(0.937)	(0.211)
Estimation Method	OLS	OLS	OLS	OLS	IV	IV	IV	IV
R-squared	0.340	0.487	0.229	0.321	0.230	0.450	0.178	0.233
F- Test					0.000	0.000	0.000	0.000
F-Test (First Stage)					30.140	17.270	14.262	11.292
OIR Test					0.374	0.315	0.159	0.210
Observations	79	46	82	79	76	46	80	77

However, inflation and political stability variables enter significantly and positively in both OLS and IV regressions with some exceptions. Inflation enters significantly and negatively in column (3), while political stability enters significantly and negatively in column (2). Furthermore, the IV regressions first stage f-test results suggest that all instruments are jointly significant in the endogenous variable and valid to use in the models. Most of the instruments enter insignificantly in the regressions. In particular, Islamic Law, as the legal origin classification of countries, and religion indicators enter significantly and negatively in columns (6), (7) and (8) respectively.

These results are also economically large and practical for applying to policy agendas. In doing so, we take the example of Turkey and Egypt with a Financial Inclusion (first financial inclusion index) of 28% and 6% respectively. Meanwhile, in Turkey, the headcount poverty ratio decreased at 33% annually between 2004 and 2011. In Egypt, this ratio increased by 58% annually over the same period. At this point, the coefficient estimate that we found in column (8) implies that if Egypt had achieved Turkey's financial inclusion levels, their levels of population living under the poverty line would have decreased by 12 percentage points more for each year. We calculated this using the same method as we did above. In particular, we take the difference of the log regressors of the financial inclusion values of these countries and multiplying them with the coefficient in column (8).[17]

These results are consistent with the literature. For example, Chibba (2007, 2008), Dupas and Robinson (2009, 2011), Ashraf et al. (2010) and Hanning and Jansen (2010) found a negative and significant relationship between financial inclusion and poverty. They all briefly argued that increasing the supply of financial instruments might increase the overall wellbeing of people. As found in this chapter, increasing the access to formal financial services such as savings account and credits may affect poverty. Unlikely, Bhandari (2009) who argued that financial inclusion, as the increasing access to commercial bank accounts is not significantly related to poverty reduction for the states of India, a significant relationship between financial inclusion and poverty is found in this chapter. However, it is important to note here that, these results are not implying a causal relationship between financial inclusion and poverty in this chapter.

Furthermore, as was argued by Pitt and Khandker (1996), access to microfinance services might lead an increase on consumption expenditure, especially on women clients' loans. Dunford (2006) and Littlefield, Morduch and Hashemi (2003) also argue that financial access may lead to income growth and reduce poverty by increasing the income-generating activities of clients.

[17] In order to calculate this, we use the financial inclusion values of Turkey and Egypt in the log as they are in the regression equations. In doing so, we use the equation as follows: log (0.282) – log (0.133) = 0.226 and we multiply this value with the coefficient of access for the microfinance institutions indicator in column (8), which is 0.527.

The negative results of microfinance on absolute poverty might support these arguments. Overall, the results of access to microfinance institutions are found to be relatively better associated with reducing poverty in this chapter. Hence, the importance of increased access to financial services for both formal and other informal financial institutions is revealed in this chapter. In doing so, our results suggest that incremental policy regulations to increase access to financial services, especially microfinance, might be useful to combat poverty, especially for the poorest, in practice.

3.6.4 Sensitivity Analyses

It is important to test how well the relationship between our financial inclusion and poverty measures in this chapter holds up, not only when we change the estimation procedure but also when the sample region, lag structure and specification of the right-hand side variables is varied. In doing so, using various robustness tests, we explore the stability of the findings in this chapter.

As the main contribution of this chapter, we explore the effects of microfinance institutions using a new indicator that is extracted from the data we use. In particular, we separated 'formal financial institutions' from 'all financial institutions' so as to leave microfinance institutions as a residual and then regress this residual on the definitions of poverty.

Furthermore, we tested whether our findings were sensitive to the estimation technique using exogenous instrumental variables in the regression equations. Thus, it is revealed that our findings are insensitive to the new estimation model with some small exceptions. For instance, as can be seen from the tables above, the results of the OLS and IV estimation methods are almost similar. Inclusion of an IV estimation model allows us to test the robustness of the variables in terms of reverse causality and simultaneity bias. Moreover, inclusion of new control variables, such as GDP per capita income, to check the income growth effect and other macroeconomic stability variables, such as inflation, trade openness and political stability, do not alter the results and even strengthen them.

In the meantime, we first explored the outliers in the data for each measure of poverty and financial inclusion using scatter diagrams. Following the procedure in Beck et al. (2007), we identified the outliers as Azerbaijan, Bangladesh, Croatia, Kazakhstan, South Africa and Swaziland in the data. Then we tested for the potential effects of these outliers by re-running the regressions without them. However, we confirmed that omitting these countries did not alter the results, but strengthened them by increasing the size of the coefficients.

3.7 Conclusion

As has been extensively argued in the literature, the association between financial inclusion and poverty reduction is controversial. Achieving ease of access to financial services may contribute to poverty reduction either directly or indirectly through enhancing financial development. In other words, enhancing broader access to finance might increase the living standards of the poor and disadvantaged. In particular, financial inclusion studies mostly focus on microfinance in terms of reducing poverty. They pointed to the effect of microfinance on poverty without considering whether microfinance services help to reduce extreme poverty. Most studies claim that microfinance services do not work for extreme poverty.

In light of these arguments, this chapter explores the association between financial inclusion and poverty reduction using various measures and definitions of both financial inclusion and poverty. Thus, we tested the effects of access to financial services from both formal and other financial services as the proxy of financial inclusion on various poverty measures separately. Most importantly, taking the difference of formal and all financial institutions, we tested the effects of microfinance institutions on poverty measures using a panel data from 143 developing and developed countries for the period from 2004 to 2011 in this chapter. Meanwhile, since poverty is a multidimensional context, we used income distribution, health-related and absolute definitions of poverty separately. In particular, we used the income share held by the lowest quintiles (10% and 20%), infant mortality ratios and the head count poverty ratio to explore the effects of financial access. Using the income growth of the lowest segments, we tested whether financial access to both commercial banks and microfinance institutions is pro-poor.

According to the results, the financial inclusion measures that are used have significant associations with poverty definitions in this chapter. Using the financial inclusion measures that are explained above, we see that in countries with high rates of access to financial services, there is an increase in income growth of the lowest segments and decreases in infant mortality rates and the headcount poverty ratio. As previous studies have argued, we found significant association with microfinance and the income share of the lowest segments in this chapter.

The results of both microfinance and commercial bank-based access are found not only to be significantly related with poverty definitions but also robust for reversing causality. Hence, this chapter suggests that financial access levels have positive effects on the poverty reduction process. In doing so, it is concluded that increasing access to formal financial services such as savings accounts and credits may help to reduce poverty. However, it is important to note here that these results do not imply a causal relationship between financial inclusion and poverty. Furthermore, using instrumental variables and other control variables such as GDP per capita

growth and other macroeconomic stability indicators do not alter the results we got in this chapter.

Overall, the main argument in this chapter is that beyond the indirect effect through economic growth, financial inclusion has a direct effect on the wellbeing of the poor in terms of access to both formal and other financial institutions. At this point, it is important to explore the effects of financial inclusion tools and policies on people's overall wellbeing to guide policymakers during the policymaking decision process. It is argued in this chapter that policymakers should canalize financial sector reforms to boost access to financial services to all financial institutions, especially microfinance services, and supply more credits to the poor by canalizing savings towards them. Since one of the main reasons why poor people stay poor is the risk exposure that causes them to fear the risk of investment activities, policies that would reduce the risk exposure for the poor are vital to combat poverty. As was discussed in the previous sections, microfinance services might be used to reduce the risk for poor people. Direct subsidies or better credit opportunities for clients, especially women, might help to reduce poverty in certain countries. Furthermore, constructing new time series data for financial inclusion and checking the long-term causal relationship between poverty and financial inclusion should be further analysed so as to contribute to the literature. However, the data availability problem still remains an obstacle preventing this goal from being achieved.

Appendix A

Table 3.6 Variable definitions and data sources

Variable	Source	Comments
Income Share held by lowest 10% and 20%	World Bank World Development Indicator (WDI)	The percentage share of income is the share that accrues to subgroups of population indicated by deciles or quintiles.
Infant Mortality	World Bank World Development Indicator (WDI)	Infant mortality rate is the number of infants dying before completing their first years. It is calculated as per 1,000 births in a given year.
Head Count Poverty Ratio	World Bank World Development Indicators Database	The share of population below $2 a day is the percentage of the population living on less than $2.00 a day, which is calculated with 2005 international prices by the World Bank.
Financial Inclusion Index	Author's own calculation	We identify financial inclusion as the usage of formal financial services supplied by commercial banks, or in other words, the growth in deposit, checking, savings, and loan accounts of commercial banks for households and SME's.
Accounts from All Financial Institutions	World Bank's Global Financial Inclusion (Global Findex) Database 2011	Demirguc-Kunt et al., 2015. Percentage of respondents, who report having an account at a bank or another type of financial institution.
Accounts from Other Financial Institutions	Own calculations	This indicator is calculated taking the difference from 'formal financial institutions' to 'all financial institutions' and this new indicator as resiudal is used to represent microfinance institutions.
Real GDP per capita	World Bank and OECD National Accounts Data	Annual percentage growth rate of GDP per capita based on constant $2005.
Inflation	World Bank World Development Indicator (WDI)	Inflation is measured as the annual growth rate of the GDP implicit deflator. It shows the price change rate in the whole economy.
Trade Openness	World Bank World Development Indicator (WDI)	Trade openness here is calculated as export plus import as a percentage of GDP.
Government Expenditure	World Bank World Development Indicator (WDI)	General Government final consumption expenditure, which is calculated as % of GDP
Political Stability	World Bank World Governance Indicator (WGI) 2013	Political stability index ranging between -2.5 and 2.5 is used. The high values of this index represent more stability, while low scores indicate less stability of the government.
Legal Origin	The CIA World Factbook	Legal origin variable is used to control the models in terms of the constitutional means of the countries. There are five groups in this category as Civil Law, Common Law, Islamic Law, Customary Law, and Mixed Law.
Religion Data	The Association of Religion Data Archives	The data is constructed from the archive and clustered by some specific majority groups as Muslim, Catholic, Protestant, and Others as the percentage of the population in 2011.
Continental Dummies	World Bank	East Asia & Pacific Europe & Central Asia Latin America & Caribbean Middle East & North Africa South Asia Sub-Saharan Africa

Chapter 4 Financial Exclusion and Islamic Finance: How the Islamic Finance affects Voluntary Exclusion

4.1 Introduction

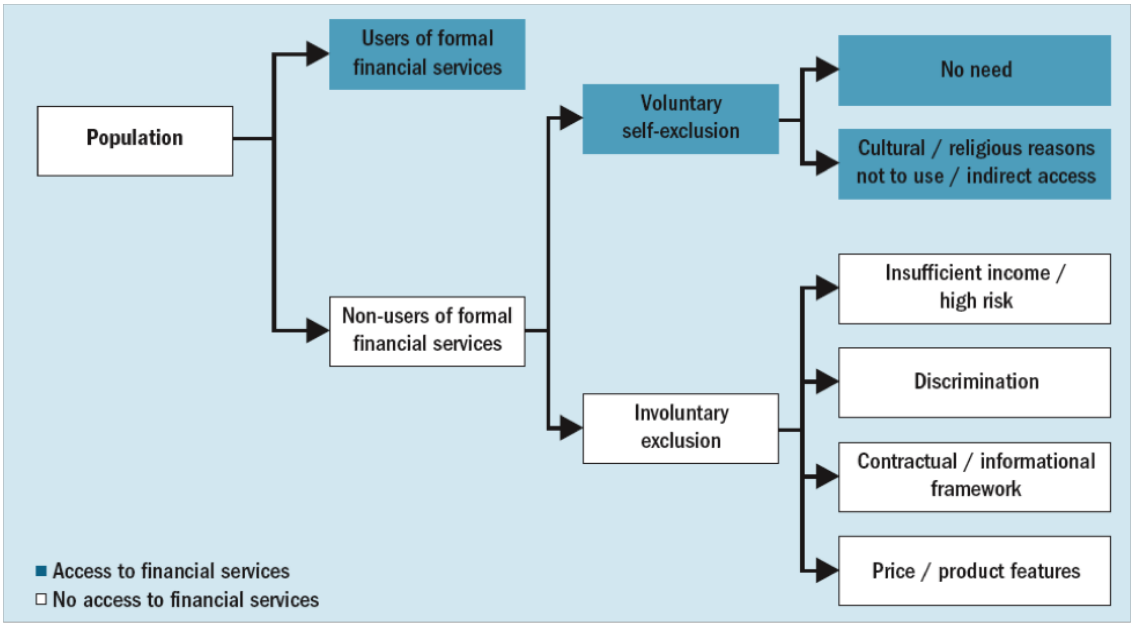
In recent years, there has been increasing concern expressed about financially excluded groups who have limited or even no access to formal financial services in societies. Poor and disadvantaged groups, who are considered as socially excluded, live without any access to formal financial services. Generally, they are denied by the formal financial systems. Therefore, as described by the European Commission (2008), financial exclusion and social exclusion are strongly associated with each other. There are various definitions of financial exclusion in the literature but all definitions are essentially similar. For example, Chant Link and Associates (2004) defines financial exclusion as the vulnerable developments of the poor that make it challenging for them to access financial services. This may cause them to be denied access to the mainstream financial system in an economy. Similarly, Goodwin et al. (1999) define financial exclusion as the lack of access to formal financial services, such as deposit and saving accounts, credit/debit cards and insurance policies.

Financial exclusion can be described according to two main factors, voluntary and involuntary exclusion, as seen in Figure 4.1. These factors are important in terms of determining the reasons for financial exclusion. Scholars mainly consider involuntary excluded groups in order to measure financial inclusiveness in an economy and ignore voluntarily excluded groups. The reason is that these groups have a chance to use formal financial services tools but prefer not to use these services. They claim that these types of groups do not require any further policy actions (World Bank, 2008). However, in this chapter, it is assumed that voluntarily excluded groups need to be considered as important as involuntarily excluded groups in order to enhance greater financial access and financial inclusiveness in an economy. As mentioned above, voluntarily excluded groups choose not to use financial services or formal financial tools, even though they might have physical and geographical access to such services. The reason for their choice can be explained as socio-cultural, religious or ethnical (Beck and Torre, 2006b).

Religious barriers are considered one of the most important reasons for voluntary exclusion, particularly among Muslim groups because of the Islamic rules on finance. Since Islamic law (*Shari'a*) forbids any interest gain from financial transactions and most of the formal financial institutions lack Islamic law-compliant financial services, these kinds of groups face religious barriers to using formal financial services and voluntarily choose not to use them. Therefore, these groups need specific targeting regulations to be involved in the financial system. This also implies that self-exclusion is considered the reason for direct banking exclusion in developing and low-income countries with predominantly Muslim populations (Kempson, 2006).

However, as is traditionally done in the literature, the way to measure the level of financial exclusion of an economy is to use commercial bank-based indicators such as 'the proportion of population covered by commercial bank branches and ATMs', and 'sizes of deposits and credits made by households and SMEs'. On the other hand, using commercial bank-based only financial access indicators to measure the extent of the financial access levels may cause some inconsistencies for economies that mainly have other financial institutions in their financial systems. In order to eliminate this kind of inconsistency, a new proxy of financial access, which contains the access indicators from other financial institutions, is used in this chapter.

Figure 4.1 Factors of financial exclusion



Source: The World Bank (2008) Finance for All: Policies and Pitfalls in Expanding Access, A World Bank Policy Research Report, World Bank, Washington, DC. USA

This chapter first measures the extent of the levels of financial inclusion in order to explore the financial exclusion levels in the relevant economies. This is because it is not possible to measure the levels of self-exclusion in an economy with the data collected in the literature so far. However, using levels of religiosity and Muslim population indicators for the relevant economies allows us to control for the levels of self-exclusion in the relevant economies.

At this point, the term Islamic finance gains much importance in order to eliminate the reasons for voluntary exclusion and to achieve more inclusive financial systems in the policy arena. The World Bank Global Findex database suggests that only 5% of unbanked people indicate religious reasons for avoiding using formal financial services. However, as the Global Financial Inclusion Index Database indicates, this rate is extremely high in the Middle East and North Africa, and other Muslim-dominant population countries. Therefore, any attempt to provide religious-compliant formal financial services in these kinds of countries may cause a sufficient

increase in account penetrations, which would help to build an inclusive financial system in these economies (Demirguc-Kunt and Klapper, 2013).

This chapter is based on the premise that voluntarily excluded groups who have a chance to use formal financial services but prefer not to use them need to be considered as important as involuntarily excluded groups in order to enhance greater financial inclusion to an economy. Since Muslim people mostly prefer to use financial services and products from Islamic financial institutions, this chapter assumes Islamic financial services can play a significant role in financial access for Muslim populations.

Since little empirical research has been done to examine the association between financial exclusion and Islamic finance in the literature, this study will empirically fill this gap. In doing so, this chapter conducts two main analyses with two different estimation models: First, following the Global Financial Development Report (2014), Demirguc-Kunt et al. (2013) and Naceur et al. (2015), it aims to contribute to the literature by empirically examining the effects of Islamic finance on voluntarily financial exclusion, which is determined by lack of access to formal financial services. Furthermore, in modifying the results in the literature and as one of the main contributions of this chapter, we subdivide Islamic banking products to assess the mechanism by which the impact of Islamic finance on financial exclusion occurs. Second, it attempts to test argument proposed by Beck et al. (2013)s by exploring the impact of the recent global financial crisis by comparing Islamic and conventional banks with new interaction variables for crisis periods using Arellano and Bond's (1991) GMM estimation model. The disaggregated data on Islamic banking products are also used in this section to assess the mechanisms by which the relative performance of Islamic banks occurs.

