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MEASURING FINANCIAL INCLUSION IN THE MAIN EURO AREA COUNTRIES: THE ROLE OF ELECTRONIC CARDS

by Giorgio Nuzzo* and Stefano Piermattei*

Abstract

Since financial inclusion has become a policy target in many countries, it is crucial to measure it properly. The usual indexes of financial inclusion include inappropriate variables and do not take into account other relevant aspects, thus misrepresenting the phenomenon. In this paper, we focus on the distribution of electronic cards, generally not included in the usual indexes of financial inclusion even if they provide alternatives to usual saving practices and make transactions across larger markets and wider geographic areas less costly. We show that if we also take account of these instruments, the comparative valuation of the degree of financial inclusion across the main euro-area countries changes substantially. We also employ survey data to analyze cross-country differences in the degree of financial inclusion and the distribution of multidimensional deprivations of specific sub-groups of populations.

JEL Classification: G20, G41, I22.

Keywords: financial inclusion, payment instruments, electronic cards.

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1. Introduction*

Broadly speaking, we can define financial inclusion as the ease of access by individuals and enterprises to appropriate and reasonably priced financial services. During the last years, financial inclusion has increasingly become a policy priority in many countries, especially in emerging countries, where it is an important part of the policy agenda that aims at reducing poverty levels. In advanced economies data on financial inclusion are collected and analysed. While the debate on the relationship between financial development and economic growth is mature¹, there is still discussion on whether financial development improves financial inclusion, as there can be well-developed financial systems that are not necessarily inclusive for some segments of population. An inclusive financial system can enhance economic growth and reduce income inequality by facilitating the efficient allocation of resources, enlarging investment opportunities and promoting capital formation for a wider segment of population. An inclusive financial system also improves welfare by providing safer saving practices and by limiting the growth of informal sources of credit such as moneylenders and peer-to-peer lending platforms (Faia and Paiella, 2017), with implications on the effectiveness of monetary policy and financial stability (Mehrotra and Yetman, 2015; Panetta, 2018). For these reasons, financial inclusion targets have become increasingly popular, leading the World Bank to formulate in 2013 the Universal Financial Access Goal: *“By 2020, adults, who currently aren't part of the formal financial system, have access to transaction account to store money, send and receive payments as the basic building block to manage their financial lives”*.²

Despite the recent growing attention, there is still no full agreement on how to properly define financial inclusion. Financial inclusion is a complex concept in the larger context of *social* inclusion and its definition involves different aspects. Following Sarma (2012) financial inclusion is *“a process that ensures the ease of access, availability and usage of formal financial system”* for as many as possible members of the economy.

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¹ Before the recent financial crisis most of the literature underlined the positive relationship between financial development and economic growth (King and Levine, 1993; Levine, 2004). More recently, the literature underlined the risks associated to an excess of finance and excess of credit (Berkes et al., 2012; Schularick and Wachtel, 2014).

² <http://www.worldbank.org/en/topic/financialinclusion/brief/achieving-universal-financial-access-by-2020>.

Alternative definitions focus on the exclusion aspect: Amidzic et al. (2014), for instance, define financial inclusion as “*an economic state where individuals and firms are not denied access to basic financial services based on motivations other than efficiency criteria*”. The World Bank takes a step further underlining that the definition of financial inclusion should also take into account financial sustainability and individuals’ needs: “*financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way*”.³ These definitions highlight the lack of consensus on whether financial inclusion should be measured as an attribute of the economic system rather than of the single component and, in this latter case, whether it is more correct to measure the phenomenon at the household or at the individual level.⁴ Despite differences, the complexity of the phenomenon means that an analysis of financial inclusion must necessarily embrace several dimensions. Literature identifies four major *forms* of exclusion: a) *access exclusion*, when segments of population is excluded due to the remoteness of financial facilities and providers; b) *condition exclusion*, when there are barriers related to the socio-economic conditions of groups of population (e.g. exclusion from targeted marketing and sales of financial products, financial illiteracy, excessive documentation required for some individuals); c) *price exclusion*, due to the presence of prohibitive fees or unaffordable prices of financial products for some segments of the population and d) *self-exclusion*, that occurs when groups of people exclude themselves from the formal financial system owing to psychological barriers.

Because of its policy relevance, it is critical to properly measure financial inclusion. While up to some years ago data on financial inclusion were scarce and limited to country specific surveys, the past years have seen substantial progress in this area.⁵ There are two major data-collection initiatives about financial inclusion; the first one is the Financial

³ <http://www.worldbank.org/en/topic/financialinclusion/overview>.

⁴ Whereas the issue of the correct unit of measurement has not been adequately discussed yet in the literature about financial inclusion, there are academic contributions in other fields, such as the poverty analysis. Vijaya et al. (2014), for instance, argue that, when constructing multidimensional measures of poverty, equating the household with the individual is problematic because intra-household differences in resource allocation and interconnected deprivations are ignored.

⁵ World Bank (2006a) and World Bank (2006b) were among the first attempts to describe data availability and data needs to measure financial inclusion.

