WORKING PAPER

Financial Inclusion: A New Multi-dimensional Index and Determinants

Evidence from the Union for the Mediterranean Countries

Rym Ayadi, Olfa Benouda, Soumaya Ben Khelifa, Dorra Hmaied, Rania Makni

EMNES Working Paper N₀ 34 / July, 2020

Abstract

This paper proposes a new multi-dimensional financial inclusion index based on a two-stage Principal Components Analysis (PCA) and aggregating indicators of availability, access and use. The paper first assesses the cross-country variations in the index and analyses trends over time for a sample of countries members of the Union for the Mediterranean (UfM) from 2010-18. Second, it investigates factors that could explain the level of financial inclusion across countries.

Our financial inclusion index shows a downward trend for the full sample over the period under investigation, however when splitting the sample by income group, it appears that high and middle income countries did not register the same trend. When examining the determinants of financial inclusion for UfM countries, we find that macroeconomic, social and governance factors, as well as banking conditions, matter.

Keywords: Multidimensional Financial Inclusion Index, Determinants, Principal Component Analysis

JEL Classifications: G21, O11

Introduction

Financial exclusion is one of the major socioeconomic challenges on the agendas of international organisations, policymakers, central banks, governments and also financial institutions. It has become an important policy objective in many countries, as it is considered a key factor in socioeconomic development, inclusive and sustainable economic growth.[1] In emerging and developed countries, governments have promoted various financial inclusion initiatives (Demirgüç-Kunt and Klapper 2012; Alam Iqbal and Sami 2017).

Financial inclusion has attracted growing interest from the academic community, as many researchers have focussed on the beneficial effects it provides for individuals and the economy as a whole. Whilst the literature on what reinforces financial inclusion still remains limited, empirical studies on financial inclusion determinants document the role of macroeconomic conditions, social and technological development, and institutional quality (Honohan 2008; Demirgüç-Kunt and Klapper 2013; Allen et al. 2016).

There is neither a formal definition for financial inclusion in the literature nor a consensus on how it could be measured. In this paper, we retain a broad definition that includes the availability, the access and the use of financial services by individuals and MSMEs. On measuring financial inclusion, different approaches have been proposed in the literature, including the use of a variety of dimensions. A recent approach considers financial inclusion as a multidimensional concept and proposes the construction of an index. A multi-dimensional index allows for the understanding of changes over time and across countries. Different indexes are proposed in the literature that consider different dimensions and indicators (Sarma 2012, Camara and Tuesta 2014, Mialou et al. 2017 and Park and Mercado 2015,2018).

This paper extends the existing literature on financial inclusion by focussing on northern and southern Mediterranean countries that are members of the Union for the Mediterranean (UfM).[2] First, we construct a new financial inclusion index, based on a definition covering three dimensions (availability, access and use) of financial services, using data from the International Monetary Fund's Financial Access Survey (FAS) and Global Payment System Survey (GPSS), for a sample of 35

[1] Several studies, such as Honohan (2008) and Demirguc-Kunt and Klapper (2012) amongst others, established a strong link between financial access to banking services and economic development and growth.

[2] The UfM includes the 28 European Member States and 15 Southern Mediterranean, African and Middle Eastern countries (Albania, Algeria, Bosnia-Herzegovina, Egypt, Israel, Jordan, Lebanon, Mauritania, Monaco, Montenegro, Morocco, Palestine, Syria, Tunisia and Turkey).

country members of the UfM from 2010-18. Then, we assess the cross-country variations in the index and analyse trends over time. Finally, the paper identifies the relevant factors explaining the cross-country differences in financial inclusion levels for the sample of UfM countries, using a set of macroeconomic and country-specific factors (banking conditions, institutional quality and social factors).

This paper contributes to the literature in several ways. First, we provide a new measure of financial inclusion using a three-dimensional index: availability, access and use, for which weights are assigned using PCA. It uses data available for the UfM sample by combining data from different databases, in order to include most indicators considered in the literature, as the majority of studies only use single measures (number of bank branches, ownership of a bank account, ratio of credits or deposits to GDP etc.). Second, by focussing on UfM countries, the study covers a region that includes both large developed and small developing economies that are connected via financial and trade ties, whilst previous studies generally give global evidence from an international sample with little or no economic ties. Third, splitting the sample by country income groups, the paper presents a more comprehensive representation of the cross-country variation in financial inclusion levels between high income and middle income economies for this region.

The results show that high income countries, such as Malta and Portugal, score highly during the period of investigation. The bottom of the ranking includes middle income economies, like Albania, Tunisia, Morocco and Egypt. Furthermore, we find that amongst country-level factors, per capita income, rule of law, financial freedom and age dependency ratio significantly affect the level of financial inclusion for UfM countries. Specifically, higher per capita income, rule of law, and financial freedom significantly increase financial inclusion; whilst higher age dependency ratio significantly reduces financial inclusion. When splitting the sample by income level, factors differently affect financial inclusion for high and middle income countries.

The remainder of the paper is structured as follows. Section 2 presents the literature review. Section 3 presents the sample and data. Section 4 exposes the methodology adopted to construct the financial inclusion index and to examine the determinants. Section 5 presents the results and section 6 provides the conclusion.

Literature Review

The literature on the determinants of financial inclusion has examined both the individual (Zins and Weill, 2016)[3] and country-level characteristics, however the research remains limited. Moreover, the measurement of financial inclusion varies across studies. Whilst previous studies use single measures for financial inclusion (number of bank branches, ownership of a bank account, ratio of credits or deposits to GDP etc.), the indexing approach has been proposed to capture the different dimensions of financial inclusion.

Beck et al (2007) were the first to explore the determinants of the cross-country variation in financial inclusion. Using single indicators, they find that factors such as the economic development level, the quality of the institutional environment, the strength of the informational environment of credit markets, and the development of the physical banking infrastructure all have a positive impact on financial inclusion. Using single measures, other studies have provided further evidence on the importance of macroeconomic conditions, social development, technological advancements, and institutional quality for enhancing financial inclusion (Ardic et al. 2011; Honohan 2008; Rojas-Suarez 2010; Demirgüç-Kunt and Klapper 2013; Allen et al. 2016).

Kabakova and Plaksenkov (2018) suggest that the development of financial inclusion does not depend only on the development of financial markets, but on the entire ecosystem, including economic, political, social and technological spheres. They examine financial inclusion, measured by account ownership for 43 developing and low income economies, considering four dimensions of the ecosystem: socio-demographic, technological, economical and political, constructed as indexes from a set of indicators. They find that the absence of social and economic factors, even in the presence of political and technological development, affects financial exclusion. Moreover, they argue that it is important to consider at least two out of four spheres in the ecosystem - social and economical, economical and political or social, digital and political, in order to develop financial inclusion.