We use two different samples of countries to assess the impact of Islamic banking on financial exclusion. Therefore, we use both the all countries and the Organization of Islamic Cooperation (OIC) member countries only samples in the empirical analyses. As presented in Tables 4.10 and 4.11, the first sample consists of 118 countries from different geographic and economic backgrounds around the world. The second sample consists of 52 Organization of Islamic Cooperation (OIC) member countries. Because of the data limitations on other countries (non-OIC countries) for Islamic banking products, we cannot use OIC member country interaction terms in the all countries regression models. Moreover, because of the nature of data, we average the values of financial inclusion index and Islamic banking products for the period from 2004 to 2011 in the first empirical analysis. Hence, in this chapter, the notion that providing a range of the financial services that are compliant with Islamic law can play a significant role in the voluntary financial exclusion, particularly in countries with predominantly Muslim populations, is briefly considered.

The empirical findings suggest that Islamic finance is significantly associated with lower levels of conventional bank-based financial access, using both the all countries and the OIC member countries samples. However, Islamic banking indicators are significantly associated with higher levels of access to microfinance institutions, credit unions and post offices services using both the all countries and the OIC member countries samples.

After assessing the mechanisms by which the impact of Islamic banking occurs, the results show that higher levels of specific Islamic banking products are associated with lower conventional bank access in the all countries sample. Regarding the OIC member countries sample, higher levels of loans and deposit percentages of GDP variables are associated with lower levels of commercial bank access. However, higher levels of percentages of zakah and of murabahat variables are found to be associated with higher levels of commercial bank-based financial access.

Exploring the mechanisms of the impact of Islamic finance on access to other financial institutions, we empirically find that Islamic banking deposits and murabahat transactions variables are found significantly and negatively associated with access to other financial institutions in both samples. However, Islamic banking total assets, total capital ratio and the percentages of zakah components of Islamic banks are found positively and significantly associated with access to other financial institutions in both samples.

Meanwhile, Islamic banking growth indicators are found to be significantly and negatively associated with commercial bank outreach and the access to and use of commercial banking services in both the all countries and OIC member countries samples. Moreover, regarding the impact of Islamic banking growth on other financial institutions' access, we find evidence that Islamic banking deposits as the proxy of Islamic banking growth is found significantly and negatively associated with the outreach of microfinance institutions, cooperatives and post offices in both samples. Furthermore, the Islamic banking total assets indicator is found significantly and positively associated with the outreach of other financial institutions in both samples.

Comparing the relative performances of Islamic and commercial banks during the crisis period, our findings suggest that conventional banks perform better during general periods. However, Islamic banks significantly perform better during the crisis period. Regarding the mechanisms by which this impact occurs, the Zakah to GDP ratio for equity asset ratio is found as the component that explains the relative performance of Islamic banks during the crisis.

This chapter is conducted as follows: Section 2 identifies Islamic finance and some basic Sharia-compliant products. Section 3 explains related work on the association between Islamic finance and financial inclusion. Section 4 determines the indicators and their sources. Section 5 indicates what the methodology of the chapter is. Section 6 presents the empirical results of the models performed in the chapter, and, finally, section 7 provides a conclusion.

4.2 Sharia-compliant Financial Products and Islamic Finance Institutions

As mentioned above, scholars and policymakers, such as Beck, Demirguc-Kunt and Merrouche (2013) and Mohieldin, Iqbal, Rostom and Fu (2011), have started to pay more attention to the growth of the Islamic finance and Islamic law (Shari'a) compliant financial services in order to enhance broader financial inclusion among Muslim groups. In doing so, it will be beneficial to briefly explain the scope of Islamic finance and the fundamentals of Islamic law-compliant financial tools. The main aspects of Islamic finance, which relies on Shari'a, are social justice, the equitable allocation of resources among people and inclusion. In other words, the fundamental factor of the Islamic economic system is economic growth along with social justice, which is also known as inclusive economic growth. This system aims for all members in society to have equal opportunities.

The Islamic perspective on financial inclusion has two dimensions: First, Islamic law promotes financial inclusion through risk-sharing contracts, which are the best alternative to conventional finance. Second, it promotes financial inclusion through particular redistribution of the wealth instruments among all groups in an economy (Iqbal and Mirakhor, 2012). Risk-sharing financial instruments can be classified as Shari'a-compliant microfinance, SME financing and micro insurance, and Shari'a-compliant deposits and/or savings accounts, which operate under *Mudaraba* (profit sharing) in order to provide broader access to finance. This also means more financial inclusion. These instruments can be referred to as profit and loss sharing principles in all types of financial transactions. Risk-sharing financial instruments, as classified above, operate under profit-sharing principle, wherein there is no interest gain for account owners, but rather they share the overall profit or loss of the Islamic financial institution (Demirguc-Kunt and Klapper, 2013).

Furthermore, redistributive instruments are explained as Zakah, Sadakat, Qard-al-hassan and Waqf, which target the disadvantaged and underprivileged in order to eradicate poverty and enhance social justice in society. These redistributive instruments are considered as mandated levies. In other words, the social and economic risks of the poor are also faced by the privileged sectors in society (Mohieldin, Iqbal, Rostom and Fu, 2011).

The first redistributive instrument, *Zakah*, as explained above, simply refers to a wealth distribution cycle where the rich and the poor are the main players. According to Shari'a law, a wealthy person who gains more than what they consume must share this residual amount with the poor in society. Zakah is expressed as a wealth tax, which is calculated according to a person's level of net worth. In order to encourage capital investment and house ownership, Shari'a excludes business capital and housing from Zakah taxation. At this point, it must be noted that Zakah is totally different than general government taxation; it is based on the basis of willingness of Muslim groups to adhere to Islamic law.

The second redistributive instrument, *Sadaqah*, refers to voluntary social spending in order to eradicate poverty in society, as the Qur'an requires. The third instrument, *Qard-al-hassan*, is a voluntary loan, which does not have any interest or any expectation of return from the borrower as a government subsidy. It is the borrower's responsibility to repay the loan but the well-off creditor does not ask the needy borrower to pay off the debt at a certain time.

Finally, *Waqf* (endowment) is voluntarily donating properties such as land or buildings for philanthropic purposes in society (Askari, Iqbal, Krichene and Mirakhor, 2012). All of those levies are different from general charity tools because, according to the Qur'an, they are required, and there will be multiple returns on these levies in an increasing rate as a reward from God.

Since not all countries with predominantly Muslim populations engage in the Islamic economic system and Shari'a, the redistributive instruments outlined above remain people's voluntary choices and cannot be controlled or tracked by the policymakers of such countries. For example, there is no way by which the annual amount of Zakah in the Republic of Turkey as a secular country can be tracked. Therefore, in most countries, redistributive instruments are not considered as tools for Islamic financial institutions. Risk-sharing products are the main objectives of Islamic financial institutions across the world.

4.2.1 Impact of the Financial Crisis

The relative performance of Islamic and conventional banks during the recent global financial crisis has been intensively argued in recent years. The global financial crisis has increased attention of policymakers and researchers on the association between Islamic finance and financial stability, along with the resilient nature of Islamic financial institutions during the crisis. The effect of the global financial crisis on commercial bank assets was destructive. However, the asset-base and risk and profit sharing nature of Islamic financial institutions shielded their clients from the worst effects of the financial crisis. Therefore, the evidence in the

literature globally suggests that Islamic banks performed better during the crisis. The effects of the global crisis were greater in well-developed economies, such as in Europe and the US, while the effects were relatively lower in less developed regions. (Hasan and Dridi, 2010).

In particular, there are three factors determined in the literature that helped to increase the stability of Islamic banks by focusing on real practices. First, Islamic financial activities are more related to actual economic activities than commercial banks. Islamic banking services that rely on profit and loss sharing principles provide much better risk sharing opportunities. This creates a strong link between the real and the financial sector. Profit and loss sharing products, such as *murabaha* and *mudaraba* services comprise a large share of other Islamic financial services. For instance, *murabaha* services comprised 65.4% of the total Islamic financial activities in OIC member countries in 2007. These kinds of services require determining the credit holders' real purpose of using these services and those banks should hold the ownership of the asset. Hence, this helps the bank to keep tracking the funds, is used for their actual intention and it keeps them tied to the real sector. However, commercial banks are more flexible on choosing the clients and their intended purposes of using the funds. Finally, in the nature of these services, Islamic banks are against commodity, usufruct and tangible assets in the future. Hence, this helps them to prevent ballooning of debt and loans and to create a strong tie between the real and the financial sector (Syed Ali, 2011).

Second, exotic and toxic financial services, which are considered as speculative investments for commercial banks and amplifying components of the global crisis, are not available in Islamic banks. Before the crisis, this situation was considered as a barrier to Islamic banking development. However, during the crisis, it turned out to be a powerful factor for Islamic banks. Third, Islamic banks have relatively larger liquidity amounts compared to commercial banks. Lack of interest-free, short-term transactions and risk management aims, as the nature of Islamic banks, causes an excess of liquidity (Syed Ali, 2011).

Moreover, as discussed in *The Economist* (2009) and El-Said and Ziemba (2009), since the main source of the global crisis was sub-prime mortgage transactions, this crisis did not affect Islamic banks because of the strong association between financial and productive investments. However, Islamic banking transactions were not totally free from the impacts of the global financial crisis. The global financial crisis had indirect effects on Islamic banks. In particular, after the global crisis, some specific transactions such as *murabaha* services and services that are strongly tied with the real sector started to incur higher risks. Furthermore, the butterfly effect of the global crisis affected developing economies by decreasing their economic growth rates and trade activities. These economic restrictions in such countries, which have more Islamic banks, reduced the funding capacity of these financial institutions (Beck et al., 2013).

4.3 Related Work

The concerns about the groups with limited access to financial services and those considered financially excluded have been increasing recently. Financial exclusion, which is the absence of physical banking services, causes low community investment, unemployment and poverty in an economy (Beck at al., 2007b). In doing so, researchers have been paying more attention to the causes of financial exclusion and financial service provision developments which are organised to eradicate financial exclusion (Collard, Kempson and Whyley, 2001).

However, research studies examining the range of financial exclusion are rare in the literature. For instance, Kempson (2006) and Connolly and Hajaj (2001) add the barriers of access to formal financial services, such as geographical location, the economic situations of the potential clients and other social conditions, to the definition of financial exclusion. Moreover, Kempson et al. (2004, p.5) defined the reasons for financial exclusion as 'identity requirements', 'psychological and cultural influences', 'terms and conditions of bank accounts', 'physical access to bank branches', 'levels of bank charges' and 'the ease to use the banking services'. Those are considered as barriers to financial inclusion, which are also key factors in determining the extent of the financial system outreach in an economy.

Typically, the most important part of financial services in an economy is measuring the number of people who have access to these services (Beck and De la Torre, 2006a). Therefore, bank accounts identify access to many financial services in an economy (Mohan, 2006). In doing so, following the traditional way outlined in the literature, this chapter determines financial exclusion as the measure of the extent of financial access in an economy, which is called financial inclusion.

There are other studies on different aspects of financial exclusion in the literature. For example, in rural areas, the UK Treasury (2004) found a link between financial exclusion and child poverty. The high costs of using financial services and debt have a negative impact on family life in society. Moreover, in Australia, closures of some bank branches caused a reduction in savings, reduced income investment and increased the cost of finance (Chant and Link, 2004). Collard, Kempson and Whyley (2001) identified that people living in isolated and low-income areas and the unemployed are most likely to be excluded from the mainstream financial system. Therefore, the exclusion rates are particularly high among disadvantaged groups, the unemployed, single parents, women and people from ethnic minorities.

Furthermore, Muslims are less likely to use formal financial services such as by having a bank account and saving at a formal financial institution than non-Muslims. However, they are less likely to use Islamic law-compliant banking services in some countries (Demirguc-Kunt,

Klapper and Randall, 2013). Therefore, lack of access to Islamic law-compliant financial services is considered one of the most important causes of low banking penetration and, as a result, financial inclusion, particularly in the Middle East and North Africa (MENA) regions, where the financial inclusion rates are the lowest in the world (Ghoul, 2011). Hence, Muslim households and SMEs may choose to stay outside the financial system because of the Islamic law on finance around the world. These exclusion rates tend to be high in religiously conscious Muslim populated regions.

Specific studies examining the association between financial exclusion and Islamic finance are rare in the literature. However, there have been various studies conducted on the participatory preferences of the clients of Islamic financial institutions in order to determine the importance of the religious reasons behind choosing and preferring such institutions. For instance, Ozsoy, Gormez and Mekik (2013) stated that the reasons why arbitrarily chosen sample clients from the province of Bolu in Turkey prefer Islamic financial institutions are service quality, trust and religious reasons. This result can be interpreted as the structure of Islamic financial institutions, which are different from the traditional Islamic law-compliant financial institutions in the world. Intuitively, the results from the countries that have traditional Islamic banking institutions support this argument.

For example, Gerrard et al. (1997) in Singapore, Metawa et al. (1998) in Bahrain, Naser et al. (1999) in Jordan, Othman et al. (2001) in Kuwait, Wakhid et al. (2007) in Indonesia, Gait et al. (2009a and 2009b) in Libya and Lee et al. (2011) in Pakistan found that religious reasons are the most important reasons why some clients prefer using Islamic banking services. Furthermore, Karakaya et al. (2004) and Okumus (2005), using all Islamic finance institutions in Turkey, found that religious beliefs are the most important reason behind the preference for using Islamic banking services.

Mohieldin, Iqbal, Rostom and Fu (2011) argue that if they are applied in a true spirit, Islamic law-compliant financial services may lead to overall wealth distribution among people in society, from the rich segments to the poor. This redistribution results in poverty reduction and the elimination of income inequality in that economy. Hence, in order to increase levels of access or reduce financial exclusion rates, policymakers should provide different sets of Islamic financial instruments in Muslim-dominant countries.

As mentioned above, scholars and policymakers have started to pay more attention to the growth of the Islamic finance and Shari'a-compliant financial services in order to enhance broader financial inclusion among Muslim groups. Beck et al. (2013) suggested that during the recent global financial crises, Islamic finance institutions performed relatively better than

conventional finance institutions because of their higher capitalisation and liquidity, particularly in Muslim countries.

Furthermore, the World Bank Global Financial Development Report (2014) concluded that the emergence of Islamic banks has a significant impact on the financial access of households and small and medium-scaled firms. For example, this report suggests that there is an inverse and significant association between the size of Islamic financial institutions and the proportion of firms identifying access to finance in OIC countries. Moreover, the increasing number of Islamic banks has a positive influence on the operations of small-scaled firms. This chapter follows the theory behind their work, and tests the association between financial access and Islamic finance for both all countries from different backgrounds and Muslim-dominant countries, separately.

Similarly, Naceur et al. (2015) suggested that in Organization for Islamic Cooperation (OIC) member countries, where levels of financial inclusion are lower and the extent of exclusion from formal financial system because of religious reasons are greater, Islamic banking is an effective factor for financial inclusion. They found evidence that the presence of Islamic banking activities is associated with higher levels of banking credits for households and firms in OIC member countries.

The global financial crisis has increased the attention being paid by policymakers and researchers on the association between Islamic finance and financial stability along with the resilient nature of Islamic financial institutions during the crisis. They commonly pointed to the relative performance of Islamic and conventional banks during the global financial crisis. The impact of the global financial crisis on commercial bank assets was more destructive. The asset-base and risk and profit sharing nature of Islamic financial institutions shielded their clients from the worst effects of the global financial crisis. Thus, as the literature shows, Islamic banks performed relatively better than conventional banks during the crisis (Beck et al., 2013; Syed Ali, 2011; Hasan and Dridi, 2010).

In particular, Syed Ali (2011) empirically explored the reasons for the relatively better performance of Islamic banks during the global financial crisis. The first reason was the association of Islamic banking activities with real economic activities. This strong association comes from the nature of Islamic banking transactions, such as profit and loss sharing principles, which provide much better risk sharing opportunities for clients. Second, exotic and toxic financial services, which are considered as speculative investments for commercial banks and as amplifying components of the global crisis, are not available in Islamic banks. Third,

Islamic banks have relatively larger liquidity amounts than commercial banks. This much higher liquidity is the consequence of the risk management purposes of Islamic banks.

Finally, Hasan and Dridi, (2010) empirically suggested in their paper that Islamic banks were affected by the global financial crisis differently to conventional banks. Islamic banking factors such as its business model helped to reduce the impacts of the global crisis on profitability in 2008. However, some Islamic banks faced a larger profitability decline in 2009 because of their inability to risk manage activities. Additionally, Islamic banks performed better in asset and credit growth than conventional banks during the crisis period.

4.4 Data

4.4.1 The Impact of Islamic Finance on Financial Inclusion

In this section, we empirically aim to examine the impact of Islamic finance on financial exclusion. Following the traditional way outlined in the literature, financial exclusion is determined oppositely to financial inclusion in this chapter. In order to examine this association between Muslim-dominant countries and other countries separately, we use two different samples of countries in the regression models. The first set of regression models is run for 118 countries from different geographic and economic backgrounds around the world. As presented in Tables 4.9 and 4.10, the second set of regression models is run for 52 Organization of Islamic Cooperation (OIC) member countries to analyse the association between financial inclusion and Islamic finance.

Meanwhile, we examine this association in terms of both conventional banks and other financial institutions, such as microfinance institutions, separately in this section. Hence, there are two proxies of financial inclusion used as the dependent variable to examine the effects of the Islamic financial institutions on financial inclusion. The multidimensional financial inclusion index, which is constructed in the first chapter, is used as the proxy of commercial bank-based financial inclusion. This index contains the demand and supply side of the commercial bank-based financial access indicators. Following the OECD's handbook for composite index construction, this index is constructed using several analyses. Using different access indicators, this index is constructed as a single composite index that lies in the range [0–1], where 0 denotes absolute financial exclusion and 1 denotes absolute financial inclusion.