Access Survey (FAS) by the International Monetary Fund, which collects annual data on indicators tracking financial access, an important pillar of financial inclusion; it provides insights on the availability and use of financial products across the globe. The second one is the World Bank Global Financial Inclusion Database (called Findex) that provides more than 800 country-level indicators of financial inclusion summarized for the entire adult population but also disaggregated by key demographic characteristics such as gender, age, education, income, employment status and rural residence. Covering more than 140 countries, the Findex indicators of financial inclusion measure how people save, borrow, make payments and manage risk.

FAS and Findex indicators undoubtedly provide useful insights on the degree of inclusiveness of financial systems. However, if used individually, they give only partial information on the overall inclusiveness of financial systems, and can lead to misinterpretation of the extent of financial inclusion in a given country. Moving from these considerations, academic literature has recently investigated synthetic indexes of financial inclusion that are comprehensive, comparable across countries and over time, and satisfy desirable mathematical properties. The recent progress in measuring financial inclusion has helped to monitor progress towards policy targets, and in turn policy targets have provided impetus for additional enhancements in measurement. Nevertheless, there is still room for improvement in adequately measuring financial inclusion.⁶

Usual measures of financial inclusion incorporate information on various aspects of the phenomenon: accessibility, availability, degree of use and quality of financial services. Nonetheless, there is still a large debate on *what* dimensions to consider and *how* to measure them. For instance, the “degree of usage” of the financial system is often measured by the total amount of credit granted by the banking system. In this respect Beck (2016) underlines that the total amount of credit is an indicator of “financial depth” (the aggregate amount of resources accessible by the economic system) rather than financial inclusion. In addition, the amount of loans to the private sector can be a quite concentrated phenomenon driven by credit booms and hence not very indicative of the state of financial inclusion in a system. Beck et al. (2018) argue that access to saving instruments may have a more inclusive impact

⁶ It is worth to cite Goodhart’s law which says that “*when a measure becomes a target, it ceases to be a good measure*” (Beck, 2016).

than credit on consumption, income, wealth and social spending. On the other hand, measures of financial inclusion sometimes do not consider other relevant aspects, such as the supply of efficient, accessible and safe retail payment systems and services that are critical for financial inclusion. Digital payments, for example, can allow less costly economic transactions across larger markets and wider geographic areas, increase integration, opportunities and the efficiency of government social programs (BIS, 2016), as well as limit the social costs of corruption.

The aim of this paper is to assess *pros* and *cons* of the most commonly used measures of financial inclusion, with a primary focus on the four main euro area economies - France, Germany, Italy and Spain. We refer to the degree of access to financial services by individuals (specifically the adult population). We find that usual indexes may provide misleading pictures of the actual state of financial inclusion *in* and *across* countries, either because they consider improper variables or because they neglect relevant aspects. Concerning the latter point, in this paper we focus on the role and diffusion of electronic cards, that are generally not included in indexes of financial inclusion. We show that, taking this aspect into account, the comparative valuation of the degree of financial inclusion in our set of countries changes substantially.

This paper is organized as follows: Section 2 reviews the literature on financial inclusion and its measures. Section 3 illustrates current availability of data and discusses the variables we select. Section 4 discusses the most commonly used measures of financial inclusion for the main euro area countries and proposes alternative indicators based on new evidence on the diffusion of electronic payments instruments. Section 5 illustrates the state of within-country financial inclusion inequality across income groups, gender and education levels and analyzes the distribution of multidimensional deprivations across individuals in specific sub-groups of populations. Section 6 discusses data quality issues and identifies room for improvement in the financial inclusion data collection. Section 7 concludes.

2. Review of the literature

Financial inclusion (exclusion) is a fairly new topic in economic literature.⁷ One of the early attempts to formally define financial exclusion was by Leyshon and Thrift (1995) who define it as those processes that prevent disadvantaged individuals from gaining access to the financial system. According to Sinclair (2001), financial exclusion is the inability to access *necessary* financial services *in an appropriate form*. Carbo et al. (2005) define financial exclusion as the inability of some *social groups* to access finance. Sarma (2012) defines financial inclusion as a process that ensures the ease of *access, availability* and *usage* of formal financial system. As it is evident, all the various definitions actually emphasize two fundamental aspects of financial inclusion: a) it is a manifestation of a broader question of *social* inclusion and b) it is a multidimensional phenomenon.

Measuring financial inclusion obviously depends on the way it is defined. Early attempts to measure financial inclusion simply relied on basic indicators like the proportion of adults (or households) having access to financial services, for example a bank account. These early measures were usually obtained through country-level surveys, implying they were not fully comparable and not available at regular intervals. Moreover, single indicators like the share of adults with a bank account ignore other important aspects of an inclusive financial system, i.e. the degree of usage and the quality of financial services. Literature pointed out that merely having a bank account does not mean that the account is utilized (or adequately utilized).⁸ Once world-wide databases like the FAS and the Findex have become available, financial inclusiveness has begun to be described by a variety of financial sector outreach indicators (Beck, 2007; Demirguk-Kunt and Klapper, 2012) including geographic branch penetration indicators (number of bank branches per 1,000 km²), demographic branch penetration (number of bank branches per 100,000 adult persons) and loans and deposits accounts per capita.