Based on the financial inclusion index, the findings of the recent studies are in line with the previous ones. Park and Mercado (2018) consider indicators from the World Bank Global Findex Surveys (2011) and (2014) which are related to the

3 Zins and Weill (2016) investigate the determinants of financial inclusion in Africa. They find that individual characteristics (such as being a man, richer, more educated and older to a certain extent) favor financial inclusion with a higher influence of education and income.

availability and use of dimensions to measure financial inclusion for 151 countries. They find that per capita income, rule of law, dependency ratio, education and literacy are important factors that explain a country's financial inclusion level.

Sha'ban et al. (2018) study the determinants of financial inclusion across 95 countries from 2004-2015. They construct a financial inclusion index, using two different approaches covering the dimensions of use, access and depth. Their results suggest that banking conditions, technology and infrastructure, macroeconomic factors, institutional quality and social variables explain the variation in financial inclusion levels across countries.

Sample and Data

Sample

Our sample includes all the country members of the Union for the Mediterranean (UfM). The UfM includes the 28 European Member States and 15 Southern Mediterranean, African and Middle Eastern countries, namely Albania, Algeria, Bosnia-Herzegovina, Egypt, Israel, Jordan, Lebanon, Mauritania, Monaco, Montenegro, Morocco, Palestine, Syria, Tunisia and Turkey.

As data is missing for some countries over the period of investigation, our final sample includes 35 economies that are classified into two income groups (high income and middle income).[4]

Data for the construction of the Financial Inclusion Index

To construct the financial inclusion index, we collect data for the period 2010-18 using supply-side annual data from the IMF's Financial Access Survey (FAS 2019) for the availability and use dimensions; and data from the Global Payment System Survey (GPSS) for the access dimension.[5]

For the availability dimension, we consider demographic and geographic penetration of the banking system using four indicators: the number of branches and the number of ATMs, both per 100,000 adults and per 1,000 Km2. The access dimension is captured by two indicators: the number of deposit transaction accounts and the number of debit cards in circulation, both per 100,000 adults. To evaluate the extent of the use of financial products by individuals, we employ the following

[4] The middle income group includes upper-middle and lower-middle income countries.

[5] GPSS data is not updated when the study is conducted; the access data is limited to 2015 and maintained unchanged until 2018.

indicators: Domestic credit provided by financial sector (% of GDP); Outstanding deposits with commercial banks (% of GDP); and Outstanding loans with commercial banks (% of GDP).

Appendix A summarises the indicators considered for the construction of the financial inclusion index and the data sources.

Data for the determinants of financial inclusion

To examine the determinants of financial inclusion, we use data from several sources for the period 2010-18. The data on macroeconomic and social factors are obtained from the World Bank Development Indicators (WDI) and the IMF. Banking conditions' data is drawn from the Global Financial Development Database (GFDD) and Heritage Foundation. Data on governance quality are drawn from the World Governance Indicators and the Centre for Systemic Peace.

Appendix B summarises the variables and data sources.

Methodology

Construction of the Financial Inclusion Index

The lack of a harmonised measure to define financial inclusion challenges the understanding of the phenomenon. Measuring financial inclusion, accounting for its multi-dimensionality in an index, is important in several aspects. First, a measure that aggregates several indicators into a single index allows the summarising of the complex nature of financial inclusion and permits the study of its evolution. Second, a multi-dimensional index is a better means for extracting the relevant information and assessing the relationship between financial inclusion and other macroeconomic variables. Third, information by dimension helps to better understand financial inclusion and can be used as a tool to set up and evaluate policies.

In this paper, we construct a multi-dimensional financial inclusion index considering three dimensions: availability, access and use. Unlike Sarma (2008, 2010, 2012)[6] who uses a non-parametric method to construct the index by assigning equal weights to all indicators and dimensions, we apply a parametric approach

[6] The non-parametric approach assumes that all dimensions have the same impact on financial inclusion. There is evidence that indexes are sensitive to subjective weight assignment.

(PCA) that limits the problem of assigning exogenous or equal weights to components (Camara and Tuesta 2014).[7],

First, each indicator is calculated by dimension as:

$$X_{i,d} = \frac{X_i - m_i}{M_i - m_i} \qquad (1)$$

Where X_I is the actual value of indicator i, m_i and M_i are respectively the lower and the upper limits on the value of indicator i and $X_{i,d}$ is the standardised value of indicator i of dimension d.

PCA is employed in order to aggregate each indicator to a dimension index. Following Camara and Tuesta (2014), we denote λ_j (j = 1; : : : ; p) as the j-th eigenvalue, subscript j refers to the number of principal components that also coincides with the number of indicators. We suppose that $\lambda_1 > \lambda_2 > \ldots > \lambda_p$ and denote P_k (k = 1, ..., p) as the k-th principal component. We compute the estimator of each dimension index Y_i^d using the weighted averages:

$$Y_i^d = \frac{\sum_{j,k=1}^{p} \lambda_j^d P_{ki}^d}{\sum_{j,k=1}^{p} \lambda_j^d} \qquad (2)$$

Where $P_k = X.\lambda j$; λj is the variance of the k_{th} principal component (weight) and X represents the indicators matrix.

The weights assigned to each component are decreasing, so that the highest proportion of the variation in each dimension is given by the first principal component and so on. Once, we construct the sub-indexes, we apply a second stage of PCA to compute the aggregate financial inclusion index. Thus, we obtain the following estimator for the financial inclusion index:

$$FII_i = \frac{\sum_{j=1}^{p} \lambda_j P_{ki}^u}{\sum_{j=1}^{p} \lambda_j} \qquad (3)$$

Where FII_i is the aggregate financial inclusion index for country i. $P_k = X.\lambda j$; λj is the variance of the kth principal component (weight) and X represents the dimensions matrix.

[7] Camara and Tuesta (2014) apply a two-stage principal components methodology to estimate the degree of financial inclusion as an indexing strategy. Since the sub-indexes contain highly inter-correlated indicators, they estimate the sub-indexes first, rather than estimating the overall index directly by picking all the indicators at the same time. In the second stage, they estimate the dimension weights and the overall financial inclusion index by using the dimensions as explanatory variables.

$$Financial\ inclusion\ index = w_1 \times Availability\ index + w_2 \times Access\ index + w_3 \times Use\ index \quad (4)$$

where w is the weight assigned to a dimensional index in the principal component analysis.