Table 4.1 Summary statistics and correlations of the all countries sample
4.1A:

Variable	Obs	Mean	Std. Dev.	Min	Max
Fiindex	116	0.24	0.09	0.03	0.70
Other financial institutions	118	4.89	1.00	-0.90	6.83
Islamic Banking dummy	118	0.41	0.49	0.00	1.00
Number Islamic Banks	118	3.26	7.72	0.00	43.00
Islamic Banking Loans%	52	2.92	2.88	0.10	13.20
Islamic Bankin Assets %	52	3.13	3.12	0.20	16.10
Islamic Banking Deposits %	52	3.77	4.40	0.10	26.20
Islamic Banking Capital Ratio	52	1.91	2.36	0.10	8.90
Zakah %	52	0.55	0.84	0.10	5.20
Murabahat %	52	52.00	1.18	0.10	6.70
Relgiosity %	109	75.06	24.05	16.00	99.00
Muslim %	91	0.49	0.41	0.01	0.99
No account religious reasons	48	9.37	8.67	0.00	33.60
GDP per capita growth	116	-1.25	5.40	-16.59	18.07
Private Credits/GDP	110	60.00	56.68	3.78	269.72

4.1B:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Fiindex	1													
2 Other financial institutions	0.2206*	1												
3 Islamic Banking dummy	0.0362*	0.0022*	1											
4 Number of Islamic Banks	0.0742*	0.0337*	0.5125*	1										
5 Islamic Banking Loans%	-0.0267*	0.0185*	0.2183	0.3655*	1									
6 Islamic Bankin Assets %	-0.0526*	0.0090	0.1465	0.3819*	0.6846*	1								
7 Islamic Banking Deposits %	-0.0831	-0.1083	0.1499	0.2712	0.3302*	0.2609	1							
8 Islamic Banking Capital Ratio	-0.0004	0.1506	-0.0414	-0.1394	0.1849	0.0098	0.1683	1						
9 Zakah %	-0.1421*	0.0547*	0.0718	0.5253*	0.4167	0.5804*	0.1009	0.0130	1					
10 Murabahat %	-0.1476*	0.3883*	0.2022	0.4155*	0.1496	0.2006	0.3414	-0.0412	0.4019	1				
11 Relgiosity %	-0.3592*	0.3571*	0.2962*	0.2919*	0.3576	0.4059*	0.2723	0.0044	0.1659	0.2628	1			
12 Muslim %	-0.1939	0.4031*	0.4279*	0.4295*	0.3145	0.2393	0.2443	0.0438	0.0182	0.2641	0.4311*	1		
13 No account religious reasons	0.1172	-0.1210	0.0998	-0.1701	0.0557	-0.0903	-0.0527	-0.0541	-0.2018	-0.2307	0.1824	0.4330*	1	
14 GDP per capita growth	0.2932*	0.2494*	0.1943*	0.0145	0.1047	0.0392	-0.0557	-0.2432	0.1002	0.1634	0.2844*	0.2150*	0.4174*	1
15 Private Credits/GDP	0.6765*	0.3469*	-0.1146	-0.0411	-0.1967	-0.1827	-0.0450	-0.1126	-0.1381	-0.2145	-0.3769*	-0.3413*	-0.1084	-0.3630*

Regarding the access indicator for other financial institutions, we follow the same process by using the residuals after differentiating the all-financial institutions indicator from the formal financial institutions indicator. Since using commercial bank-based financial access indicators to measure the extent of financial access in economies may cause some inconsistencies for the countries that mainly used other financial institutions, a new proxy of financial inclusion that covers financial access indicators from other financial institutions is used in this section. 'The percentage of adults that have an account at a formal financial institution' variable, which includes accounts in credit unions, post offices and other financial institutions, such as cooperative or microfinance institutions, is constructed from the World Bank's Global Financial Inclusion Database.

As can be seen from Tables 4.1 and 4.2, we use various indicators to assess the impact of Islamic finance in this section. In line with the literature, we first use an Islamic banking dummy and the number of Islamic banks variable in the regression models (Beck et al., 2013; Khan, 2010). These variables are constructed from the Global Financial Development Report 2014 database. Moreover, in order to assess the mechanisms by which the impact of Islamic finance occurs, we use the services of Islamic banks separately in the models. This helps us to assess the different channels of the real impact of Islamic finance on financial access in both country types. Bringing a broader aspect on the impact of Islamic finance on financial access than in the literature, this analysis is one of the main contributions of this chapter. Following the previous studies, we use the ratio of Islamic banking assets to GDP, the ratio of Islamic bank deposits to GDP and the ratio of Islamic loans to GDP as the *mudaraba* services of Islamic banks. These variables are also used as the measures for the development of Islamic banking in the literature (Imam and Kpodar, 2015). Furthermore, the ratios of *zakah* and *murabahat* services to GDP variables are also used to assess the mechanisms of this impact. Finally, following Imam and Kpodar (2015), we use the capital-asset ratio of Islamic banks as the robustness check of the results in terms of the capitalisation measure of Islamic banks. All of these indicators are constructed from *Bankscope* database.

Furthermore, following the literature, we use some other control variables, such as 'the percentage of adults citing religious reasons for not having an account at a formal financial institution', 'the percentage of religiosity of a country', and 'the percentage of Muslim population' variables in this section. These variables are used to determine the impact of Islamic financial institutions on financial access in the economies in terms of the levels of religiosity and Muslim population. These variables are constructed from the Global Financial Development Report 2014 database. Meanwhile, 'the percentage of Muslims' variable is constructed from the study by Demirguc-Kunt, Klapper and Randall (2013).

Finally, following Beck, Demirguc-Kunt and Merrouche (2013), log GDP per capita as the proxy of income growth and private credits to GDP ratio as the proxy of financial development variables are used to control for the results of the models. These variables are used to control for the results in terms of a country's income growth and financial development levels, and the World Bank's World Development Indicators database is used to construct these indicators.

Table 4.2 Summary statistics and correlations of OIC member countries sample
4.2A:

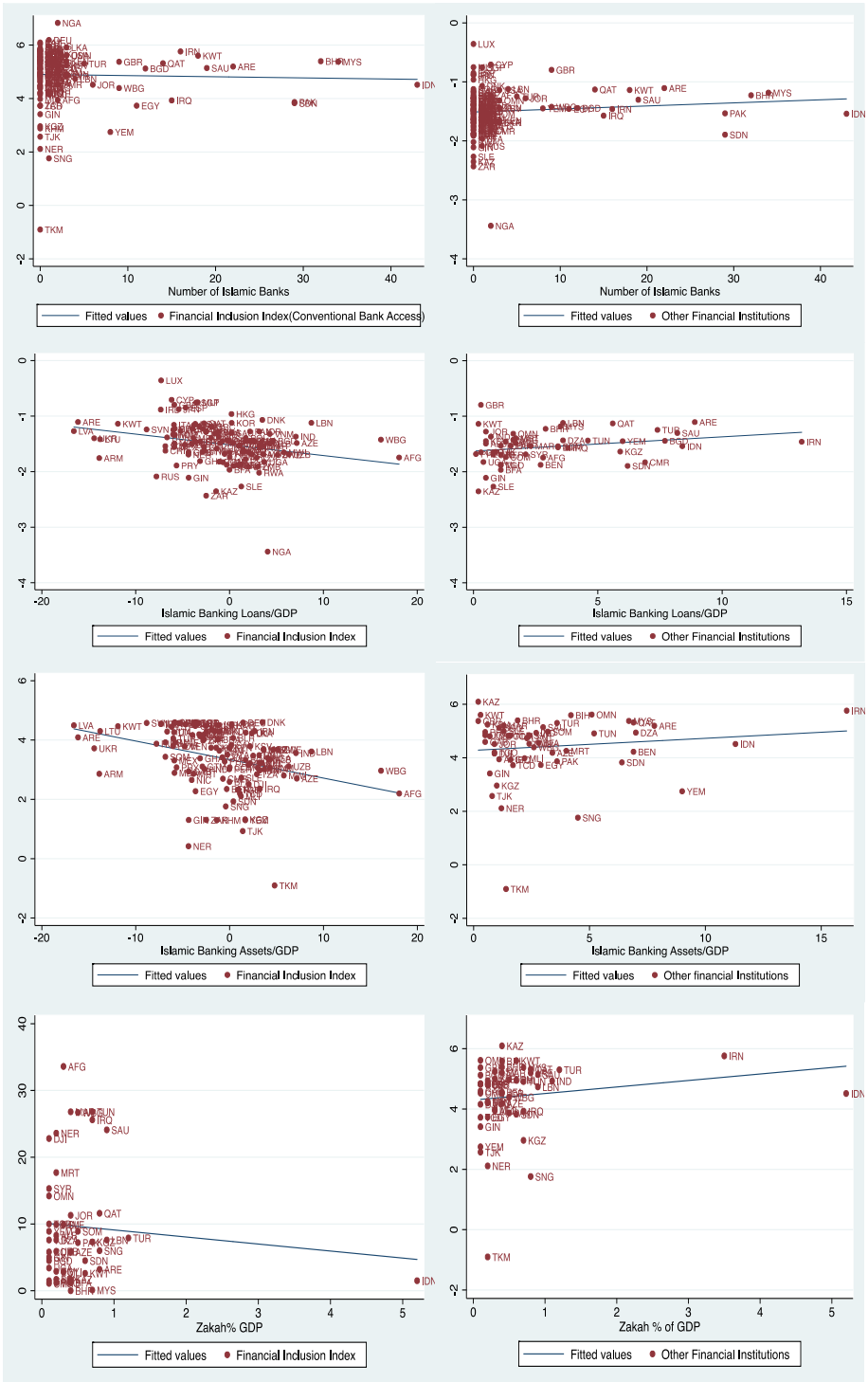
Variable	Obs	Mean	Std. Dev.	Min	Max
Findex_OIC	116	0.08	0.11	0.00	0.33
Other Institutions_OIC	118	1.78	2.30	-0.90	6.83
Islamic Banking dummy	118	0.41	0.49	0.00	1.00
Number Islamic Banks_OIC	118	2.86	7.67	0.00	43.00
Islamic Banking Loans%_OIC	52	2.57	2.57	0.00	8.90
Islamic Bankin Assets %_OIC	52	2.66	2.62	0.00	11.30
Islamic Banking Deposits %_OIC	52	3.34	4.39	0.00	26.20
Islamic Banking Capital Ratio_OIC	52	1.73	2.33	0.00	8.90
Zakah %_OIC	52	0.43	0.73	0.00	5.20
Murabahat %_OIC	52	1.03	1.64	0.00	6.70
Religioisty_OIC %	109	31.53	43.45	0.00	99.00
Muslim_OIC %	91	0.42	0.45	0.00	0.99
No account religious reasons	48	9.37	8.67	0.00	33.60
GDP per capita growth_OIC	116	0.29	3.64	-16.15	18.07
Private Credits/GDP _OIC	110	13.66	23.38	0.00	111.61

4.2B:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Findex_OIC	1													
2 Other Institutions_OIC	0.9115*	1												
3 Islamic Banking dummy	-0.5457*	0.5053*	1											
4 Number of Islamic Banks_OIC	-0.5707*	0.4778*	0.4517*	1										
5 Islamic Banking Loans%_OIC	-0.3339*	0.2739*	0.2014	0.4120*	1									
6 Islamic Bankin Assets %_OIC	-0.2885*	0.2452*	0.1581	0.4673*	0.5566*	1								
7 Islamic Banking Deposits %_OIC	-0.3148*	0.1927*	0.2400	0.3373*	0.3991*	0.3023	1							
8 Islamic Banking Capital Ratio_OIC	0.1266	0.1889*	-0.0165	-0.0865	0.3055	0.1039	0.1998	1						
9 Zakah %_OIC	-0.0658*	0.0132	0.0718	0.5212*	0.4167	0.5804*	0.1009	0.0130	1					
10 Murabahat %_OIC	-0.166*	0.0690	0.2013	0.4670*	0.3651	0.4526*	0.3831	-0.0402	0.4017	1				
11 Religioisty_OIC %	-0.9315*	0.9081*	0.5342*	0.5427*	0.5258*	0.5243*	0.3836*	0.0957	0.1509	0.3596	1			
12 Muslim_OIC %	-0.8793*	0.8026*	0.3618*	0.4658*	0.3669*	0.3334*	0.3707*	0.1325	0.0190	0.3353	0.9343*	1		
13 No account religious reasons	-0.1172*	-0.1210	0.0998	-0.1701	0.0557	-0.0903	-0.0527	-0.0541	-0.2018	-0.2307	0.1824	0.4330*	1	
14 GDP per capita growth_OIC	0.0097*	0.0426	0.0237	-0.1463	0.0960	-0.0179	-0.1169	-0.2643	0.0925	0.1506	0.0854	0.0778	0.4174*	1
15 Private Credits/GDP_OIC	0.8286*	0.7927*	0.4594*	0.5760*	0.0674	0.0750	0.2057	-0.0207	-0.1334	-0.0426	0.7157*	0.6639*	-0.1084	-0.2401*

Tables 4.1 and 4.2 explain the summary statistics and correlations among these variables. According to these tables, the Islamic banking dummy, number of Islamic banks and Islamic banking products are mainly negatively and significantly associated with a conventional bank-base access indicator in both the all countries and the OIC member countries samples.

Figure 4.2 Correlates of financial inclusion proxies against Islamic banking products



However, in terms of access to other financial institutions, these variables have positive and significant correlations in both country types. Similarly, the percentage of religiosity and Muslim population variables are negatively and significantly associated with conventional bank access in both types of countries, while they are positively and significantly associated with access to other financial institutions.

Finally, Figure 4.2 explores the correlations between the proxies of financial inclusion and Islamic banking products. Accordingly, the graphs show that Islamic banking products have a negative association with commercial bank-based access, while they have a positive association with access to other financial institutions. These graphs let us assess the data in terms of outliers and the level of the association. Meanwhile, these results show that the indicators of Islamic banking products in this section have strong association with the proxies of financial inclusion.

In particular, starting clockwise from the upper left corner, the first sets of graphs show the number of Islamic banks against access to conventional banks and other financial institutions for the average of the years 2004 to 2011. The second sets of graphs explore the Islamic banking loans to GDP ratio against access to financial services at both institutions. The third one shows the Islamic banking total assets to GDP ratio against the proxies of financial inclusion. Finally, the last sets of graphs explore the Zakah % of GDP for the countries against access to financial services to both institutions. The data show that all the products of Islamic financial institutions are negatively associated with conventional bank-based access, while they are positively associated with access to other financial institutions. There are some common outlier countries in the data, such as Turkmenistan, Nigeria, Niger and Afghanistan, as can be seen from the graphs. As a robustness check, we extracted these countries from the data and re-ran the estimation models to assess the impacts of outliers.

4.4.2 Impact of the Financial Crisis

Following the argument put forward by Beck et al. (2013), in this section we empirically aimed to assess the impact of the recent global financial crisis on both Islamic financial institutions and conventional banks. We used a sample of countries that have both commercial and Islamic banks to assess the relative performance of those bank types during the crisis. As can be seen from Table 4.3, following Beck et al (2013), in order to construct and examine different indicators of all banks, such as business orientation and stability, we used data from both Bankscope and World Bank's Financial Development Database for the period 2004 to 2011. We used various variables to compare conventional and Islamic banks during the financial crisis periods.

In particular, we used an equity asset ratio, return on assets, and return on equity, Z-scores and finally, loans to deposits ratio to compare the relative performance of Islamic and commercial banks during the recent global financial crisis period (Beck et al., 2013; Syed Ali, 2011). It is suggested in the literature that these indicators are relatively better for comparing both types of banks in the models since these indicators were affected more by contagion effects. Moreover, the loan-deposit ratio let us measure '(dis-) intermediation trends' across both types of banks during the recent global financial crisis (Beck et al., 2013).

In the meantime, in order to test Beck and others' results, we used our constructed financial inclusion index as the proxy for financial inclusion along with the proxies that they used. Regressing these proxies separately and together in different regressions, we compared the results to test our constructed financial inclusion index. Their conventional bank access proxies, total assets, non-learning assets and fixed assets were constructed from the World Bank's Financial Development Database and Bankscope. Finally, in line with the modification of the results in Beck et al. (2013), we used aggregate data for specific Islamic bank products to examine the mechanisms of the relative performance of Islamic banking during the crisis. Subdividing the products of Islamic financial institutions allowed us to assess the mechanism by which Islamic finance provides a better service or vice versa in this section.

Table 4.3 Summary statistics and correlations
4.3A:

Variable	Obs	Mean	Std. Dev.	Min	Max
Equity-Asset Ratio	162	4.901	13.943	0	74
Return on Asset (ROA)	326	1.594	3.380	-51	21
Return on Equity (ROE)	326	15.806	17.791	-89	241
Z-score	326	17.262	11.329	-5	56
Loan-deposit	316	79.980	41.105	9	368
Financial Inclusion Index	336	0.059	0.068	0	0
Banking Crisis Dummy	336	0.381	0.486	0	1
Islamic Banking Dummy	928	0.440	0.497	0.000	1
Zakah % of GDP	335	0.072	0.713	0	9
Financial Inclusion Index_Crisis	336	0.023	0.052	0	0
Islamic Banking Dummy_Crisis	927	0.174	0.379	0.000	1
Zakah % of GDP_Crisis	335	0.019	0.338	0	6
Total Assets (Conventional banks)	287	39.159	28.935	4	143
Non-Loan Earnings Assets	167	8.257	6.433	1	31
Fixed Assets	312	71.252	18.979	32	100

4.3B:

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Equity-Asset Ratio	1																	
2	Return on Asset (ROA)	-0.010*	1																
3	Return on Equity (ROE)	-0.035	0.489*	1															
4	Z-score	-0.023*	0.070	-0.244*	1														
5	Loan-deposit	0.482*	-0.145*	0.062	-0.112*	1													
6	Financial Inclusion Index	0.315*	-0.036	-0.111	0.409*	0.148*	1												
7	Total Assets	0.202*	-0.050	-0.191	0.721*	0.111	0.816*	1											
8	Non-learning assets	-0.104	-0.218	0.057	0.148*	-0.009	-0.076	0.082*	1										
9	Fixed assets	0.172	0.037	0.016	0.318*	-0.062	0.307*	0.325*	-0.213	1									
10	Islamic Banking Dummy	-0.103*	0.032*	0.066*	0.140*	0.244*	0.041*	-0.242*	-0.134	-0.324	1								
11	Banking Crisis Dummy	0.165*	-0.073*	0.080	-0.123	0.235*	-0.022	-0.065	-0.129*	-0.018	-0.042	1							
12	Zakah % of GDP	-0.080	0.016*	-0.006	-0.221*	-0.103	-0.142	-0.188*	-0.069*	-0.207*	-0.070	0.054	1						
13	Financial Inclusion Index_Crisis	0.307	-0.091	0.005	0.039*	0.202	0.314*	0.224*	-0.098	0.114*	0.842*	-0.082	0.123*	1					
14	Total Assets_Crisis	0.244*	-0.082	-0.016*	0.147	0.203*	0.239	0.281*	-0.109	0.125	0.854*	-0.099	0.944*	0.786*	1				
15	Non-learning assets_Crisis	0.109*	-0.236	0.244	-0.116	0.189	-0.001	-0.048	0.417*	-0.092	0.656*	-0.076	0.566*	0.563	0.543*	1			
16	Fixed assets_Crisis	0.230*	-0.061	0.077*	-0.034	0.214*	0.057	0.031	-0.160	0.184*	0.945*	-0.098	0.865*	0.882*	0.578*	0.342*	1		
17	Islamic Banking Dummy_Crisis	0.045*	0.041*	0.021	0.054*	0.112*	0.541*	-0.086*	0.517*	0.156*	0.123	0.065	-0.003	0.234*	-0.054	0.101*	-0.001	1	
18	Zakah % of GDP_Crisis	-0.042	0.009*	-0.003	-0.119*	-0.049	-0.057	-0.109*	-0.070	-0.124*	0.117	0.463*	0.052	0.019	0.016	0.046	0.065*	0.121*	1

Meanwhile, we used the same products in the previous section to assess the mechanism behind the performance of Islamic banking. We first compared the business orientation of commercial and Islamic banks during the crisis period using the loan-deposit ratio. The loan-deposit ratio varies from 9% to 368% in our sample. Second, we used several bank stability indicators, such as a z-score. The z-score shows the measure of bank stability and explores the level of insolvency. A higher level of z-score represents a higher level of bank stability (Beck et al., 2013). The z-score varies from -5% to 56% in this sample. Finally, we used two components of the z-score, return on assets and return on equity, in this section.

As seen in Tables 4.2B and 4.3B, there are high correlations between some Islamic bank products. For instance, the correlation between Islamic bank loans and Islamic bank assets is

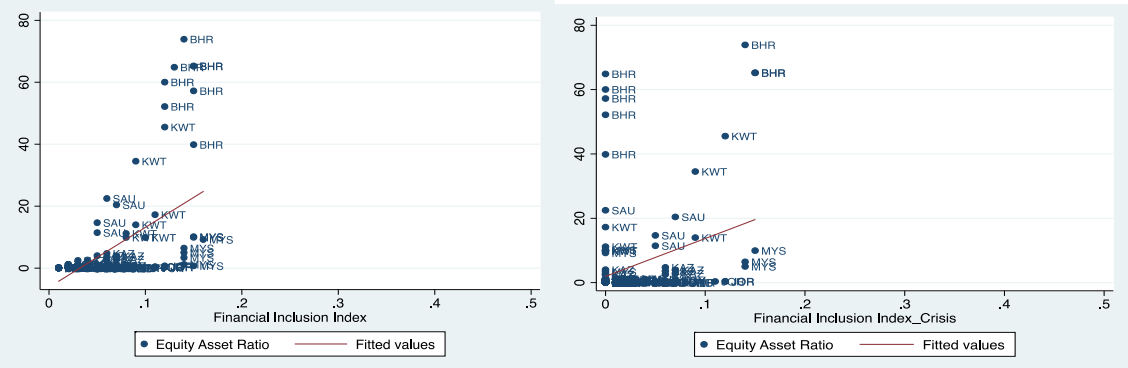
0.878. Moreover, the correlation is 0.812 between Islamic bank assets and Islamic bank deposits. Therefore, we regressed these products one at a time in separate regressions.

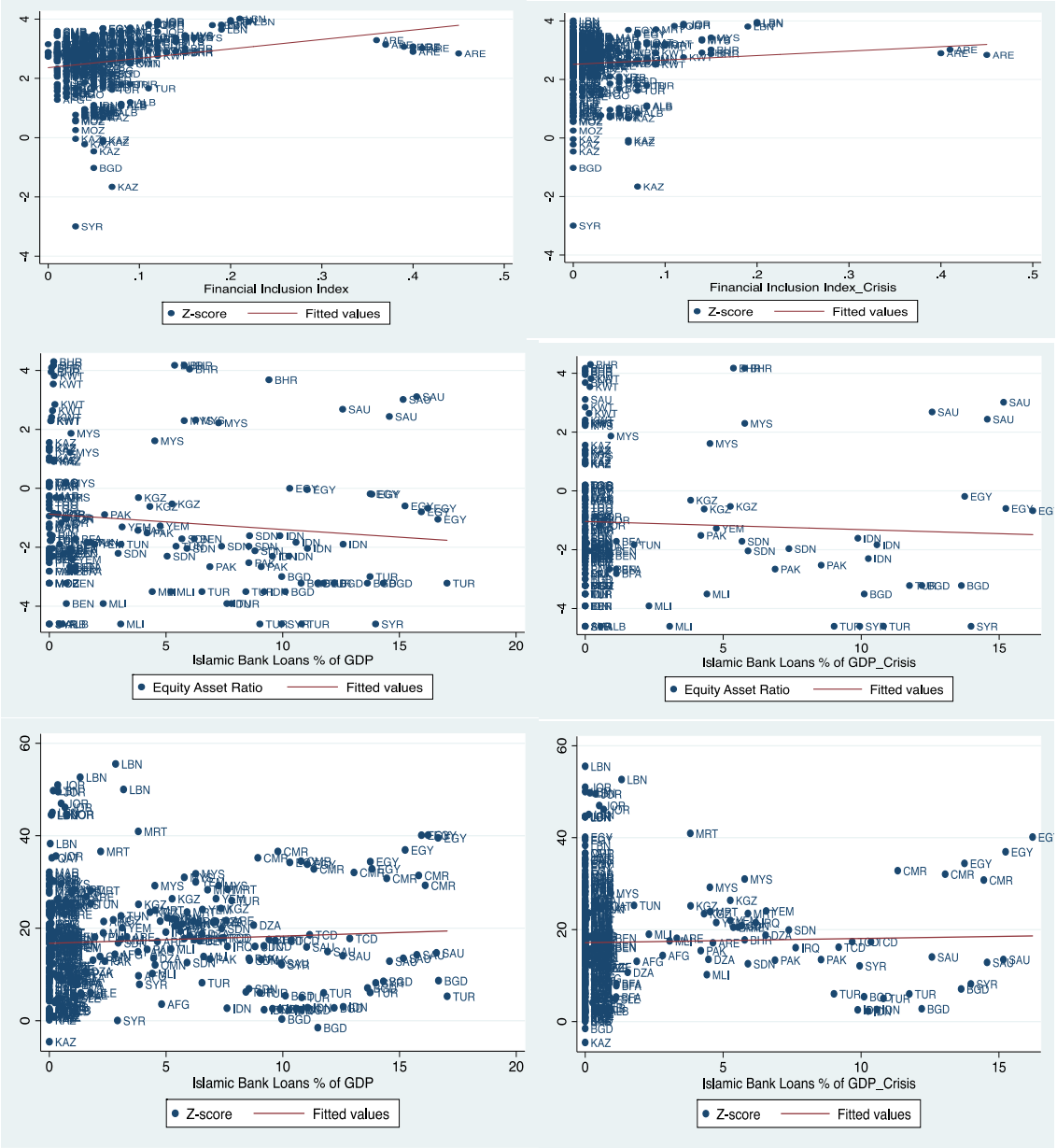
The correlations of the indicators of Islamic banking products and a conventional banking access indicator with asset quality and stability indicators suggest that Islamic banking products are positively and significantly associated except for the equity-asset ratio of banks during crisis periods. Conventional bank-based access is also positively associated with some asset quality and stability indicators during crisis periods; however, this amount of association is relatively lower than for Islamic banking products. As can be seen from Table 4.3B, the association between asset quality and stability indicators and conventional bank-based access is relatively better than Islamic banking access in terms of equity-asset ratio during crisis periods.

Moreover, Figure 4.3 explores the correlations between commercial and Islamic banking access indicators with asset quality and stability indicators during and before the crisis periods. Scatter diagrams allow us to examine the data in terms of outliers. Moving clock-wise, we use a financial inclusion index as the proxy for conventional bank-based access and some selected Islamic banking products in the graphs. Some countries emerges as outliers in the data, such as Bahrain, Kuwait, Kazakhstan, Syria and Lebanon. Therefore, as a robustness check for the results, we eliminated outliers in the data. Following the literature, we eliminated outlier countries by winsorizing them at the first and 99th percentiles (Beck et al., 2013).

In particular, a financial inclusion index as the proxy for conventional bank access is positively and significantly associated with equity-asset ratio, with a correlation amount of 0.121 even during the banking crisis periods. This association is even relatively better than other Islamic banking products during the crisis period. Moreover, in terms of return on assets and z-scores, Islamic banking products seem to have a better relationship than a financial inclusion index during a crisis period.

Figure 4.3 Correlates of asset quality and stability variables against Islamic and conventional banks





4.5 Methodology

As explained above, this chapter aims to explore the association between financial access and Islamic finance. Religiosity is considered as one of the most important barriers for financial access, or, as it is called, voluntary exclusion. This rate is found to be extremely high in Muslim-dominant countries, as was shown in the literature section. Therefore, it can be suggested that Islamic financial services may increase the levels of financial access in these countries. In the meantime, financial access levels may have some impact on Islamic finance in these economies.

In doing so, this chapter has conducted two main analyses with two different estimation models: The first analysis examines the potential effects of Islamic finance and the rate of religiosity on financial exclusion by subdividing the mechanism by which this impact occurs. Financial

exclusion is determined by the lack of access to formal financial services by preforming the OLS estimation method in this section. The second analysis, testing the argument put forward by Beck et al. (2013), examines the impact of the recent global financial crisis comparing Islamic and conventional banks with new interaction variables for crisis periods using a panel fixed effects estimation model.

4.5.1 The Impact of Islamic Finance on Financial Inclusion

Adopting the arguments and methodologies in the Global Financial Development Report (2014), Demirguc-Kunt et al. (2013) and Naceur et al. (2015), this section assesses the impact of Islamic finance on financial exclusion using OLS regressions. Furthermore, we use Islamic banking products to assess the mechanism by which the impact of Islamic finance on financial exclusion occurs. This additional analysis is one of the main contributions of this chapter.

We examine this impact in terms of both all countries and Organization of Islamic Cooperation (OIC) member countries only samples. Therefore, there are two different sets of regression models for each empirical model in this chapter. The first sets are run for 118 countries of different geographic and economic backgrounds around the world. In order to examine the association between financial exclusion and Islamic finance in the Islamic countries, the second sets of the regression models, as presented in Tables 4.10 and 4.11, are run for 52 Organization of Islamic Cooperation (OIC) member countries. Because of the data limitations of other countries (non-OIC countries) for Islamic banking products, we cannot use OIC member country interaction terms in the all countries regression models. Moreover, because of the nature of the data, we average the values of financial inclusion index and Islamic banking products for the period from 2004 to 2011 in this section.

Following the studies in the literature, this chapter begins by investigating the OLS models to explore the linkage between financial exclusion and Islamic finance. These models are used for both sets of the samples presented above. The basic regressions are conducted as follows:

$$Y_i = \alpha + \beta' X_i + \varepsilon_i \qquad (1)$$

Where Y_i is the dependent variable, X represents the vector of explanatory variables as explained above and ε_i is the usual stochastic term.

There are two different proxies of financial inclusion as the dependent variables with two different regressions. The first proxy is the constructed financial inclusion index, which is constructed with several commercial bank-based and demand and supply-side financial access

indicators. This index explores the extent of financial access levels in an economy in terms of commercial bank-based access. Moreover, the percentage of adults who possess an account at other financial institutions variable as the proxy of financial access indicator is used as the second proxy of financial inclusion. This new indicator refers to the access to other financial institutions, such as microfinance institutions, post offices and credit unions. These two proxies of financial inclusion are used in all regression models for all empirical models.

Furthermore, regarding Islamic banking access, we first use the number of Islamic financial institutions in the relevant countries and Islamic banking dummy variables to assess the impact of Islamic finance on financial access in this section. Furthermore, following Beck et al. (2013), we add specific Islamic banking products to the regressions. These products are Islamic Banks Loans % of GDP, Islamic Banks Assets % of GDP and Islamic Banks Deposits % of GDP as the mudaraba (profit sharing) accounts, Islamic Banks Total Capital Ratio as the proxy of Islamic banking development, and, finally, Zakah % of GDP and Murabahat % of GDP. Using these products, we explore the mechanism by which the impact of Islamic finance occurs for financial access in the specific country samples. Meanwhile, Islamic banking loans, assets and deposits % of GDP variables are also considered as Islamic banking growth indicators. Therefore, we also interpret them to assess the impact of Islamic banking growth on the financial access outreach and access to and use of financial services from both types of banks for all empirical analyses in this chapter. Because of the high correlations amongst the Islamic banking products, we regress them one at a time in each regression equation.

Moreover, following Demirguc-Kunt et al. (2013), the percentage of adults, who choose not to use formal financial services for religious reasons, the percentage of religiosity of a country, as well as the percentage of Muslim population variables are also used to explain the dependent variables in the regressions for the estimation models with all types of regression models for different countries separately. These control variables allow us to assess the impact of religiosity on people's choices about using Islamic banking products. Since the literature shows that the levels of religiosity and levels of Muslim populations are highly associated with Islamic finance, controlling these indicators should help us to control our results in this chapter. Finally, the log GDP per capita as the proxy of income growth and private credits to GDP ratio as the proxy of financial development variables for the relevant countries are used to control the dependent variables in the regressions for the estimation models.

4.5.2 The Impact of the Financial Crisis

Moreover, in order to have a broader view of the association between financial access and Islamic finance, this chapter aims to conduct a further analysis by performing a new empirical

estimation model in this section. Hence, in this section, we compare commercial and Islamic banks in terms of their relative performance during the recent global financial crisis period. In doing so, following the specification laid down by Beck et al. (2013) and testing their argument, this section aims to examine which type of bank is better positioned against exogenous financial shocks during the crisis period.

As was explained above, we used asset quality and bank stability indicators to compare conventional and Islamic banks during the crisis period. We focused on the sample period 2004 to 2011 for all indicators in this section. Therefore, we have a panel data for countries that have both bank types so that we might consider country and year-fixed effects. This allowed us to control for country level factors in examining the impact of the financial crisis. Moreover, in order to test the results of Beck et al. (2013), we used our constructed financial inclusion index as the proxy for financial inclusion along with the proxies that they used. Regressing these proxies separately and together in different regressions, we compared the results to test our constructed financial inclusion index.

Additionally, following Beck et al. (2013), we subdivided Islamic banks' produces to assess the mechanism by which the impact of Islamic finance occurs. These new variables allowed us to see the mechanism by which Islamic finance provides a better service and in what way. Therefore, we added specific Islamic banking products that are found to be associated with financial inclusion in the previous analysis. Thus, we used Zakah to GDP ratio as the proxy for Islamic bank products. Subdividing the products of Islamic financial institutions allowed us to assess the mechanism by which Islamic finance provides a better service or vice versa in this section. In the meantime, there are high correlations between Islamic bank products and the Islamic bank dummy variable. We regressed these variables one at a time in separate regressions.

In financial inclusion literature, there are two major methods to analyse the impacts of ease of and use of financial services across countries. First and common method is to perform financial access indicators separately on the right hand-side of the models and find that these indicators matter. The second method is to explore aggregate information of these financial access indicators by constructing multidimensional indices. Following the second strategy, this chapter uses the multidimensional financial inclusion index, which are constructed in the first chapter. This multidimensional financial inclusion index is a broader measure of financial access across countries. Since financial inclusion focuses on spread of financial activities among different segments of society, the domain of banking activities might be large and they might vary across countries.

According to the capability-functioning perspective by Sen (1987), different activities of banks represent the functioning of bank performances. Hence, in order to get a complete picture in bank performances, we need to have more activities. In this regard, we assume that financial inclusion is a multidimensional phenomenon and it is important to have an aggregate measure of the context. Therefore, in this chapter, we expect to have a broader measure of the impact of commercial bank base access in measuring the ability to cope with crises.

Unlike the single indicators that are used in Beck and others' paper, our multidimensional index can be used to monitor progress in banking performance and the level of the ability to cope with crises in this section. Moreover, this index allows us to make recommendations on how to increase the performance levels. In so doing, this ability of the index demonstrates an important policy application. Using individual indicators might cause to get partial information in measuring the ability to cope with crises in this section. Therefore, unlike the Beck and others, our results are better able to measure ability to cope with global financial crises in this section.

The results of our measure are found consistent with those are found by Beck et al. (2013). Therefore, we can conclude that using an aggregate measure of financial access levels of countries is efficient to explore the ability to cope with crises in this section. This is the most important added value from using our measures of financial inclusion.