Determinants of financial inclusion

To investigate the relevant factors explaining the cross-country differences in financial inclusion levels, we use a comprehensive set of variables, macroeconomic and social factors as well as factors related to banking conditions and governance quality.

The governance quality is assessed through two variables. First, we consider *Polity*, an index which reflects the extent of democracy in the country. A high level of democracy favours financial inclusion through established institutions and better policies (Claessens and Perotti, 2007; Deininger and Squire, 1998). Second, we use *Rule of law* as we argue that good governance and high institutional quality should increase financial inclusion, since it improves enforcement of financial contracts (Honohan, 2008, Rojas-Suarez, 2010 and Park & Mercado, 2015).

We add two factors that reflect a country's banking system conditions. To capture the extent of an economy's financial freedom, we use, *Financial freedom*, an indicator of banking efficiency, independence from government control and interference in the financial sector. We expect a low government control to encourage financial inclusion through ease of access to financial services (Beck et al. 2007; Rojas-Suarez, 2010). We also consider, *Bank concentration*, calculated as the share of assets of the three largest commercial banks, as a share of total commercial banking assets. The literature predicts a negative relationship between bank concentration and financial inclusion. A high level of concentration in the banking sector can be associated with low financial inclusion, as banks are less incited (low competition) to assess the quality of potential borrowers in the provision of credits (Demirgüç-Kunt and Klapper 2013).

We use *GDP per capita* as a measure of country income (in logarithm form). We argue this variable should be positively associated with the level of financial inclusion, as high income countries have more inclusive financial systems (Ardic et al. 2011; Owen and Pereira 2018; Shaban et al. 2018). The second variable to assess the macroeconomic environment is *Inflation*. Inflation may negatively affect both the demand for and supply of financial services because of economy uncertainty (Rojas-Suarez 2010; Allen et al. 2014).

Our proxy for the social factor is age dependency ratio, which is the percentage of dependants to working-age population. Higher age dependency ratio should reduce financial inclusion as a larger segment of the population do not have access to financial services, because they do not earn income (too young or above the retirement age).

The following specification is estimated through the GLS method in a panel data regression. [8]

$$FII_{i,t} = \alpha + \beta_1\ Polity_{i,t-1} + \beta_2 Rule\ of\ law_{i,t-1} + \beta_3\ Financial\ freedom_{i,t-1} + \beta_4\ Bank\ concentration_{i,t-1} + \beta_5\ GDP\ per\ capita_{i,t-1} + \beta_6 Inflation_{i,t-1} + \beta_7\ \text{Age dependency} + \mu_{i,t} \quad (5)$$

FII_{it} is the country's financial inclusion index.
$\mu_{i,t}$ is the error term

Results

Summary statistics

Table 1 reports the descriptive statistics for the indicators used to construct the financial inclusion index, as well as the variables used in the regression analysis. As for indicators of financial inclusion, the mean number of branches and ATMs across the sample of UfM countries is around 28 and 75 per 100,000 adults, respectively. Bank deposits and loans represent 64.35 and 67.69 per cent of GDP, respectively, whereas domestic credit provided by financial sector is around 118 per cent.

The mean of the financial inclusion index is 0.35 with a minimum of 0.071 for Egypt and a maximum of 0.678 for Luxembourg.

[8] The explanatory variables are lagged by one year to allow for potential endogeneity issues. The independent variables - Rule of Law, Financial Freedom and GDP per Capita - are measured as the natural logarithm.

Table 1. Descriptive statistics

Panel A: Financial inclusion indicators

Variable	Obs	Mean	Std. Dev.	Min	Max
ATMs (per 100,000 adults)	273	75.09	39.04	10.94	194.63
ATMs (per 1,000 Km2)	273	96.40	111.98	4.79	675
Commercial bank branches (per 100,000 adults)	273	27.99	15.82	1.43	91.9
Commercial bank branches (per 1,000 Km2)	273	37.09	60.96	0.22	459.38
Domestic credit provided by financial sector (% of GDP)	273	118.27	59.29	32.84	317.41
Outstanding loans with commercial banks (% of GDP)	273	67.69	35.00	19.55	197.45
Outstanding deposits with commercial banks (% of GDP)	273	64.35	28.22	13.58	162.36
Number of debit cards in circulation par 1000,000 adults	273	8924.4	4051.3	5060.1	16499.1
Number of deposit accounts par 1000,000 adults	273	15722.8	9607.4	7821.7	98001.3
Financial inclusion index	273	0.351	0.129	0.071	0.678

Panel B: Determinants

Variable	Obs	Mean	Std. Dev.	Min	Max
Polity	272	8.02	4.05	-6	10
Rule of Law	280	4.31	0.26	3.38	4.61
Financial Freedom	280	4.17	0.22	3.40	4.50
Bank concentration	280	0.66	0.16	0.32	0.98
GDP per Capita	280	9.90	0.91	7.80	11.69
Inflation	280	0.02	0.03	-0.02	0.30
Age dependency ratio	272	0.51	0.06	0.38	0.70

Note: The table reports descriptive statistics. Panel A reports summary statistics for indicators used to construct the financial inclusion index and for variables used in the regression analysis for the full sample of 35 countries for the period 2010-18.

Financial inclusion index time trend

Table 2 reports the normalised weights assigned to dimensions' indicators (first stage PCA), as well as the weight of each dimension in the global index (second stage PCA). The index and each sub-index take values between 0 and 1, where 1 suggests a very high level of financial inclusion and 0 is associated with the lowest level.

Table 2. Composition of the financial inclusion index

Indices	Indicators	Normalised weights
Availability	• Commercial bank branches (per 100,000 adults)	0.404
	• ATMs (per 100,000 adults)	0.250
	• Commercial bank branches (per 1,000 Km_2)	0.200
	• ATMs (per 1,000 Km_2)	0.147
Access	• Number of deposit transaction accounts	0.282
	• Number of debit cards in circulation	0.718
Use	• Domestic credit provided by financial sector (% of GDP)	0.438
	• Outstanding loans with commercial banks (% of GDP)	0.316
	• Outstanding deposits with commercial banks (% of GDP)	0.245
Financial Inclusion Index	• Availability	0.206
	• Access	0.539
	• Use	0.255

Note: The table reports the weights, calculated through a two stage principal component analysis, of dimension indicators and the three dimensions to construct the financial inclusion index.