Furthermore, we specifically created an Islamic banking dummy and Islamic banking products interaction terms with a global financial crisis dummy to assess the impact of Islamic finance during crisis period. This bank crisis dummy variable takes values one for the period 2007 to 2009 for each sample country. Since we have small time dimension and the explanatory variables are not strictly exogenous, the Arellano & Bond (1991) GMM estimation model has been employed to mitigate dynamic endogeneity in this section.[18] Thus, this estimation model allowed us to control the country and year-fixed effects by first differentiating and eliminating the unobserved heterogeneity of the results. The basic functional form of the regression equation was as follows:

$$Banking_{i,j,t} = \alpha y_{i,t-1} + \beta B_{i,j,t} + \gamma_1 C_i + \gamma_2 C_i * Crisis_{i,t} + \delta_1 I_i + \delta_2 I_i * Crisis_{i,t} + \eta_i + \varepsilon_{it} \quad (2)$$

[18] Since the existing panel data is of a short time dimension (T=8), larger country dimension (N=113) and also with variables that are not strictly exogenous, the Arellano and Bond (1991) model is the best fit for this model. This method consists of two essential steps, which are taking the first-differenced form of the model and the lagged levels of the variables are uncorrelated with the error term in terms of the moment condition that the model is based on. Firstly, the differencing eliminates the potential bias that may arise from unobserved heterogeneity. Besides, the method controls the dynamic endogeneity of the lagged dependent variable by using lagged endogenous variables as instruments (Roodman, 2006).

In the equation above, $Banking_{i,j,t}$ stands for the value of the endogenous variable for country i in period t. In this section, the dependent variables are sets of bank asset quality and stability indicators. $y_{i,t-1}$ is the lagged dependent variable of asset quality and stability indicators. β implies the coefficient of the independent variables and $B_{i,j,t}$ represents the matrix of independent variables. γ_2 and δ_2 allow us to measure the impacts of Islamic and conventional banks during a crisis. η_i is unobserved country-fixed effects and ε_{it} is the general stochastic term.

4.6 Empirical Results

4.6.1 The Impact of Islamic Finance on Financial Inclusion

Following the arguments and specifications in the literature, this section assesses the impact of Islamic finance on financial exclusion using OLS regressions (Global Financial Development Report, 2014; Demirguc-Kunt et al., 2013; Naceur et al., 2015). We examined this impact in terms of both all countries and Organization of Islamic Cooperation (OIC) member countries only samples. Moreover, because of the nature of data, we averaged the values of the financial inclusion index and Islamic banking products for the period from 2004 to 2011 in this section.

The methodology here indicates the effects of Islamic finance and the rates of religiosity among people in society for financial inclusion by performing an OLS model for two different proxies of financial inclusion. These two proxies of financial inclusion were used separately as dependent variables in the regression equations. In doing so, the potential effects of Islamic finance on financial inclusion was examined in terms of two different financial access situation in an economy, using access to both commercial banks and other financial institutions.

We added Islamic banking products to the regressions to assess the mechanism of the impact of Islamic finance on financial exclusion in both the all countries and the OIC member countries samples. We also added specific Islamic banking growth indicators to assess the impact of Islamic finance growth on the financial access outreach and access to and use of financial services from both types of banks in this section. Because of the high correlations among Islamic banking products, we regressed them in separate regression equations to get more accurate results. Finally, in order to control for the results, we added GDP per capita growth as the proxy of income growth and private credits to GDP as the proxy of financial development in the regression models.

4.6.1.1 All Countries Sample

In order to thoroughly analyse the association between financial exclusion and Islamic finance, it was important to differentiate countries that are used in the models. In this case, the data from 118 countries from different geographic and economic backgrounds around the world were used to examine the association between financial inclusion and Islamic finance in this section. Using this data allowed us to analyse the association between financial exclusion and Islamic finance, not only in Muslim-dominant countries, but also in countries of different backgrounds. Therefore, it gave us the opportunity to make broader inferences about this association.

Table 4.5 confirms that higher levels of the indicators of Islamic finance are significantly associated with lower levels of conventional bank-based financial access, even after controlling for levels of religiosity indicators and macroeconomic stability variables such as GDP per capita and private credit to GDP ratio. The Islamic banking products also negatively and significantly enter in the estimation models, except for deposit accounts. Since we regressed Islamic banking products in separate regression equations because of the high correlations between them, these results are accurate. We changed the explanatory variables changes coefficient and the significance of some key control variables such as Muslim populations and no account due to religious reasons indicators such as the proxy of religiosity. Overall, the results show that Islamic banking in the all countries sample is negatively and significantly associated with conventional bank-based access, and the country-specific control variables do not alter these results.

In particular, these results show that higher levels of specific Islamic banking products, such as loans, total assets percentage of GDP, stronger capitalization ratio of Islamic banks and higher levels of percentage of zakah and murabahat transactions are associated with lower conventional bank access in the sample countries. Meanwhile, the percentage of Islamic banking loans, assets and deposits ratio variables, which are also considered as Islamic banking growth indicators, are found significantly and negatively associated with commercial bank outreach and the access to and use of commercial banking services in this section.

Furthermore, the levels of religiosity indicators such as percentage of Muslim population, religiosity and people having no account due to religious reasons, are negatively associated with commercial bank-based access. As explained above, religiosity indicators have a negative and statistically significant association with financial inclusion, which is measured with commercial bank-based access indicators. This result also supports the assumption that this chapter relies on, which is the suggestion that the more religious (Islamic) people are the less they use financial

services. Hence, the impact of religious indicators on people's preferences might explain the results of Islamic banking and its products.

These results support the arguments in the literature, as Ghoul (2011) argued that lack of access to Islamic financial institutions is one of the main reasons behind having low levels of financial access. Similarly, most research in the literature, such as that of Gerrard et al. (1997), Metawa et al. (1998), Naser et al. (1999), Othman et al. (2001), Wakhid et al. (2007), Gait et al. (2009a and 2009b) and Lee et al. (2011), argues that religious beliefs are the most important reasons behind clients choosing Islamic banking services, which may decrease the level of access to financial services at conventional banks. Furthermore, as Karakaya et al. (2004) and Okumus (2005) stated, religious beliefs such as being a Muslim are the most important reason behind the preference for using Islamic banking services in Turkey. Therefore, Muslim clients prefer to use Islamic financial services over conventional banking services.

However, when we rerun the regressions on the access indicator of other financial institutions, the results are different, with some exceptions. The Islamic banking dummy and number of Islamic banks indicators along with Islamic banking products are positively and significantly associated with access to microfinance institutions, credit unions and post office services. Similarly, changing the main explanatory variables in each regression changes the coefficients and significance of some key control variables. In particular, the significance of the proxies of religiosity change when we change the Islamic banks products for each regression. However, the results of economic growth and financial development proxies remain similar for each regression equation.

These results hold even after controlling for religiosity indicators and macroeconomic country-specific factors. Unlike the previous regression results, % of Muslim population and % of religiosity variables significantly and positively enter the models. Furthermore, the indicators of Islamic banking growth are found to be significantly and positively associated with outreach of microfinance institutions, cooperatives and post offices in this section.

Table 4.5 Cross-country OLS estimation of the impact of Islamic finance on financial inclusion in the all countries sample

The first dependent variable is the financial inclusion index for model specifications (1) to (8). The second dependent variable is other financial institutions access indictor for model specifications (9), to (16). Regression equations are determined in the methodology section above. We use Islamic banking dummy and number of Islamic banks to assess the impact of Islamic finance on financial inclusion. In addition to this, improving the works in the literature, we add Islamic banking products to examine the mechanism behind this impact in this chapter. Because of the high correlations amongst these products, we regress them one at a time in the regression equations. Furthermore, we add percentage of Muslim population, religiosity, and people have no account due to religious reasons indicators to control for the levels of religiosity in countries. Finally, GDP per capita and private credits/GDP indicators are used to control the results in terms of income growth and financial development levels of countries respectively. Robust Standard Errors are clustered by country. ***, **, and * show significance levels at 1, 5, 10 % respectively.

Dependent Variable	Financial Inclusion Index (Commercial Bank Access)								Other Financial Iinstitutions (Access from Microfinance Institutions)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Islamic Banking dummy	-0.040**								0.181**							
	(0.020)								(0.437)							
Number of Islamic Banks		-0.009*								0.002*						
		(0.002)								(0.015)						
Islamic Banking Loans%			-0.002*								0.057*					
			(0.001)								(0.043)					
Islamic Banking Assets %				-0.003								0.010*				
				(0.001)								(0.054)				
Islamic Banking Deposits %					0.001*								0.003			
					(0.0001)								(0.025)			
Islamic Banking Capital Ratio						-0.004								0.078*		
						(0.015)								(0.079)		
Zakah %							-0.010*								0.089*	
							(0.016)								(0.077)	
Murabahat %								0.011*								0.013*
								(0.016)								(0.091)
Relgiosity %	-0.001	0.001	-0.001*	-0.002	-0.001	-0.004*	-0.004	-0.003	-0.011*	-0.011	0.016**	0.013*	0.014*	0.012*	0.014**	0.014*
	(0.001)	(0.001)	(0.0001)	(0.0007)	(0.0008)	(0.005)	(0.005)	(0.005)	(0.007)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Muslim %	-0.054*	-0.041*	-0.042*	-0.034	-0.036*	-0.265*	-0.265	-0.228*	0.275**	-0.311*	0.258**	0.138**	0.210	0.130**	0.232**	0.136*
	(0.030)	(0.032)	(0.031)	(0.029)	(0.030)	(0.150)	(0.156)	(0.167)	(0.537)	(0.670)	(0.538)	(0.562)	(0.573)	(0.467)	(0.534)	(0.724)
No Account due to Religious reasons	0.001	0.001	-0.001*	-0.0001*	-0.0001	-0.002*	-0.0003	0.0006	0.001	0.001	0.007	0.004*	0.006	0.007	0.007	0.004
	(0.001)	(0.001)	(0.0006)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)	(0.015)	(0.021)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.019)
GDP per capita growth	0.002*	0.001***	0.001***	0.0002***	0.004***	0.0002**	0.006***	0.006***	0.0005*	0.003***	0.0001**	0.0001***	0.001***	0.0001***	0.002***	0.001***
	(0.002)	(0.010)	(0.0001)	(0.0002)	(0.0006)	(0.0005)	(0.001)	(0.001)	(0.0004)	(0.004)	(0.0006)	(0.0004)	(0.007)	(0.0001)	(0.006)	(0.007)
Private Credits/GDP	0.001***	0.001**	0.001***	0.002***	0.001***	0.004***	0.004***	0.004***	0.018***	0.018***	0.017***	0.017***	0.017***	0.018***	0.017***	0.017***
	(0.003)	(0.001)	(0.0002)	(0.0002)	(0.0002)	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Constant	0.079	-0.104	0.090	0.093*	0.092*	-2.301***	-2.304***	-2.280***	1.682***	1.819***	5.972***	5.794***	5.856***	5.656***	5.867***	5.803***
	(0.080)	(0.085)	(0.084)	(0.082)	(0.083)	(0.530)	(0.531)	(0.525)	(0.134)	(0.138)	(0.723)	(0.690)	(0.715)	(0.684)	(0.697)	(0.750)
R-squared	0.479	0.505	0.657	0.655	0.649	0.533	0.534	0.536	0.414	0.409	0.504	0.485	0.484	0.514	0.490	0.485
Number of Observations	53	52	51	51	51	51	51	51	53	53	52	52	52	52	52	52

Table 4.6 Cross-country OLS Estimation of the impact of Islamic finance on financial inclusion in the OIC member countries sample

The first dependent variable is the financial inclusion index for model specifications (1) to (8). The second dependent variable is other financial institutions access indictor for model specifications (9), to (16). Regression equations are determined in the methodology section above. We use Islamic banking dummy and number of Islamic banks to assess the impact of Islamic finance on financial inclusion. In addition to this, improving the works in the literature, we add Islamic banking products to examine the mechanism behind this impact in this chapter. Because of the high correlations amongst these products, we regress them one at a time in the regression equations. Furthermore, we add percentage of Muslim population, religiosity, and people have no account due to religious reasons indicators to control for the levels of religiosity in countries. Finally, GDP per capita and private credits/GDP indicators are used to control the results in terms of income growth and financial development levels of countries respectively. Robust Standard Errors are clustered by country. ***, **, and * show significance levels at 1, 5, 10 % respectively.

Dependent Variable	Financial Inclusion Index (Commercial Bank Access)								Other Financial Iinstitutions (Access from Microfinance Institutions)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Islamic Banking dummy	-0.035*								0.180*							
	(0.021)								(0.408)							
Number of Islamic Banks_OIC		-0.001*								0.012*						
		(0.002)								(0.016)						
Islamic Banking Loans%_OIC			-0.002								0.058*					
			(0.002)								(0.056)					
Islamic Banking Assets %_OIC				-0.004*								-0.011				
				(0.005)								(0.059)				
Islamic Banking Deposits %_OIC					0.002*								0.005*			
					(0.001)								(0.032)			
Islamic Banking Capital Ratio_OIC						-0.002								0.079		
						(0.003)								(0.062)		
Zakah %_OIC							-0.002*								0.090*	
							(0.008)								(0.166)	
Murabahat %_OIC								0.002**								0.014*
								(0.004)								(0.050)
Religioisty_OIC %	0.0002	0.0002	-0.0005*	-0.0005*	-0.0005	-0.0006*	-0.0006	-0.0006	0.012	0.011	-0.017*	0.014*	0.015*	0.012	-0.014*	0.013*
	(0.0005)	(0.0006)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.011)	(0.011)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Muslim_OIC %	-0.055*	-0.041*	-0.042*	-0.035	-0.037*	-0.044*	-0.045	-0.039*	0.175*	0.121*	0.150*	0.038*	0.320*	0.030*	0.132*	0.045*
	(0.048)	(0.052)	(0.036)	(0.038)	(0.039)	(0.037)	(0.037)	(0.040)	(0.461)	(0.370)	(0.240)	(0.399)	(0.173)	(0.046)	(0.159)	(0.123)
No account religious reasons_OIC	-0.001*	0.0004	-0.0001*	-0.0007*	-0.0001	-0.0003	-0.0002	0.0001*	0.001	0.002	0.007	0.005	0.005	0.008*	0.008	0.005
	(0.001)	(0.001)	(0.0008)	(0.0009)	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.019)	(0.020)	(0.016)	(0.018)	(0.017)	(0.016)	(0.017)	(0.018)
GDP per capita growth_OIC	0.0002**	0.001**	0.0007**	0.0006**	0.0006**	0.0001**	0.0003**	0.0005**	0.0001	0.002	0.0002	0.0002*	0.0002*	0.0002**	0.0002*	0.0002
	(0.0001)	(0.010)	(0.0009)	(0.0008)	(0.0008)	(0.0008)	(0.0004)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
Private Credits/GDP _OIC	0.001**	0.0008**	0.001***	0.001***	0.0009**	0.001***	0.001***	0.001***	0.018*	0.017**	0.018***	0.018***	0.018***	0.019***	0.018***	0.018***
	(0.003)	(0.0004)	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)
Constant	0.072	0.104*	0.091*	0.094*	0.093*	0.086*	0.084*	0.088*	0.670***	0.850***	0.572***	0.794***	1.456***	1.650***	1.365***	1.815***
	(0.066)	(0.071)	(0.049)	(0.050)	(0.051)	(0.050)	(0.050)	(0.051)	(0.189)	(0.234)	(0.151)	(0.054)	(0.315)	(0.154)	(0.197)	(0.250)
R-squared	0.418	0.515	0.657	0.656	0.650	0.644	0.642	0.645	0.410	0.410	0.505	0.481	0.485	0.515	0.491	0.455
Number of Observations	52	52	51	51	51	51	51	51	53	53	52	52	52	52	52	52

To test the robustness of the results, we ran the regressions omitting the outliers in the data. However, the results hold even when omitting the outliers for both proxies of financial inclusion. These results are also consistent with the literature. These results support the argument in Naceur et al. (2015) that Islamic banking is associated with greater levels of financial inclusion in terms of access to other financial institutions. In particular, in adding Islamic banking products into the regressions, our results improve on the existing research by exploring the mechanism by which the impact of Islamic banking occurs. The results of the regressions for the second proxy of financial inclusion are consistent with the literature. For instance, as Ghoul (2011) argued, increasing access to Islamic financial services may also increase the levels of banking penetration in an economy.

4.6.1.2 Organization of Islamic Cooperation (OIC) Member Countries Sample

In order to examine the effect of Islamic finance on financial inclusion in Muslim-dominant countries, this section only uses 52 Organization of Islamic Cooperation member countries (Tables 4.9 and 4.10). Following the previous model's specifications, there are two different sets of regression equations with two proxies of financial inclusion in this section.

As seen in Table 4.6, the Islamic banking dummy variable and the number of Islamic financial institutions significantly and negatively enter the model for commercial bank-based financial inclusion. Regarding the Islamic banking products, they are found to be negatively and significantly associated with commercial bank-based access, except for Islamic banks deposits and murabahat variables. In particular, Islamic bank deposits percentage of GDP and percentage of murabahat variables positively and significantly enter the regression models for commercial bank-based financial inclusion. However, Islamic banking loans and total capital ratio variables do not enter significantly in the regressions.

The positive association of deposits and murabahat transactions of Islamic banks with conventional banks in OIC member countries can be explained as the nature of some Islamic financial institutions. Murabahat transactions, which are profit and loss sharing transactions, have the major share amongst Islamic banking products.

Furthermore, most of the Islamic financial institutions contain commercial banking services, which mostly use retail deposit as the major funding source. Thus, in countries like Kuwait, Malaysia and Qatar, where Islamic banks are the major financial obstacle, Islamic banking murabahat and zakah transactions have a positive association with conventional banking outreach.

Meanwhile, since the percentage of Islamic banking loans, assets and deposits ratio variables are also considered as Islamic banking growth indicators, we can interpret their association here as the impact of Islamic banking growth on commercial banking outreach in OIC member countries. In doing so, in OIC countries, Islamic banking growth is found to be significantly and negatively associated with commercial bank outreach and the access to and use of commercial banking services in this section.

These results hold even after controlling for levels of religiosity indicators and macroeconomic country-specific factors in the regression models. Accordingly, the percentage of religiosity, the percentage of Muslim populations and the percentage of people having no account due to religious reasons variables are significantly and negatively associated with commercial bank-based access in the regression models. Furthermore, income growth and financial development indicators are found to be positively and significantly associated in the models.

These results suggest that in Muslim-dominant countries, higher levels of usage of Islamic financial products and higher levels of religiosity are associated with lower commercial bank access. However, there are some exceptions for specific Islamic banking products, such as the percentage of murabahat and deposits in the regression models. As explained above, higher levels of these components of Islamic banks are associated with higher levels of commercial bank access.