For the Availability dimension, it appears that the indicator "Branches of commercial banks per 100,000 adults" is the most important, as it has the largest weight (around 40%), followed by "(ATMs) per 100,000 adults" (around 25%). The indicators of ATM and bank branches per 100,000 adults have higher weights than the same indicators per Km_2. This is consistent with Camara and Tuesta (2014) who argue that the ratios associated with population contain more information than those associated with location. For Access, the indicator "Number of debit cards" is highly weighted (72%) compared to "Number of deposit accounts" (28%). Finally, for the

use dimension, the two indicators “Domestic credit to GDP” and “Outstanding loans with commercial banks” appear to be more important than “Outstanding deposits” for the entire period, presenting the weights of 44% and 31% respectively. It seems that the credit indicators contain more information than the deposits.

The results show that UfM countries are at very different levels of availability, access and use. In terms of income groups, high income countries have higher levels of availability, access and use indexes than countries in middle income groups. We note that Turkey is the only upper-middle income country ranked in the top five over time for the access index. Israel is the only high income country presenting a very low access index.

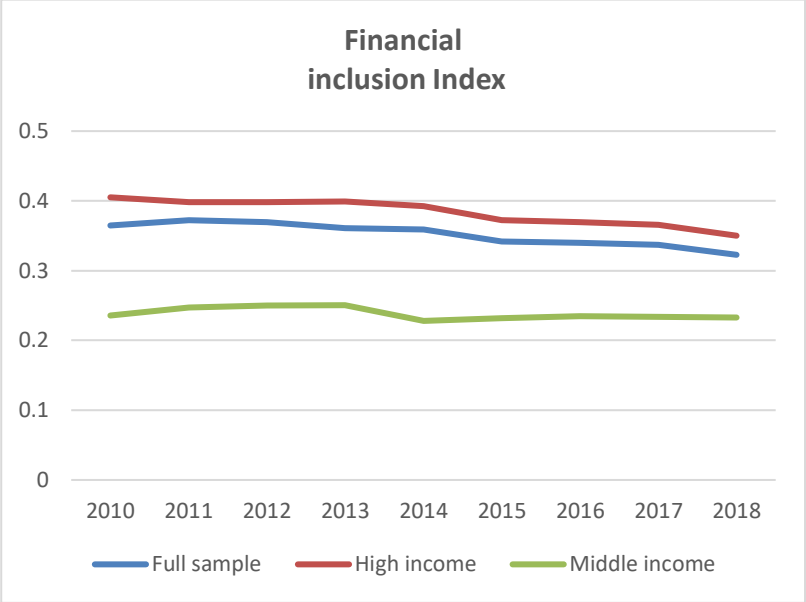
Looking at the composition of the financial inclusion index, we find that access is the most important dimension, with a weight of 54%, followed by use (25%) and availability (21%).

Figure 1 shows the time trend of the financial inclusion index for the period 2010-2018. A downward trend is observed as more pronounced since 2015. This declining trend is noted especially for high income countries, whilst middle to low-countries experienced a steadily increasing index, with a slight drop in 2014 and a quasi stability until 2018. The figure shows a high level of financial inclusion for high income countries, compared to the middle income group. However, the increase in financial inclusion over time is more pronounced in middle income countries. The downward trend for high income countries may be explained by several factors, mainly the saturation of demand for conventional financial products, structural changes after the 2012 sovereign debt financial crisis, the decrease of GDP growth driven by demographic ageing, the increasing use of digital banking and the rapid evolution of digital financial products. [9] [10].

[9] Digital and mobile banking are not considered in the financial inclusion index calculation because data is not available.

[10] Findex Database : Measuring Financial Inclusion and the Fintech Revolution 2017.

Figure 1. Financial inclusion index trend over time by income group



Note: The graph plots the trend of financial inclusion index overall and by income region over the period 2010-18.

Figure 2 shows a decline in the three dimensions of financial inclusion for the full sample. The decrease is more pronounced for the availability [11] and use dimensions, however, for the access dimension, we note a slight increase until 2014 and a quasi stability thereafter. When looking at the evolution of the dimensions over the period, by splitting the sample by income group, it appears that the high and middle income groups did not register the same trend. For middle income countries, the graph shows a significant increase in the use index, a decrease of the access index from 2014 followed by stability until 2018 and a more stable trend for the availability indicators. For high income countries, the decline in the financial inclusion index is explained by the downward trend of the indicators, which are mostly related to the banking sector. The trend of financial inclusion indicators for the period 2010-2018 is presented in Appendix D. Panels A, B and C present the evolution of availability, use and access indicators, respectively. We note a clear difference in the level and trend of the different indicators of financial inclusion between the two groups of countries. The European Banking Federation draws attention to the contraction of the banking sector of the EU28 countries since the financial crisis and especially in 2015

[11] Cihak et al. (2016) suggest that limiting the growth rate in the numbers of bank branches at an optimal level maintains stability in the macroeconomic environment.

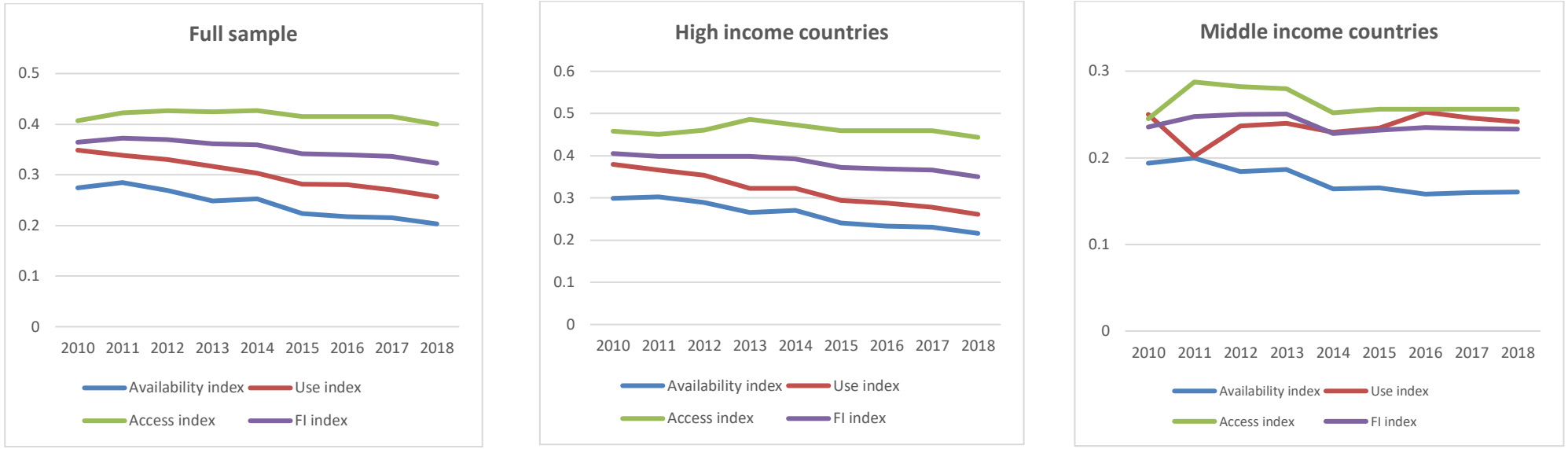
compared to 2014 (reduction in number of bank branches etc.).[12] This trend has been accentuated by the increasing use of digital banking, as more than half of EU individuals, 54%, used internet banking in 2018, up from 25% in 2007.