In the meantime, the results are consistent with the previous sample when we run the regressions on access indicators from other financial institutions. According to Table 4.6, the Islamic banking dummy variable and the number of Islamic financial institutions are found to be significantly and positively related to financial inclusion in terms of other financial institutions. Meanwhile, Islamic banking products are also found to be positively and significantly associated with access to other financial institutions in this section.

In particular, the percentage GDP of Islamic banking deposits, murabahat transactions and zakah transactions are found to be positively and significantly associated with access to other financial institutions, such as microfinance institutions, cooperatives and post offices. However, Islamic banking total assets and total capital ratio variables are found to be insignificant. Meanwhile, as the proxies of Islamic banking growth, Islamic banking deposits' percentage of GDP is found to be significantly and positively associated with the outreach of microfinance institutions, cooperatives and post offices.

The negative association of Islamic banking total assets with other financial institutions can be explained as being due to the same reason we have given above. Therefore, the close link

between some Islamic banks and conventional banking services, which rely on retail deposits as the major funding source, might also explain this negative association. In the meantime, consistent with our results in this section, in countries like Kuwait, Malaysia and Qatar, where Islamic banks are the major financial presence, Islamic banking murabahat and zakah transactions are more likely to have a positive association with other financial institutions' outreach.

Furthermore, the levels of religiosity variables, such as the percentage of Muslim population, religiosity and people having no account due to religious reasons are found to be significantly and positively related to access to the other financial institutions variable in the regression models. Finally, the macroeconomic control variables GDP per capita growth and private credits to GDP significantly and positively enter the models in this section. Overall, higher levels of Islamic finance components are associated with higher levels of access to microfinance institutions, cooperatives and post offices. The specific products of these financial institutions that are offered in the Muslim-dominant countries can explain these results. Meanwhile, the results of the indicators of religiosity indicators in this section support this argument.

Meanwhile, as was discussed in the all countries sample, changing the main explanatory variables in each regression changes the size of the coefficients and significance of some key control variables. In particular, the significance of the proxies of religiosity change when we change the Islamic banks products for each regression. However, the results of the economic growth and financial development proxies remain similar for each regression equation.

These results are economically expected, as well as meaningful. They are also consistent with the literature. As argued in the study, The World Bank Global Financial Development Report (2014), the emergence of Islamic banks has a significant impact on the financial access of the households and small and medium-sized firms. Furthermore, as Demirguc-Kunt, Klapper and Randall (2013) argued, Muslims are less likely to use formal financial services, such as having a bank account, at a formal financial institution than non-Muslims. This may explain the negative association between financial inclusion and the percentage of Muslims in the model.

Since financial inclusion levels are relatively low. It can be concluded that OIC countries are relatively less financially inclusive than other countries. Religious self-exclusion, which is also called voluntary financial exclusion, is one of the main reasons for lower financial inclusion levels. In this section, our results show that religiosity strongly enters the models in explaining the association between financial access and Islamic finance. Therefore, our results support this argument in the literature (Naceur et al., 2015 and Demirguc-Kunt, Klapper and Randall, 2013). In this regard, our results also might support the argument that Islamic finance might play an

important role in financial exclusion by imposing an expedient impact on religious voluntary exclusion.

Moreover, as the one of the main contributions of this chapter, modifying and improving on the results of Naceur et al. (2015) and Demirguc-Kunt, Klapper and Randall, (2013), we explored the mechanisms by which Islamic finance has an impact on financial exclusion by subdividing the services of Islamic banks. We assessed these services separately in both all countries and Muslim-dominant countries samples to explain the mechanisms of the impact. Meanwhile, we improved on their arguments by finding a relatively stronger association between Islamic banking and financial inclusion using our own financial inclusion measures. In this regard, our broader multidimensional financial inclusion index seems to be relatively better for explaining the extent of financial access in terms of assessing the link between financial inclusion and Islamic finance. However, our results only explore the degree of association between variables rather than mitigating endogeneity concerns and/or causal relationships.

Overall, the absolute values of Islamic banking proxies and products are relatively higher in the commercial bank access regressions using the all countries sample. In this regard, we might suggest that these results imply economically substantial impacts. For example, the Islamic banking dummy variable's smallest coefficient in the commercial bank-based access regressions for OIC member countries sample is -0.001. Meanwhile, the mean and standard deviation amounts of commercial bank-based access are 0.024 and 0.009 respectively. In this regard, the size of the coefficients imply that if the Islamic banking dummy and/or Islamic banking deposits indicators were used in the all countries sample, their low levels of the impact on commercial bank-based access would be larger. The amount of association between Islamic finance and other financial institutions outreach seems similar in both the all countries and the OIC countries samples.

4.6.2 Impact of the Crisis

This section compares commercial and Islamic banks in terms of their relative performance during recent the global financial crisis. In doing so, and in testing Beck et al. (2013), this section aims to examine which type of bank is better protected against exogenous financial shocks during the crisis period. Additionally, as a modification of the results presented by Beck et al. (2013), we subdivided the mechanisms of the impact of Islamic finance on financial inclusion using disaggregated data for specific Islamic banking products. These new variables allowed us to see the mechanisms by which Islamic finance provides a better service and in what way. We used sample countries that have both commercial and Islamic banks to control

for country-level factors that confound the results in the models. This allowed us to add country-year fixed effects in the regression models.

In order to test the impact of our constructed financial inclusion index as the proxy of financial inclusion, we performed a financial inclusion index only, the conventional bank indicators of Beck et al. (2013) only, and all indicators regression equations separately in different tables. Thus, Tables 4.7, 4.8, and 4.9 indicate all of these scenarios in testing the impact of our constructed financial inclusion index. According to the results, the serial correlation tests in the first-differenced residuals are significant, which means that there is a first-order serial correlation in the model. The AR (2) test results all fail to reject the null hypothesis, which means the first-differenced error term is not second-order serially correlated for all model specifications. Additionally, the Hansen test of over-identifying restrictions was run for the validity test of the instruments. The test results do not reject the null hypothesis. In other words, the instruments are valid. Since the goal of those applications was to consolidate the robustness of the method, these steps prove that the Arellano and Bond (1991) GMM estimation method is efficient to use for our specifications.

The results reported in Tables 4.7, 4.8 and 4.9 use specific asset quality and financial stability indicators to test for the effects of the recent global financial crisis on the relative performance of commercial and Islamic banks. We used our constructed commercial bank-based financial inclusion index as the proxy of commercial banks, along with the conventional bank access proxies that are used by Beck et al. (2013) to test their argument in this section. In particular, using separate financial statement indicators such as total assets, non-loan earnings assets and fixed assets from commercial banks, they claim that Islamic banks are relatively better than conventional banks in terms of having better capitalisation, have a higher asset quality and being less likely to disintermediate during the global financial crisis period.

Moreover, in modifying the results of Beck et al. (2013), unlike their proxies of Islamic finance, we subdivided the components of Islamic banking during the crisis period to assess the mechanisms behind its impact. We used Zakah to GDP ratio as the proxy for Islamic bank products in this section. Additionally, we included interaction variables with a crisis dummy for both proxies of banks for the period 2007 to 2009. The results in all tables show that commercial banks performed relatively better during general periods, as expected. Regarding the comparison of both banks during the crisis, there are some significant differences in both parts. In particular, our results show that Islamic banks performed better during the crisis period.

Table 4.7 Comparing Islamic and commercial banks during the global financial crisis – financial inclusion index-only regressions

The dependent variables are Equity Asset Ratio in columns (1) and (2), Return on Assets in columns (3) and (4), Return on Equity in columns (5) and (6), Z-score in columns (7) and (8), and finally Loans Deposits Ratio in columns (9) and (10). Regression equations are determined in the methodology section above. We subdivide the specific Islamic banking services to assess the mechanism of the Islamic finance impact during the crisis. Because of the high inter-correlations among Islamic banking products, we regress them separately in the regressions. Regarding conventional bank indicators, we use both our commercial bank-based financial inclusion index and Beck et al. (2013)'s indicators to compare the impact of both proxies, using them separately and together in the regression equations. We use only our constructed financial inclusion index as the proxy of conventional banks in this table. We include interaction variables with a crisis dummy for both proxies of banks for period 2007-2009. Financial inclusion index and Islamic bank proxies are regressed with lagged dependent variables. The rest of the explanatory variables are regressed as exogenous. AR (2) denotes Arellano-Bond test for second order serial correlations in first differences. Robust Standard Errors are clustered by country. Country and fixed effects are added into the regression equations. ***, **, and * show significance levels at 1, 5, 10 % respectively.

Dependent Variables	Equity Asset Ratio		Return on Assets		Return on Equity		Z-score		Loan Deposits Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lag Equity Asset Ratio	0.275***	0.296***								
	(0.099)	(0.074)								
Lag Return on Assets			0.364**	0.352***						
			(0.203)	(0.042)						
Lag Return on Equity					0.228**	0.232**				
					(0.193)	(0.056)				
Lag Z-score							0.365***	0.370***		
							(0.203)	(0.054)		
Lag Loan Deposits Ratio									0.438**	0.483***
									(0.293)	(0.048)
Crisis Dummy	-0.565*	-0.574*	-0.321**	-0.277	0.543*	0.563*	0.201*	0.283	0.419	
	(0.108)	(0.205)	(0.145)	(0.043)	(0.125)	(0.993)	(0.102)	(0.050)	(0.557)	
Financial Inclusion Index	0.667*	0.651*	0.215***	0.516*	0.283**	0.451*	0.216*	0.543*	0.319***	0.103
	(0.153)	(0.258)	(0.050)	(0.084)	(0.043)	(0.752)	(0.044)	(0.817)	(0.024)	(0.387)
Islamic Banking Dummy	-0.521*		-0.002*		-0.043*		-0.153*		0.109**	
	(0.488)		(0.010)		(0.086)		(0.151)		(0.001)	
Zakah %		-0.036*		-0.083**		-0.322**		-0.044*		-0.327***
		(0.093)		(0.040)		(0.155)		(0.028)		(0.140)
Financial Inclusion Index_Crisis	-0.382*	-0.431*	-0.772**	-0.659*	-0.381***	-0.421*	-0.241**	-0.302	-0.065*	-0.671*
	(0.590)	(0.305)	(0.491)	(0.074)	(0.464)	(0.894)	(0.577)	(0.161)	(0.102)	(0.963)
Islamic Bank Dummy_Crisis	-0.156*		-0.092*		0.103*		-0.020*		0.044***	
	(0.086)		(0.066)		(0.064)		(0.030)		(0.013)	
Zakah %_Crisis		-0.113		-0.106*		-0.117*		-0.030*		-0.186*
		(0.165)		(0.071)		(0.293)		(0.054)		(0.237)
AR(2) Test (p-value)	[0.190]	[0.104]	[0.421]	[0.155]	[0.132]	[0.123]	[0.350]	[0.341]	[0.169]	[0.565]
Hansen test of over-identification	[0.120]	[0.460]	[0.342]	[0.050]	[0.348]	[0.250]	[0.601]	[0.276]	[0.231]	[0.247]
Number of Countries	59	59	58	58	59	59	60	60	59	59
Number of Instruments	23	23	25	25	23	23	25	25	23	23
Number of Observations	538	538	554	554	538	538	554	554	538	538

Table 4.8 Comparing Islamic and commercial banks during the global financial crisis Conventional bank indicators only regressions according to Beck et al. (2013)

The dependent variables are Equity Asset Ratio in columns (1) and (2), Return on Assets in columns (3) and (4), Return on Equity in columns (5) and (6), Z-score in columns (7) and (8), and finally Loans Deposits Ratio in columns (9) and (10). Regression equations are determined in the methodology section above. We subdivide the specific Islamic banking services to assess the mechanism of the Islamic finance impact during the crisis. Because of the high inter-correlations among Islamic banking products, we regress them separately in the regressions. Regarding conventional bank indicators, we use both our commercial bank-based financial inclusion index and Beck et al. (2013)'s indicators to compare the impact of both proxies, using them separately and together in the regression equations. We use only Beck and other's indicators, which are total assets, non-learning assets, and fixed assets, as the proxy of conventional banks in this table. We include interaction variables with a crisis dummy for both proxies of banks for period 2007-2009. Beck and others' conventional bank proxies and Islamic bank proxies are regressed with lagged dependent variables. The rest of the explanatory variables are regressed as exogenous. AR (2) denotes Arellano-Bond test for second order serial correlations in first differences. Robust Standard Errors are clustered by country. Country and fixed effects are added into the regression equations. ***, **, and * show significance levels at 1, 5, 10 % respectively.

Dependent Variables	Equity Asset Ratio		Return on Assets		Return on Equity		Z-score		Loan Deposits Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lag Equity Asset Ratio	0.266*	0.248**								
	(0.187)	(0.194)								
Lag Return on Assets			0.371***	0.370***						
			(0.013)	(0.014)						
Lag Return on Equity					0.318***	0.376**				
					(0.102)	(0.164)				
Lag Z-score							0.271***	0.269***		
							(0.084)	(0.084)		
Lag Loan Deposits Ratio									0.400***	0.397***
									(0.078)	(0.079)
Crisis Dummy	0.145	0.287*	-0.134*	-0.281	-0.093*	-0.195***	0.156	0.121*	0.146*	0.108
	(0.090)	(0.107)	(0.054)	(0.220)	(0.231)	(0.754)	(0.254)	(0.171)	(0.069)	(0.114)
Ln(Total Assets)	0.207*	0.215*	-0.122	0.124*	0.354**	0.358*	0.027*	-0.026	0.110*	0.094*
	(0.132)	(0.133)	(0.100)	(0.098)	(0.033)	(0.140)	(0.042)	(0.042)	(0.145)	(0.143)
Non-loan Earnings Assets	0.216	0.298**	-0.062	0.061*	0.213*	0.219*	0.046*	0.142*	0.547***	0.559**
	(0.198)	(0.136)	(0.065)	(0.072)	(0.720)	(0.028)	(0.091)	(0.110)	(0.286)	(0.259)
Fixed Assets	0.110	0.118*	0.177	0.175	0.194	0.181*	0.153***	0.155***	0.392	0.335***
	(0.085)	(0.087)	(0.064)	(0.065)	(0.278)	(0.190)	(0.035)	(0.0035)	(0.112)	(0.115)
Islamic Banking Dummy	-0.231**		-0.051		-0.148*		-0.066		-0.165***	
	(0.188)		(0.056)		(0.687)		(0.112)		(0.347)	
Zakah %		-0.213*		0.047**		-0.103*		-0.033*		-0.618***
		(0.152)		(0.068)		(0.794)		(0.174)		(0.180)
Ln(Total Assets)_Crisis	-0.015*	-0.022	-0.101*	-0.002**	-0.111*	-0.118*	-0.112*	-0.088	-0.035*	-0.050*
	(0.038)	(0.046)	(0.006)	(0.006)	(0.119)	(0.062)	(0.015)	(0.011)	(0.047)	(0.047)
Non-loan Earnings Assets_Crisis	-0.143*	-0.077*	-0.101*	-0.101*	-0.233	-0.228*	-0.220*	-0.049	0.010	-0.167*
	(0.171)	(0.179)	(0.058)	(0.065)	(0.787)	(0.434)	(0.098)	(0.080)	(0.315)	(0.218)
Fixed Assets_Crisis	-0.046	-0.132*	-0.001	0.002	-0.046*	-0.216**	-0.108	0.019*	-0.058*	-0.114
	(0.055)	(0.056)	(0.007)	(0.008)	(0.120)	(0.089)	(0.015)	(0.022)	(0.047)	(0.072)
Islamic Bank Dummy_Crisis	-0.110*		0.025**		0.355*		-0.013**		-0.032*	
	(0.092)		(0.021)		(0.451)		(0.058)		(0.182)	
Zakah %_Crisis		0.102*		0.018*		0.366*		0.042*		-0.032**
		(0.010)		(0.026)		(0.389)		(0.066)		(0.211)
AR(2) Test (p-value)	[0.120]	[0.140]	[0.346]	[0.065]	[0.310]	[0.201]	[0.350]	[0.121]	[0.150]	[0.245]
Hansen test of over-identification	[0.246]	[0.430]	[0.542]	[0.080]	[0.148]	[0.320]	[0.431]	[0.651]	[0.432]	[0.244]
Number of Countries	59	59	58	58	59	59	60	60	59	59
Number of Instruments	33	33	35	35	33	33	35	35	33	33
Number of Observations	538	538	554	554	538	538	554	554	538	538

In particular, using our financial inclusion index as the proxy of conventional bank access, Table 4.7 indicates that conventional banks perform better during general periods in terms of equity-asset ratios and stability indicators. However, during the crisis period, Islamic banks had higher equity-asset ratios and were better capitalised than conventional banks. Similarly, as seen in Table 4.8, the results are quite similar if we use the conventional bank access indicators of Beck et al. (2013). Using total assets, non-learning assets and fixed assets as the proxy of conventional banks, we found evidence that conventional banks performed better during general periods. However, Islamic banks performed better during the crisis period.

Therefore, we suggest that our constructed financial inclusion index is an efficient proxy for conventional bank access. In the meantime, we found evidence that Zakah transaction as the percentage of GDP explains the mechanism for the relatively better performance of Islamic banks during the crisis. Thus, it can be suggested that the redistributive products of Islamic banks might be considered as the leading factors behind the performance of Islamic banks.

As seen in Table 4.9, when we use all conventional bank indicators in the same regressions equations, the results are consistent with the previous samples. In particular, the financial inclusion index has a relatively higher impact on equity-asset ratios and stability indicators than the proxies of Beck et al. (2013), except for the return on the equity ratio during general periods. However, the proxies of Beck et al. had relatively higher impacts on equity-asset ratios and stability indicators during the crisis period, with some exceptions. In the meantime, the Zakah to GDP ratio as the proxy of Islamic bank products explains the mechanism of Islamic banks' performance during the crisis.

As was found in Beck et al. (2013), we found no significant difference in asset quality and stability indicators between both bank types during the crisis. However, our results are not consistent with the literature, since Beck et al. (2013) and Syed Ali, (2011) found no difference between Islamic and conventional banks in case of return on assets measures during the crisis. Unlike their results, we found evidence that conventional banks had higher return on assets ratios during general periods, while Islamic banks had higher return on assets ratios during the crisis period. Regarding the return on equity measure, we found a higher return on equity ratio for Islamic banks than for commercial banks. We found evidence that this difference tend to increase during and even after the crisis. Thus, it can be concluded that Islamic banks have less of a reduction in lending than commercial banks.

Table 4.9 Comparing Islamic and commercial banks during the global financial crisis All conventional bank indicators regressions

The dependent variables are Equity Asset Ratio in columns (1) and (2), Return on Assets in columns (3) and (4), Return on Equity in columns (5) and (6), Z-score in columns (7) and (8), and finally Loans Deposits Ratio in columns (9) and (10). Regression equations are determined in the methodology section above. We subdivide the specific Islamic banking services to assess the mechanism of the Islamic finance impact during the crisis. Because of the high inter-correlations among Islamic banking products, we regress them separately in the regressions. Regarding conventional bank indicators, we use both our commercial bank-based financial inclusion index and Beck et al. (2013)'s indicators to compare the impact of both proxies, using them separately and together in the regression equations. We use both our constructed financial inclusion index and Beck and other's indicators as the proxy of conventional banks in this table. We include interaction variables with a crisis dummy for both proxies of banks for period 2007-2009. All proxies of financial inclusion and Islamic bank proxies are regressed with lagged dependent variables. The rest of the explanatory variables are regressed as exogenous. AR (2) denotes Arellano-Bond test for second order serial correlations in first differences. Robust Standard Errors are clustered by country. Country and fixed effects are added into the regression equations. ***, **, and * show significance levels at 1, 5, 10 % respectively.

Dependent Variables	Equity Asset Ratio		Return on Assets		Return on Equity		Z-score		Loan Deposits Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lag Equity Asset Ratio	0.176*	0.175*								
	(0.193)	(0.193)								
Lag Return on Assets			0.369***	0.370***						
			(0.015)	(0.015)						
Lag Return on Equity					0.309***	0.310***				
					(0.156)	(0.156)				
Lag Z-score							0.264***	0.264***		
							(0.085)	(0.085)		
Lag Loan Deposits Ratio									0.383***	0.381**
									(0.080)	(0.081)
Crisis Dummy	-0.186*	-0.243	-0.276	-0.288*	-0.201	-0.113**	-0.345*	-0.339	-0.178**	-0.159*
	(0.123)	(0.488)	(0.143)	(0.175)	(0.098)	(0.271)	(0.287)	(0.324)	(0.109)	(0.211)
Financial Inclusion Index	0.336*	0.233	0.355*	0.161*	0.265*	0.125	0.403*	0.286*	0.395**	0.277*
	(0.048)	(0.058)	(0.047)	(0.007)	(0.741)	(0.017)	(0.697)	(0.635)	(0.927)	(0.687)
Ln(Total Assets)	0.258*	0.262	0.120	0.123*	0.465	0.450*	0.269*	0.161	0.192*	0.183*
	(0.180)	(0.184)	(0.102)	(0.104)	(0.325)	(0.298)	(0.053)	(0.056)	(0.185)	(0.185)
Non-loan Earnings Assets	0.125	0.113*	0.246	0.245**	0.338**	0.321	0.193	0.167*	0.329*	0.203**
	(0.183)	(0.188)	(0.062)	(0.063)	(0.921)	(0.895)	(0.085)	(0.087)	(0.280)	(0.288)
Fixed Assets	0.069	0.112	0.177*	0.173*	0.154	0.173*	-0.096	0.140***	0.250**	0.270**
	(0.082)	(0.083)	(0.075)	(0.068)	(0.209)	(0.202)	(0.040)	(0.036)	(0.015)	(0.115)
Islamic Banking Dummy	-0.042*		-0.200*		-0.160*		-0.379**		-0.207*	
	(0.571)		(0.181)		(0.683)		(0.630)		(0.894)	
Zakah %		-0.227*		-0.069*		-0.175*		-0.054*		-0.244*
		(0.179)		(0.070)		(0.366)		(0.296)		(0.950)
Financial Inclusion Index_Crisis	-0.494*	-0.363	-0.571*	-0.481*	-0.371*	-0.429	-0.985*	-0.482*	-0.230*	-0.115
	(0.532)	(0.871)	(0.305)	(0.453)	(0.047)	(0.925)	(0.250)	(0.435)	(0.638)	(0.984)
Ln(Total Assets)_Crisis	-0.118*	-0.128	-0.102*	-0.102	-0.115	-0.113*	-0.107*	-0.114*	-0.014	-0.117*
	(0.110)	(0.114)	(0.009)	(0.009)	(0.127)	(0.125)	(0.020)	(0.020)	(0.065)	(0.066)
Non-loan Earnings Assets_Crisis	-0.103	0.132*	-0.117	-0.118*	-0.099*	-0.005	-0.245*	-0.245	-0.297*	-0.292*
	(0.160)	(0.170)	(0.053)	(0.054)	(0.395)	(0.401)	(0.092)	(0.095)	(0.303)	(0.309)
Fixed Assets_Crisis	0.050	0.036	-0.084*	-0.074*	-0.025*	-0.026**	-0.105*	-0.106	-0.087*	-0.186*
	(0.146)	(0.046)	(0.007)	(0.008)	(0.082)	(0.083)	(0.014)	(0.015)	(0.047)	(0.047)
Islamic Bank Dummy_Crisis	-0.036*		0.171*		-0.001*		-0.083**		-0.036*	
	(0.142)		(0.128)		(0.342)		(0.241)		(0.730)	
Zakah %_Crisis		-0.055*		0.068**		-0.022*		-0.084*		-0.029**
		(0.210)		(0.065)		(0.241)		(0.503)		(0.599)
AR(2) Test (p-value)	[0.290]	[0.109]	[0.406]	[0.055]	[0.110]	[0.401]	[0.450]	[0.321]	[0.169]	[0.345]
Hansen test of over-identification	[0.136]	[0.410]	[0.992]	[0.090]	[0.948]	[0.290]	[0.501]	[0.221]	[0.532]	[0.244]
Number of Countries	59	59	58	58	59	59	60	60	59	59
Number of Instruments	43	43	45	45	43	43	45	45	43	43
Number of Observations	538	538	554	554	538	538	554	554	538	538

Finally, consistent with the results of Beck et al. (2013), we found that Islamic banks had higher z-scores and loan-deposit ratios during the crisis period. In modifying their results, we assessed the mechanisms of this relative performance as the Zakah to GDP ratios of Islamic banks. The remarkable relative performance of Islamic banks in predominantly Muslim population countries during the global financial crisis can be explained as the nature of Islamic banking services in such countries. In particular, Islamic banking activities, especially their redistributive instruments, tend to have a closer relationship between the real economic sector because of the nature of profit and loss sharing principle services and risk sharing opportunities. The risk and profit sharing transactions, such as murabahat and mudabara, are the major sources of the Islamic banks in countries where they are the main financial actors. Hence, in countries like Kuwait, Malaysia, Qatar and Saudi Arabia, Islamic banking services, specifically murabahat, mudabara, zakah, loans and deposits services survived the global crisis.

In summary, Islamic financial institutions are better capitalised, especially during global financial crises, have higher equity-asset ratios and are less likely to disintermediate during a global crisis. Thus, higher capitalization and equity-asset ratios explain the relative performance of Islamic banks during the crises. On the other hand, these results are consistent with those of Beck et al. (2013) since they found Islamic banks were capitalised during crisis periods. However, they are not consistent with the results Syed Ali, (2011), since they found lower ROE in cases of Islamic banks compared to commercial banks. Furthermore, we found significantly higher z-scores for Islamic banks than conventional banks in our sample. This result is not consistent with the results of Beck et al. (2013). Regarding the relative performance of Islamic banks' products, Islamic bank Zakah to GDP ratio performed better in equity-asset ratios and capitalisation indicators during the crisis. Hence, it can be concluded that the redistributive instruments of Islamic banks explain the mechanism of this performance.

4.6 Conclusions

This chapter empirically analysed the association between financial access and Islamic finance in testing whether the Islamic banking system contributes to voluntary exclusion from the financial system. Furthermore, one of the main contributions of this chapter is that we used disaggregated data on specific Islamic banking products to assess the mechanisms by which the impact of Islamic finance on financial exclusion occurs. Furthermore, as a sensitivity analysis, we added specific Islamic banking growth indicators to assess the impact of Islamic finance growth on the financial access outreach and access to and use of financial services from both types of banks in this section. After exploring these associations in terms of all countries models using countries from different economical, geographical and cultural backgrounds, this chapter

also examined this association in the OIC member countries to see the effects of religiosity and Muslim population levels of the countries along with their Islamic finance levels.

First, assessing the impact of Islamic finance on voluntary financial exclusion, we found evidence that higher levels of Islamic finance is associated with lower levels of conventional bank-based financial access in both all countries and OIC member countries. We assessed the mechanisms by which the impact of Islamic banking on financial inclusion occurs using Islamic banking products. We found evidence that Islamic bank loans, deposits and the total assets percentage of GDP explain the impact of Islamic finance on conventional bank access in all countries. Meanwhile, Islamic bank loans, deposits, capital ratio, zakah and the murabahat percentage of GDP variables explain this impact on OIC member countries. On the other hand, as one of our contributions to the literature, we found evidence that Islamic banking growth indicators are significantly associated with lower levels of commercial bank outreach and the access to and use of commercial banking services in both the all countries and the OIC member countries samples.

Moreover, when we run the regressions for access to microfinance institutions, credit unions and post offices services as the proxy of financial inclusion, we found evidence that Islamic bank indicators are significantly associated with higher levels of access to other financial institutions in both the all countries and the OIC member countries samples. Assessing the mechanisms of this impact, we found evidence that Islamic bank deposits, total assets, total capital ratio, zakah and murabahat transactions % of GDP variables explain the impact of Islamic finance on access to other financial institutions in both the all countries and OIC member countries samples.

Second, as an additional analysis to assess the argument by Beck et al. (2013) in the literature, this chapter sought to examine which type of bank is better protected against exogenous financial shocks during the crisis period. Additionally, following Beck et al. (2013), we subdivided the products of Islamic banks to assess the mechanism by which Islamic finance provided a better performance during the crisis period. In doing so, we found evidence that conventional banks perform better during general periods. However, Islamic banks significantly perform better in equity-asset ratios and stability indicators during crises.

Meanwhile, in exploring the mechanisms by which Islamic finance provided a better performance during the global crisis, it is clear that the Islamic bank Zakah to GDP ratio in equity-asset ratios and capitalisation of banks explain the performance of Islamic banks. Furthermore, using both our constructed financial inclusion index and the proxies of Beck et al. for conventional bank access to compare the impacts of these indicators, we found evidence that

both proxies have similar results in different estimation models. Thus, we suggest that the constructed financial inclusion index is an efficient estimator for conventional bank access. In particular, the financial inclusion index has higher equity-asset ratios and stability indicators during general periods. However, the proxies of Beck et al., total assets, non-loan earning assets, and fixed assets have higher stability and asset quality ratios during the crisis period.

Overall, one of the main contributions of this chapter was exploring the mechanisms by which the impact of Islamic finance occurs on financial exclusion by subdividing the services of Islamic banks. We improved the arguments in the literature by finding relatively stronger association between Islamic banking and financial inclusion using our own financial inclusion measures. In this regard, our broader multidimensional financial inclusion index seems to be an efficient estimator for explaining the extent of financial access in terms of assessing the link between financial inclusion and Islamic finance. However, it is important to note here that our results only explore the degree of association and mitigating endogeneity concerns between variables but do not reflect the causal relationships.

As discussed above, the impact of Islamic finance is relatively stronger in OIC member countries since the effects of religiosity are stronger in Muslim-dominant countries. In this regard, as was argued by Mohieldin et al. (2011), governments and policymakers should consider providing more *Shariah*-compliant financial services, removing interest rate caps and strengthening customer protection rules for religious clients to bring voluntarily excluded groups into financial systems. Moreover, in order to combat voluntarily financial exclusion, OIC governments should extend access to various *Shariah*-compliant financial services through existing channels of Islamic banks. They should consider developing institutional structures for specific Islamic finance instruments that target economic and social justice and poverty alleviation, such as Zakah, Waqf and Qard-ul-hassan.

At this point, the term of 'institutionalization' emerges as a need for Islamic redistributive instruments not only in OIC countries but worldwide. Building and developing the legal infrastructure of nation-wide specific institutions for such instruments above would facilitate the redistribution of wealth among people to achieve the target of economic and social justice and poverty alleviation. Finally, developing worldwide specific institutions of Islamic redistributive instruments should be a long-term target for policymakers. Since analyses on the association between financial access and Islamic banking are rare in the literature, this chapter might stimulate more research in this area. The actual effects of Islamic finance on involuntary exclusion in different countries of different backgrounds still need to be explored, such as by showing time trends with broader data and more indicators. Therefore, future studies might concentrate on exploring this association using different strategies.

Appendix B

Table 4.10 Countries from different economic and sociological backgrounds (all countries data)

1 Afghanistan	31 Estonia	61 Malawi	91 Slovenia
2 Albania	32 France	62 Malaysia	92 Somalia
3 Algeria	33 Gabon	63 Mali	93 South Africa
4 Argentina	34 Germany	64 Malta	94 Spain
5 Armenia	35 Ghana	65 Mauritania	95 Sri Lanka
6 Azerbaijan	36 Greece	66 Mexico	96 Sudan
7 Bahrain	37 Guatemala	67 Moldova	97 Sweden
8 Bangladesh	38 Guinea	68 Montenegro	98 Syrian Arab Republic
9 Belarus	39 Honduras	69 Morocco	99 Tajikistan
10 Benin	40 Hungary	70 Mozambique	100 Tanzania
11 Bolivia	41 India	71 Nepal	101 Thailand
12 Bosnia and Herzegovina	42 Indonesia	72 Nicaragua	102 Togo
13 Brazil	43 Iran, Islamic Rep.	73 Niger	103 Tunisia
14 Burkina Faso	44 Iraq	74 Nigeria	104 Turkey
15 Cambodia	45 Ireland	75 Oman	105 Turkmenistan
16 Cameroon	46 Israel	76 Pakistan	106 Uganda
17 Canada	47 Italy	77 Panama	107 Ukraine
18 Chad	48 Japan	78 Paraguay	108 United Arab Emirates
19 Chile	49 Jordan	79 Peru	109 United Kingdom
20 China, Hong Kong SAR	50 Kazakhstan	80 Philippines	110 United States
21 Colombia	51 Kenya	81 Poland	111 Uruguay
22 Comoros	52 Korea, Rep.	82 Qatar	112 Uzbekistan
23 Congo, Dem. Rep.	53 Kosovo	83 Romania	113 Venezuela, RB
24 Costa Rica	54 Kuwait	84 Russian Federation	114 Vietnam
25 Croatia	55 Kyrgyz Republic	85 Rwanda	115 West Bank and Gaza
26 Cyprus	56 Latvia	86 Saudi Arabia	116 Yemen, Rep.
27 Denmark	57 Lebanon	87 Senegal	117 Zambia
28 Djibouti	58 Lithuania	88 Serbia	118 Zimbabwe
29 Dominican Republic	59 Luxembourg	89 Sierra Leone	
30 Egypt, Arab Rep.	60 Macedonia, FYR	90 Singapore	

Table 4.11 Organization of Islamic Cooperation (OIC) member countries

1	Afghanistan	26	Mauritania
2	Albania	27	Morocco
3	Algeria	28	Mozambique
4	Azerbaijan	29	Niger
5	Bahrain	30	Nigeria
6	Bangladesh	31	Oman
7	Benin	32	Pakistan
8	Burkina Faso	33	Philippines
9	Cameroon	34	Qatar
10	Chad	35	Saudi Arabia
11	Comoros	36	Senegal
12	Djibouti	37	Sierra Leone
13	Egypt, Arab Rep.	38	Somalia
14	Gabon	39	Sudan
15	Guinea	40	Syrian Arab Republic
16	Indonesia	41	Tajikistan
17	Iran	42	Togo
18	Iraq	43	Tunisia
19	Jordan	44	Turkey
20	Kazakhstan	45	Turkmenistan
21	Kuwait	46	Uganda
22	Kyrgyz Republic	47	United Arab Emirates
23	Lebanon	48	Uzbekistan
24	Malaysia	49	West Bank and Gaza
25	Mali	50	Yemen, Rep.