Looking at the financial inclusion trend for each country, we note that the downward trend is not registered for all high income countries, but essentially for Greece (since 2014), France (2013) and Spain. For the majority of high income countries, the financial inclusion index is quasi stable or slightly increasing (Sweden, Portugal and Poland). Middle income countries experiencing a considerable increase in financial inclusion are Turkey, Tunisia and Morocco.

Appendix C reports the ranking of the 35 UfM countries according to the 2018 financial inclusion index. The ranking shows that high income countries are in the top ten during all the period. In particular, Portugal and Malta perform the best, ranked in the top five for the whole period. This finding confirms the empirical literature, arguing that developed countries have more inclusive financial systems. It is important to note that, amongst middle income countries, Turkey and Bulgaria are well ranked compared to high income countries. Looking at the lowest six ranked countries, we note that, except Israel, all are middle income countries including Albania, Tunisia, Morocco, Jordan and Egypt. Egypt has the lowest index for all the period amongst UfM countries.

[12] European Banking Federation « Banking in Europe ; the 2019 Facts & Figures »

Figure 2. Financial inclusion index trend over time by dimension and income group



Note: The graph plots the trend of financial inclusion by dimension (availability, access and use) over the period 2010-18, considering two income groups: High and middle income countries.

Determinants of Financial inclusion

Table 3 reports the estimates for equation 5, using panel data to examine the dependence between financial inclusion and country-level factors for the entire sample for the period 2010-2018. Different specifications are employed to test the robustness of the results. In specification (1), we test governance quality, including Polity and Rule of Law. In specification (2), we include banking conditions associated with Financial Freedom and Bank concentration. In specification (3), we incorporate macroeconomic factors measured by GDP per capita and inflation; In specification (4), we add the socioeconomic factor related to Age dependency ratio.

The results related to model 1 show a positive and significant relationship only for Rule of Law, suggesting that stronger rule of law, including stringent regulation and enforcement of financial contracts, enhances customers' confidence in financial institutions, which contributes to promoting financial inclusion. This result confirms the findings of Park & Mercado (2015).

When we add banking conditions in model 2, Rule of law loses its significance. Amongst banking conditions' variables, Financial Freedom has a positive and significant effect on financial inclusion. Hence, efficient and independent banks are likely to offer more convenient and inclusive financial services (Rojas-Suarez, 2010; Shaban et al. 2018). However, no effect of bank concentration on financial inclusion has been noted. Financial freedom seems to be a main determinant of financial inclusion, as it keeps its significance even when introducing other variables.

Turning to the macroeconomic factors (model 3), GDP per capita is found to be positively associated with financial inclusion, indicating that high income countries have more inclusive financial systems (Sha'ban et al (2019) and Park and Mercado (2018)). However, there is no significant effect of inflation on financial inclusion. GDP per capita is found to be a main determinant, as it is significant for models 3 and 4.

Regarding socioeconomic factors, we find that higher age dependency ratio significantly reduces financial inclusion, suggesting that countries with a high proportion of people that do not have any income, due to being too old or too young, are expected to have a low level of financial inclusion (Park & Mercado, 2015). This shows that there is large potential to enhance financial inclusion in these population segments.

Furthermore, we investigate whether the relationship between financial inclusion and the country-level characteristics varies according to the country's income level. Hence, we split the sample into high income countries and middle income countries. The results are displayed in table (4). Focussing on governance

quality, the coefficient on Rule of law remains positive and statistically significant for high income countries. However, it is negatively associated with financial inclusion for the middle income group. The relationship between financial freedom and financial inclusion remains positive and significant for the two income groups. However, GDP per capita only retains its significance for middle income countries. Furthermore, we find that Inflation positively and significantly influences financial inclusion only in middle income countries. This result is counter-intuitive, as empirical studies find a negative relation. However, we think that for low and middle income countries, despite the instability of macroeconomic environment (high level of inflation), efforts are being made to increase financial inclusion. Finally, the relationship between Age dependency ratio and financial inclusion is negative and significant only for high income countries.

It is important to note that whilst models (3) and (4) well explain the relationship for middle income group, the Adjusted R-Squared is around 67%.

Table 3. Determinants of the financial inclusion index (Full sample)

	Model (1)	Model (2)	Model (3)	Model (4)
Polity $_{t-1}$	-0.00202	-0.00085	-0.00044	-0.00032
	(-1.4)	(-0.64)	(-0.35)	(-0.26)
Rule of law $_{t-1}$	0.13063***	0.05546		
	(3.49)	(1.49)		
Financial Freedom $_{t-1}$		0.16705***	0.15596***	0.16833***
		(6.08)	(5.59)	(5.91)
Bank concentration $_{t-1}$		-0.04311	-0.03552	-0.02999
		(-1.5)	(-1.25)	(-1.05)
GDP per capita $_{t-1}$			0.03230**	0.02553*
			(2.14)	(1.66)
Inflation $_{t-1}$			0.12258	0.06624
			(1.54)	0.82
Age dependency ratio $_{t-1}$				-0.22936***
				(-2.77)
Constant	-0.19308	-0.54663***	-0.59232***	-0.46434***
	(-1.22)	(-3.37)	(-3.84)	(-2.84)
Observations	248	248	248	241
Adjusted R-Squared	0.2663	0.1873	0.2892	0.2801

Note: The table reports the regression findings on the relationship between financial inclusion and country-level factors. The dependent variable is financial inclusion index. The independent variables (lagged by one year) are governance quality, banking conditions, macroeconomic and socioeconomic factors. The sample includes 35 UfM countries from 2010 to 2018. The t-statistics are reported in parentheses. *, **, *** represent significance at 10, 5 and 1 percent levels, respectively.