Source: http://www.oicun.org/3/28/

Table 4.12 Variable definitions and data sources

Variable	Comments	Source
Number of Islamic Banks	Number of banks in a country that offer Islamic financial services. Any financial institution that offer thiese kind of services.	Global Financial Development Report 2014 database
Islamic Bankin Dummy	Binary variable that takes one if the country has at least one Islamic Financial Institution.	Global Financial Development Report 2014 database
Islamic Banks Loans % of GDP	Total loans of Islamic banks divided by GDP	
Islamic Banks Assets % of GDP	Total assets of Islamic banks divided by GDP	
Islamic Banks Deposits % of GDP	Total deposits of Islamic banks divided by GDP	
Islamic Banks Total Capital Ratio	Capital of Islamic banks as the share of total assets	World Bank Islamic banking and Bankscope database
Zakah % of GDP	A religious obligations for Muslims and an amount to pay for poor people.	
Murabaha % of GDP	A no interest trade contract that the profit is distributed between the joint parties in accordance with ratio that they agreed.	
Equity-Asset Ratio		
Return on Asset (ROA)	Net income of formal banks in relevant countries as the percentage of their assets	
Return on Equity (ROE)	Net income of formal banks in relevant countries as the percentage of shareholders equity	World Bank Financial Development and Bankscope Database
Z-score	Z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns.	
Loan-deposit ratio	Percentage of loans and deposits of reporting banks.	
Financial Inclusion Index	We identify financial inclusion as the usage of formal financial services supplied by commercial banks, in other words the growth in deposit, checking, savings, and loan accounts of commercial banks for households and SME's.	Authors own calculation
Accounts from Other Financial Institutions	The residual of Formal financial institutions and Percentage of respondents, who report having an account at a bank or another type of financial institution indicators	World Bank's Global Financial Inclusion (Global Findex) Database 2011, Authors calculation
Percentage of Muslim Population	This data shows the percentage of adults, who identifies themselves as a Muslim, in the survey.	Gallup 2011 Survey and Demirguc-Kunt, Klapper, and Randall (2013)
Percentage of Religiosity	The % of adults, who responded to the 2010 Gallup poll's survey question: "Is religion an important part of your daily life?".	Global Financial Development Report 2014 database
The % of adults citing religious reasons for not having an account at a formal financial institution	This data shows the % of adults, who cited religious reasons for not having an account at a formal financial institution.	Global Financial Development Report 2014 database
Real GDP Per Capita	Annual percentage growth rate of GDP per capita based on constant $2005.	World Bank and OECD National Accounts Data

Chapter 5 Conclusion

Although copious studies have suggested that financial development boosts income and reduces poverty, the mechanisms through which this impact occurs is not clear. Hence, this thesis analysed the extent of access to financial services, which is considered one of the main mechanisms of financial development, in terms of its impacts on poverty reduction and association with Islamic banking in countries where commercial banking is not the primary source of the financial system. As one of its main contributions, it examined access to financial in terms of both commercial banks and microfinance institutions.

In particular, this thesis explored three separate but related empirical works on the effects of financial access worldwide. We first analysed the construction of multidimensional and aggregate indices to measure the extent of financial access in a country at a point in time. We constructed two different indices as a narrow and a broader index to examine whether adding more dimensions and indicators made the index more comprehensible by checking their correlations with some income and poverty measures. We also assessed access to other financial services, such as microfinance, cooperatives and post offices as the proxy of financial inclusion in the same chapter. The main contribution of this thesis is to construct inclusive and broader multidimensional financial inclusion indices and using them along with the other proxies of financial inclusion, such as microfinance. First it assessed the effects of financial access on poverty reduction, and then it examined the impact of Islamic finance on financial exclusion. In doing so, this thesis aimed to explore why these constructed indices are better measures of financial inclusion while examining the impact of financial inclusion and exploring the association between Islamic banking and financial exclusion in both a group of countries where commercial banking is not the primary source of the financial system and all countries samples.

Following the OECD's handbook, the Principal Component Analysis (PCA) was performed, for the indicators of both indices to examine the importance and statistical balance of the indicators used for the index construction. Since the indicators were not expressed with the same scales, the data were normalised to render the indicators comparable by using the Min-Max method. Afterwards, the Factor Analysis method was used to assign the weights for the individual indicators of the indices. The final step used the updated form of the UNDP's Human Development Index method to aggregate the indices.

According to the results of the index construction methods in Chapter 2, credit income ratio, deposit-income ratio, and life insurance premium volume/were found to be the most important (primary) indicators for the construction of the first financial inclusion index. In contrast to the indicators above, geographic ATM penetration, bank cost-income ratio and geographic branch penetration were found to be less valuable indicators for the first index construction. Similarly, most of the indicators were also used for the construction of the second index. However,

consumer loan fees, fees for ATM cards and the cost to international transfer indicators were discovered to be the least relevant indicators.

After constructing the indices, it was found that high-income countries tend to have higher financial inclusion ranks, while lower-middle and low-income countries, with some exceptions, seem to have lower rates. Regarding the first index, Luxemburg has the highest values, with the United Kingdom, Singapore and Japan following. Low-income countries, such as Nigeria, Myanmar, the Republic of the Congo and Syria have the lowest values. The results of the second financial inclusion index are consistent with the first index results. One difference is that Algeria, Peru, Albania, Romania and Belarus have the lowest inclusion rates, in spite of being upper middle-income countries.

Furthermore, Chapter 2 indicates that the second index construction outperforms the first one in terms of conducting a comprehensive analysis, which can measure the extent of the financial inclusion. However, the first index method outperforms the second one in terms of making a comparison across nations and in considering more countries and exploring the time trend, using more years for the index. Exploring the correlates of the each financial inclusion proxy with some income and poverty measures using scatter diagrams, we suggest that the broader index (second index) has better correlations than other proxies with other country-specific factors. Thus, the broader index, which is constructed using more dimensions and indicators of financial access, has the highest predictability amongst the proxies of financial inclusion in this chapter.

Financial inclusion policies have become an important part of the financial and even economic development agendas of policymakers especially in developing countries. According to the G20 principles for innovative financial inclusion, there are some specific factors that help to establish an enabling policy environment for financial inclusion. These factors are considered as starting points for designing substantial policy frameworks for financial inclusion. In particular, *Leadership* is necessary to develop broader government obligation for financial inclusion to combat poverty. *Diversity* is necessary to create policies that provide competition between financial services as well as financial service providers. *Innovation* helps to develop technological and institutional means of financial access. *Protection* helps to increase consumer protection policies that explore the importance of the roles of government and providers. *Empowerment* is important to increase financial capability and literacy among consumers. *Cooperation* and *Knowledge* are necessary to develop a sustainable institutional situation with comprehensive coordination within government and across other providers and which help to develop evidence-based policies and incremental approaches for providers. Finally, a

Framework is necessary to implement international standards, domestic environments and supporting competitiveness (Pearce, 2011).

As a starting point, it is important to identify the barriers to using financial services for researchers and policymakers in order to expand financial access. In general, policies that eliminate bureaucratic, physical and financial barriers can help to boost the usage of financial services. However, these barriers vary across countries and regions. In relatively poor regions, the main barriers are physical distance and cost of services. Exploring technological and other innovations would help to deal with distance barriers for people. Furthermore, reducing documentation requirements, the fees of financial services, especially for small transactions, withdrawal charges and balance fees would also be good solutions for such regions to make formal financial services more attractive. Studies show that technological innovations help to expand the usage of financial services. For instance, the supply of mobile money in Sub-Saharan Africa expanded the participation in financial services. Hence, it is accepted that mobile money and informal savings clubs, which can be used outside the financial system, are good mechanisms to reach people who tend to use informal financial tools (Demirguc-Kunt and Klapper 2012).

In this sense, constructing such indices for financial inclusion helps to both design and evaluate new policy interventions for policymakers. It would help to improve the process of building new policies and explore broader inclusive access to financial services in an economy. The aggregate information that the indices hold in one single dimension can help researchers and policymakers to assess the extent of financial intermediation in countries. Moreover, constructing a multidimensional composite index would help to explore the trend and frame policies to address the levels of financial exclusion in a country. Using this kind of an index, researchers and policymakers might assess the impacts of financial access on various macroeconomic factors, such as income distribution and poverty. Meanwhile, policymakers and researchers should also analyse the factors behind financial exclusion and how to extinguish these factors. The voluntary and involuntary reasons should be identified, and researchers should also discuss proper policy solutions for these factors. The rest of this thesis addresses these issues.

In Chapter 3, the association between financial inclusion and poverty reduction was explored, using the proxies that were explored in the previous chapter. Hence, the constructed broader financial inclusion index was used to explain the various measures of poverty, along with other control variables, as a panel data from 143 developing and developed countries for the period between 2004 and 2011 in this chapter. In doing so, Chapter 3 contributes to the literature by identifying the effects of financial inclusion in terms of both the commercial bank-based and

microfinance access on people's overall wellbeing to guide policymakers. Since poverty is a multidimensional context, we used various measures of poverty to make a broader poverty analysis. In particular, we used the income share held by the lowest quintiles to control for the income-related poverty definition, infant mortality ratios to examine the health-related poverty definition, and, finally, the head count poverty ratio to assess the absolute poverty definition in each model separately to explore the effects of financial access.

The results suggest that in terms of all proxies of financial inclusion, obtaining broader access to financial services has a significant effect on poverty reduction. In other words, both commercial banks-based access and access to microfinance institutions seem to influence all poverty definitions in 143 developed and developing countries. Using the financial inclusion measures explained above, we suggest that in countries with higher access to financial services, there is an increase in the income growth of the lowest segments and decreases in infant mortality rates and headcount poverty ratios. Consistent with previous studies, we found a significant association between microfinance and the income share of the lowest segments in this chapter. These results are robust in controlling for various sensitivity tests. The results are also robust when we control for reverse causality and omit the outliers in the data and in controlling for various macroeconomic stability variables, such as GDP per capita growth as the income proxy, inflation, trade openness and political stability.

To sum up, Chapter 3 supports the ideas of the relevant literature. It is suggested that beyond the indirect effect of economic growth, financial inclusion has a direct effect on the wellbeing of the poor in terms of all proxies of financial inclusion. This chapter suggests that for policymakers, financial sector reforms should be directed at both broadening access to financial services and enhancing more credits available to the poor by canalising savings towards them. In particular, policymakers should canalise financial sector reforms to boost access to financial services from all financial institutions, specifically microfinance services, and supply more credits to the poor by canalising savings towards them.

There are three important aspects to developing new affordable credit models. First, the idea that financial exclusion is not only the consequence of lack of access to deposits or credit should be considered. It has a multifaceted nature, encompassing special factors that can cause the need for the use of mainstream and regulated and non-predatory services. Second, financial inclusion policies must be regulated for the range of needs, such as the social and political ones, rather than just the economic aspects. Finally, financial inclusion policies and initiatives need to be flexible and creative, and mostly should give more attention to the areas that are especially financially excluded (Fuller, Mellor, Dodds and Affleck, 2006). Meanwhile, policymakers should use different policy tools for each group of involuntarily excluded people. For instance, a

non-lending support mechanism is the right tool for people who are excluded from the formal financial system because of their extreme poverty and who therefore carry high lending risks (Beck, Demirguc-Kunt and Honohan, 2009).

This chapter also argues that microfinance services are the most substantial tool for combating poverty even with the lowest segments. Increasing the supply of specific services for the poor might help these people to recover their life situations. Eliminating and developing these specific microfinance institutions and their services might be the main policy instrument to reduce poverty levels in countries. For instance, since one of the main reasons of poverty is risk exposure that causes the poor to fear the risk of investment activities, policies that can reduce the risk exposure on the poor are vital to combat poverty. This policy instrument is universal, since poor people react the same in terms of risk exposure in investment in any country worldwide.

Furthermore, direct subsidies or better credit opportunities for clients, especially for women, might help to reduce extreme poverty in less developed countries. These kinds of instruments need specific attention for specific countries. Countries ranging from low-income to high-income levels need different strategies to provide such instruments. Even some specific regions in a country might need specific attention in this manner. In particular, direct subsidies are quite important for dealing with extreme poverty in areas in sub-Saharan Africa and Bangladesh. Moreover, it is believed that information infrastructures are mainly needed in low-income countries, while enforcement of credit rights is the most important policy requirement in high-income countries. Meanwhile, in order to improve on the research done in this area, constructing new time series data for financial inclusion and checking the long-term causal relationship between poverty and financial inclusion should be conducted in future research. However, the data availability problem for financial inclusion still remains an obstacle to achieving this goal.

As aforementioned, analysing the voluntary reasons for avoiding using financial services should be considered as important as the involuntary ones. To date, involuntarily excluded groups are primarily considered in order to measure financial inclusiveness, while voluntarily excluded groups are evidently ignored. However, the primary argument of the third empirical analysis in this thesis, which is presented in Chapter 4, assumes that the significance of voluntarily excluded groups needs to be considered as much as involuntarily excluded groups so as to enhance an inclusive financial system in the economy.

In this regard, using our constructed broader financial inclusion index and outreach from other financial institutions indicator as the proxy of financial exclusion, Chapter 4 first empirically explored the association between financial access and Islamic finance to test whether the

Islamic finance contributes to combatting voluntary financial exclusion. In the meantime, as part of the modification of the results in the literature, we used disaggregated data on specific Islamic banking products to assess the mechanisms by which the impact of Islamic finance on financial exclusion occurs. Moreover, as the robustness check for the results, we added specific Islamic banking growth indicators to assess the impact of Islamic finance growth on financial access outreach and access to and use of financial services from both types of banks in this section.

This chapter aimed to assess these results in the case of two different country groups using a range of countries from different economical, geographical and cultural backgrounds and an OIC member countries sample, where commercial banks are not the main source of the financial system. The second analysis aimed to test the argument made by Beck et al. (2013) in the literature by examining which type of banks is better positioned against exogenous financial shocks during the crisis period. Meanwhile, in modifying the results of Beck et al., this chapter assessed the mechanisms by which Islamic finance provides a better performance during the crisis period by subdividing the products of Islamic banks.

The results of the first analysis suggest that higher levels of Islamic finance are associated with lower levels of conventional bank-based financial access in both the all countries and the OIC member countries samples. We assessed the mechanisms by which the impact of Islamic banking on financial inclusion occur using Islamic banking products. We found evidence that Islamic banking loans, deposits and total assets percentage of GDP explain the impact of Islamic finance on conventional bank access in all countries. Meanwhile, Islamic banking loans, deposits, the capital ratio, zakah and the murabahat percentage of GDP variables explain this impact in OIC member countries. On the other hand, as one of our contributions to the literature, we found evidence that Islamic banking growth indicators are significantly associated with lower levels of commercial bank outreach and the access to and use of commercial banking services in the all countries and the OIC member countries samples.

Additionally, in the case of the second proxy of financial inclusion, we found evidence that Islamic banking indicators are significantly associated with higher levels of access to other financial institutions in both the all countries and the OIC member countries samples. Assessing the mechanisms of this impact, we found evidence that Islamic banking deposits, total assets, total capital ratio, zakah and murabahat transactions % of GDP variables explain the impact of Islamic finance on access to other financial institutions in the all countries and OIC member country samples.

Moreover, the results of the second analysis suggest that conventional banks perform better during normal times. However, Islamic banks significantly perform better during crisis periods.

Meanwhile, in exploring the mechanisms by which Islamic finance provided a better performance during the global crisis, the Islamic bank zakah to GDP ratio in equity-asset ratios and stability indicators of banks were found to be significantly better for explaining the impact of Islamic banks during the crisis period. Comparing the impacts of both proxies of conventional bank access on asset quality and stability indicators, we found evidence that our constructed financial inclusion index has similar results to the proxies devised by Beck et al. In particular, during general periods, the constructed financial inclusion index has a higher impact on equity-asset ratio and stability indicators. However, during the crisis period, the proxies of Beck et al., total assets, non-learning assets and fixed assets had higher impacts.

As argued in the literature, the impact of Islamic finance is relatively stronger in OIC member countries since the effects of religiosity are stronger in Muslim-dominant countries. Therefore, in light of these results, policymakers should consider voluntary financial exclusion more in seeking to achieve higher levels of financial access so that there will be more financial development. Building specific institutions or services for particular groups might be the starting point for these policies.

In particular, Mohieldin et al. (2011) demonstrated some specific dimensions of policy recommendations for developing financial inclusion in OIC member countries where Islamic finance has helped to increase the extent of financial access. *Development of* a *supportive regulatory and supervisory framework* is necessary to facilitate risk management and substantial consumer protection approaches. *Strengthening financial infrastructure* and developing technological and informational credit systems help to increase financial inclusion in OIC countries. *Providing more areas for Islamic microfinance* is necessary to develop financial access in OIC countries. In this regard, governments and policymakers should consider providing more *Shariah*-compliant financial products, removing caps on interest rates, and strengthening customer protection rules for religious clients to bring voluntarily excluded groups into the financial system.

Moreover, in order to combat voluntarily financial exclusion, OIC governments should extend access to various *Shariah*-compliant financial services through existing channels of Islamic banks. Institutionalization of redistributive instruments of Islamic finance is also necessary to develop financial access in OIC countries. Policymakers and regulators should consider developing institutional structures for specific Islamic finance instruments that target economic and social justice and poverty alleviation, such as Zakah, Waqf and Qard-ul-hassan. In doing so, the need for institutionalisation emerges for Islamic redistributive instruments to combat voluntary financial exclusion. Starting with buildings and developing the legal infrastructure of such instruments for nation-wide specific institutions would facilitate the redistribution of

wealth among people to achieve the target of economic and social justice and poverty alleviation.

Since the analysis on the association between financial access and Islamic finance in terms of involuntary exclusion is rare in the literature, this chapter may help policymakers with their decision-making process and stimulate more research in this area. However, the actual effects of Islamic finance on the involuntary exclusion of people from different backgrounds in different countries still need more attention. For instance, exploring time trends with broader data and more indicators would be helpful for explaining this association. Therefore, future work may concentrate on exploring this association using different strategies.

Overall, this thesis aimed to analyse all components of financial inclusion using three different but yet related studies. First, it aimed to explore the use of a broader financial inclusion index. Second, using this index, it analysed involuntarily financial exclusion by examining the impact of financial inclusion on various poverty measures. Finally, using the same index, it aimed to analyse the effect of Islamic finance on voluntary financial exclusion. In particular, these are the specific contributions of the research in this thesis.

The first study (Chapter 2) explored broad multidimensional financial inclusion indices, which contain various dimensions and indicators of financial access, in the literature. Using these indices, this thesis tested the arguments in the studies that have made original contributions to the literature to explore the predictability and comparability of the indices as the proxy of financial inclusion. In particular, this thesis sought to explore why these constructed indices are better measures of financial inclusion while examining the impact of financial inclusion on poverty and exploring the association between Islamic finance and financial exclusion separately.

The second study (Chapter 3) provided evidence that the constructed financial inclusion index is a good source for measuring the extent of financial access while examining the impact of financial access outreach on specific poverty measures to eliminate involuntary financial exclusion. In the third study (Chapter 4), we improved on the arguments in the literature by finding a relatively stronger association between Islamic banking and financial inclusion in both country samples using our own financial inclusion measures. In this regard, our broader multidimensional financial inclusion index seems to be relatively better for explaining the extent of financial access in terms of assessing the link between financial inclusion and Islamic finance in order to eliminate voluntary financial exclusion.

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