Table 4. Determinants of the financial inclusion index by country income level

	High Income Countries				Middle Income Countries			
	Model (1)	Model (2)	Model (3)	Model (4)	Model (1)	Model (2)	Model (3)	Model (4)
Polity $_{t-1}$	0.03631	0.03652	0.03769*	0.03003	-0.00100	-0.00008	-0.00076	-0.00077
	(1.64)	(1.61)	(1.69)	(1.29)	(-0.9)	(-0.09)	(-0.78)	(-0.78)
Rule of law $_{t-1}$	0.26631***	0.16971***			-0.09209**	-0.05348		
	(4.59)	(2.59)			(-2.22)	(-1.54)		
Financial Freedom $_{t-1}$		0.10941***	0.14586***	0.16004***		0.28162***	0.22430***	0.22103***
		(3.25)	(4.59)	(4.9)		(4.71)	(4.49)	(4.38)
Bank concentration $_{t-1}$		-0.04320	-0.02623	-0.02797		-0.10703**	-0.16714***	-0.16179**
		(-1.34)	(-0.8)	(-0.85)		(-2.1)	(-2.98)	(-2.44)
GDP per capita $_{t-1}$			0.00451	0.00656			0.0699**	0.07210**
			(0.21)	(0.3)			(2.43)	(2.49)
Inflation $_{t-1}$			0.11411	-0.05831			0.23014***	0.23540***
			(0.85)	(-0.4)			(2.63)	(2.63)
Age dependency ratio $_{t-1}$				-0.26148**				-0.03446
				(-2.52)				(-0.22)
Constant	-1.12869	-1.13717	-0.61245**	-0.48493	0.59139***	-0.61406**	-1.18108***	-1.17207***
	(-3.44)	(-3.49)	(-2.04)	(-1.55)	(3.65)	(-2.11)	(-4.09)	(-3.88)
Observations	190	190	190	183	58	58	58	58
Adjusted R-Squared	0.1798	0.1134	0.0715	0.045	0.1566	0.2149	0.6714	0.6787

Note: The table reports the regression findings on the relationship between financial inclusion and country-level factors for each income group: high income countries and middle income countries. The dependent variable is financial inclusion index. The independent variables (lagged by one year) are governance quality, banking conditions, macroeconomic and socioeconomic factors. The sample includes 35 UfM countries from 2010 to 2018. The t-statistics are reported in parentheses. *, **, *** represent significance at 10, 5 and 1 percent levels, respectively.

Conclusion

This paper proposes a multi-dimensional index that considers three dimensions: availability, access and use to measure financial inclusion for 35 member countries of the UfM. First, we identify the weights assigned to each dimension and construct the overall index, using a two-stage principal components analysis. Our results suggest that access is the most important dimension, as it presents a significant weight. UfM countries present different levels of availability, access and use. In terms of income groups, high income countries have high levels of financial inclusion and middle income countries are still lagging behind. However, it is interesting to note that the trend of the financial inclusion index varies between the two groups. Whilst middle income countries experienced a steadily increasing index for the period 2010-18, a downward trend is observed for the high income group, which was more pronounced since 2015. This may be explained by several factors, mainly the saturation of demand for conventional financial products, the structural changes in the banking sector after the 2012 financial crisis and, essentially, the increased availability, access and use of digital banking.

Second, our paper investigates the determinants of financial inclusion level for the UfM countries. Our findings suggest that, amongst the country characteristics, per capita income, rule of law, and demographic structure significantly influence the level of financial inclusion. Specifically, higher per capita income, rule of law, and financial freedom significantly increase financial inclusion; whilst higher age dependency ratio significantly reduces financial inclusion. When splitting the sample by income level, the results vary between the two groups, suggesting that factors affecting financial inclusion depend on the level of financial inclusion in a country.

The findings provide several implications. First, they highlight the importance of country income-level oriented policies and strategy, in terms of financial inclusion. Studies considering global samples could not identify specific factors affecting the different groups of countries. Second, they emphasise the importance of having access to a wide variety of financial products, at reasonable costs, to boost financial inclusion. Third, the rapid evolution of financial inclusion in developed countries suggests consideration of indicators that reflect technological aspects and the use of digital financial products, in order to better assess the level of financial inclusion (Ayadi and Shaban, 2020). Finally, policy-makers in low and middle income economies should consider the importance of digital financial inclusion, which is substituting the role to traditional banking system, to close the gap and accelerate its development. This suggests the need to readjust the traditional definition of financial inclusion to include digital availability, access and use of financial services as means of defining and measuring financial inclusion.

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Appendix A - Financial inclusion index Composition

Dimension	Indicators	Source
Availability	• Automated teller machines (ATMs) (per 100,000 adults) • Commercial bank branches (per 100,000 adults) • ATMs (per 1,000 Km_2) • Commercial bank branches (per 1,000 Km_2)	FAS
Access	• Number of deposit transaction accounts • Number of debit cards in circulation	GPSS
Use	• Domestic credit provided by financial sector (% of GDP) • Outstanding deposits with commercial banks (% of GDP) • Outstanding loans with commercial banks (% of GDP)	FAS

Note: The table summarises the indicators used to construct the financial inclusion index and data sources.

Appendix B - Data Definition and Sources

Variables	Description		Source
Financial inclusion index	A multi-dimensional financial inclusion index for each country. Values are ranging from 0 to 1.		Authors calculation
Polity	Polity 2 score measures democratic practice on a scale from -10 to +10 with higher values indicating greater institutionalisation of democratic procedures.	Governance quality	Center for Systemic Peace
Rule of law	Captures perceptions of the extent to which agents have confidence in, and abide by, the rules of society, in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence.	Governance quality	World Governance Indicators.
Financial Freedom	An indicator of banking efficiency, as well as a measure of independence from government control and interference in the financial sector. It ranges between 0 and 100.	Banking conditions	The Heritage Foundation
Bank concentration	Assets of three largest commercial banks as a share of total commercial banking assets.	Banking conditions	GFDD
GDP Per Capita	The log value of real GDP per capita (PPP in constant US$)	Macro-economic	World Bank, World Development Indicators (WDI)
Inflation	The year-on-year change in consumer price index.	Macro-economic	IMF, International Financial Statistics and data files.
Age dependency ratio	The percentage of dependants to working-age population.	Social factors	World Bank, WDI

Note: The table summarises the variables used in the regression analysis and data sources.

Appendix C - Country ranking by financial inclusion index

Rank	Country	Financial inclusion index 2018
1	Luxembourg	0.678*
2	Malta	0.611*
3	Portugal	0.604
4	Belgium	0.546*
5	Netherlands	0.535
6	Croatia, Rep. of	0.510
7	Denmark	0.465
8	Turkey	0.444
9	Germany	0.424*
10	United Kingdom	0.418*
11	Finland	0.410
12	Cyprus	0.395
13	Sweden	0.388
14	Slovenia	0.378
15	Estonia	0.364
16	Austria	0.362
17	Italy	0.359
18	Bulgaria	0.346
19	Spain	0.331
20	Ireland	0.330
21	Lithuania	0.328
22	Greece	0.307
23	Czech Rep.	0.302
24	France	0.298
25	Slovak Rep.	0.294
26	Poland	0.291
27	Latvia	0.268
28	Hungary	0.241
29	Romania	0.201
30	Morocco	0.195
31	Jordan	0.174
32	Israel	0.169

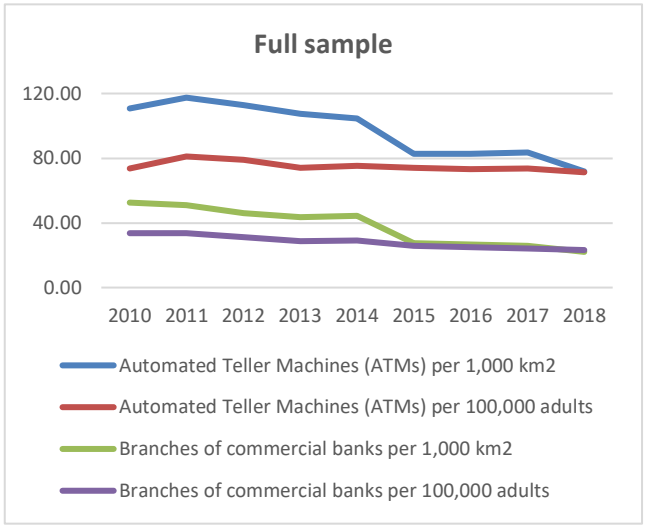
33	Tunisia	0.168
34	Albania	0.123
35	Egypt	0.102

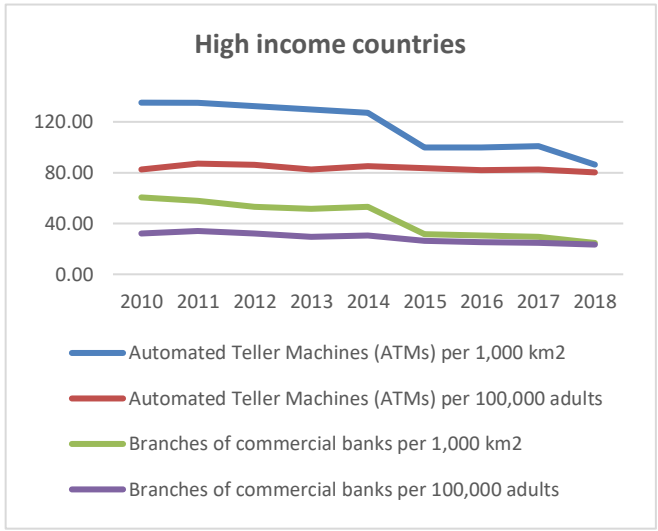
Note: The table reports the ranking of the 35 UfM countries of the sample, based on the 2018 score of the financial inclusion index. Countries are ranked from the most financially inclusive to the least.
* values reported represent average scores for the period 2010-2018 due to missing data needed to calculate the scores for 2018.

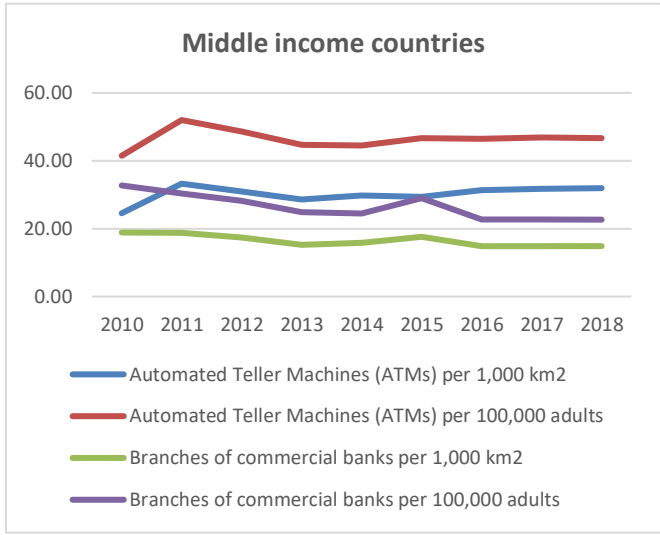
Appendix D - Trend over time of financial inclusion indicators

Panel A: Availability Indicators

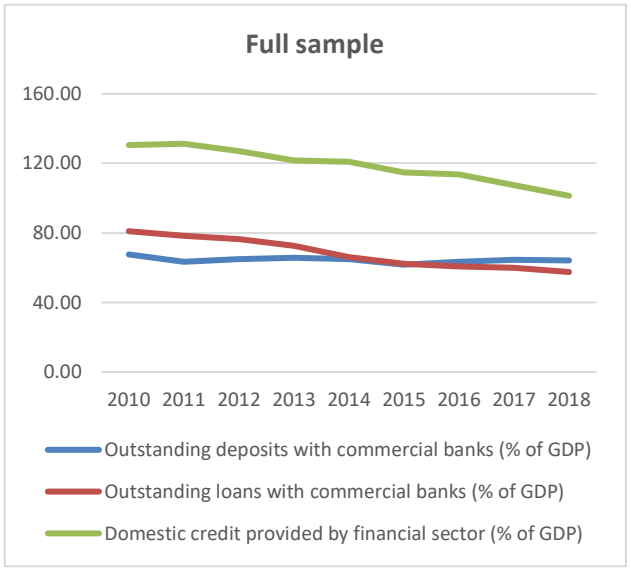
Note: The graph plots the trend of financial inclusion indicators for the period 2010-18 by dimension availability, use and access in Panel A, B and C, respectively.

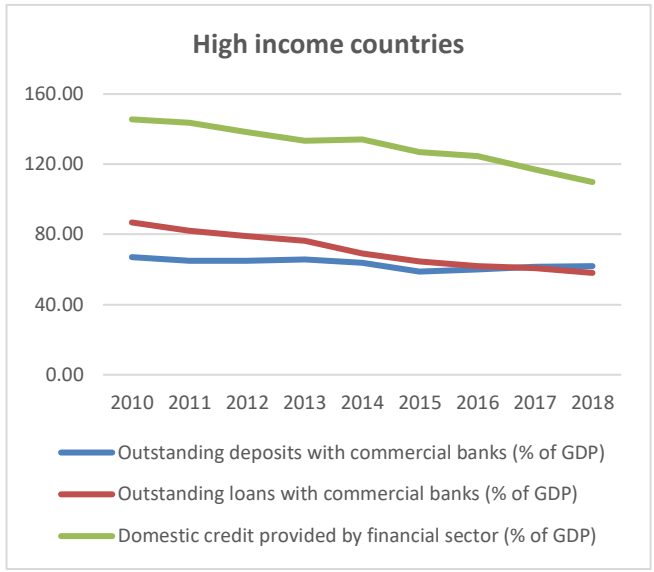


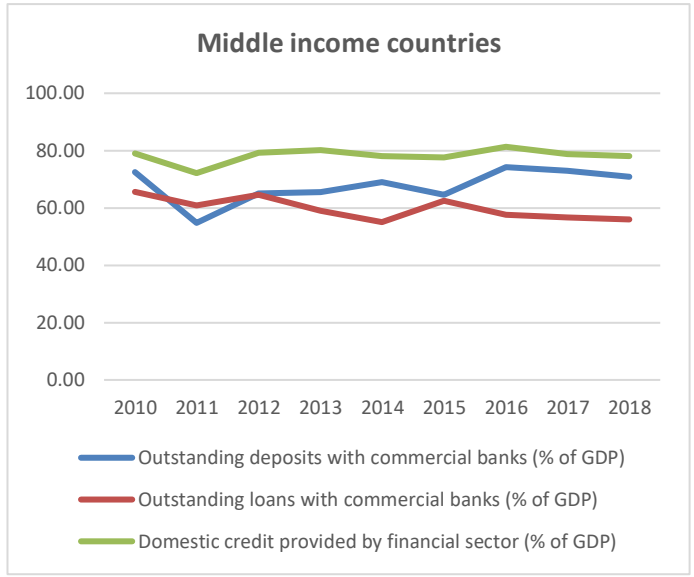




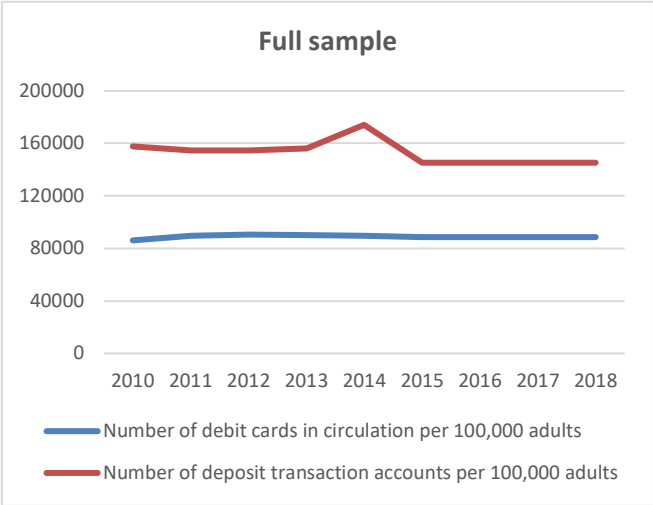
Panel B: Use indicators

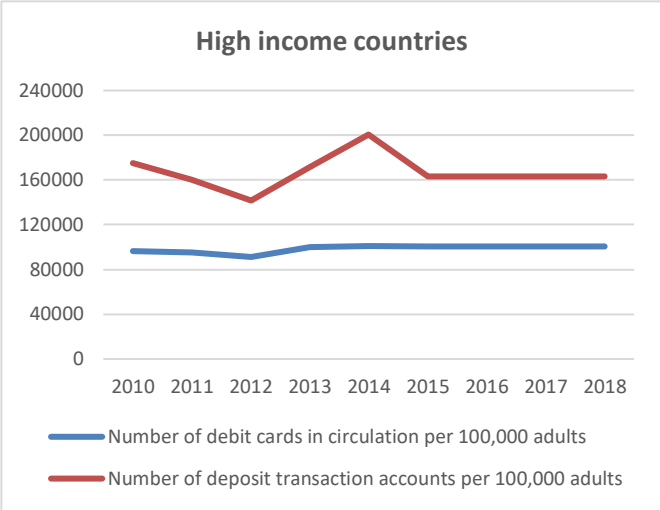


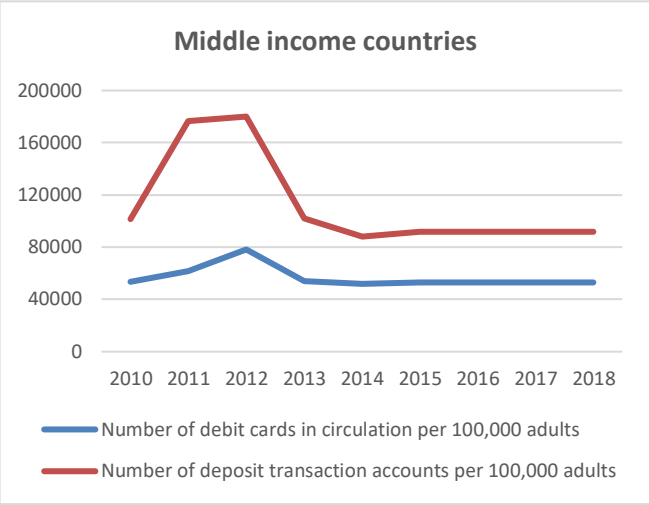




Panel C: Access indicators







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The Euro-Mediterranean Network for Economic Studies (EMNES) is a network of research institutions and think tanks working on socio-economics policy in the Euro-Mediterranean. EMNES is coordinated by the Euro-Mediterranean Economists Association (EMEA).

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- Private sector, micro, small and medium –sized enterprises development, entrepreneurship and social business;
- Digital economy;
- Healthcare policy;
- Human capital development, education, innovation, skill mismatch and migration;
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- Sustainable development;
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EMNES acknowledges the financial assistance of the European Union within the context of the EU project "Support to economic research, studies and dialogue of the Euro-Mediterranean Partnership" under contract number ENPI/2014/354-488 (2014-2019).

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