Moving from these early attempts, efforts to provide synthetic and comprehensive indexes of the extent of financial inclusion have been made. A good synthetic index of

⁷ For a literature survey on “access to finance” see Karlan and Morduch (2010).

⁸ Kempson et al. (2004) define the notion of “underbanked” or “marginally banked” people as those who, despite having a bank account, do not make adequate use of it.

financial inclusion should satisfy desirable properties, such as capturing all relevant multi-dimensional - possibly non-overlapping - aspects of financial inclusion while being parsimonious at the same time, allowing comparison across countries and highlighting temporal paths in a given economy. Among the first attempts, Honohan (2008) combined survey based and banking sector information to econometrically estimate the proportion of households having access to formal financial services for as many as 160 countries. Differently from these econometric approaches, a number of studies began to follow the approach developed by UNDP to calculate the Human Development Index (UNDP, 2014), that is to compute a composite index through some kind of weighted average of the various dimensions⁹ of financial inclusion. There are two main approaches to construct composite indexes: non-parametric methods – where the weight assigned to each dimension is chosen arbitrarily, based on researches’ intuitions (Sarma, 2008; Chakravarty and Pal, 2010) - and parametric methods, where weights are estimated endogenously through some model assumptions. In the latter group, Amidzic et al. (2014) derive weights through the use of factor analysis, whereas Cámara et al. (2014) employ a principal component analysis. In our work we use Sarma’s index but, differently from the author, we estimate weights endogenously by means of principal component analysis.

The improvement and the availability of good, synthetic, and comparable indexes recently allowed researchers to develop new strands of the literature that study the relationship between financial inclusion and other macroeconomic variables; the two major research strands focus, respectively, on the *determinants* of the extent of financial inclusion (Abel et al., 2018; Ampudia and Ehrmann, 2017; Weill and Zins, 2016), and on the *effects* of financial inclusion on income inequality and growth in a given economy (Demirguc-Kunt et al., 2017; Kim, 2015).

⁹ Among the dimensions of financial inclusion most commonly considered – each one measured, in the various works, by selected indicators – there are the *availability*, *accessibility* and *usage* of financial services. One can think of many other dimensions of an inclusive financial systems, such as the “*quality*”, “*affordability*” and “*timeliness*” of financial services. Nonetheless, data measuring these aspects are not readily available and these dimensions are not generally incorporated in financial inclusion indexes.

3. Data description

In order to provide a comparative measure of financial inclusion between the four main euro area countries in the recent years, we have built a unique dataset by combining three main different sources:

- The Financial Access Survey (FAS), launched by the IMF in 2009, is the key source of data on access to and use of financial services by individuals and enterprises around the world. The FAS is based on administrative data provided by Central Banks and other regulators, covers 189 countries and contains 152 time series resulting in 47 basic indicators and spanning more than 10 years. The indicators most commonly used to measure various aspects of financial inclusion are the number of bank accounts (per 1,000 adult persons), the number of bank branches (per 100,000 adult persons), the number of ATMs (per 100,000 adult persons or per 1,000 km²), the amount of bank credit and the amount of bank deposits.
- The Global Financial Inclusion Database (Findex) by the World Bank has been published every three years since 2011. The Global Findex Database is the most comprehensive dataset based on primary surveys on 150,000 adults in 148 countries.¹⁰ The World Bank Findex provides interesting indicators of financial inclusion from a micro perspective, such as the shares of adults having an account with a formal financial institution, of adults who saved and borrowed using a formal account, of adults who used informal methods to save and informal sources to borrow and the shares of adults with credit/debit cards, with mortgage and with a health insurance. These statistics are also provided by income group, gender and education levels of the respondents (Demirguk-Kunt and Klapper, 2012).
- Euro area payment statistics compiled on the basis of ECB Regulation no. 43/2013 provide statistics on non-cash payments, which comprise indicators on access to and use of payment services and of terminals by the public, as well as on the volumes and values of transactions processed through payment systems.

Each source has some pros and cons; FAS data are mainly administrative data and they are quite reliable since provided by national competent authorities. The questionnaire is

¹⁰ In Germany, France, Italy and Spain data are obtained through landline and cellular phone interviews with a sample of 1,000 adults in each country.

very comprehensive but the degree of participation in the different jurisdictions is not homogeneous. In particular, some data are not compiled by the main euro area countries, requiring the authors to look for different alternative sources. In our work FAS is used to obtain data on the presence of financial services (number of branches and automated teller machines) and on the intensive margin of the use of financial services (bank loans and deposits in percentage of GDP). Findex offers data collected through nationally representative surveys that are available only for the different waves of the survey (2011, 2014 and 2017). The same questionnaire is utilized in different countries offering high comparability of data. The possibility to disaggregate data for specific segments of the population is potentially helpful to provide targeted policy initiatives. We use Findex to measure the extensive use of financial products (percentage of borrowers and depositors). Finally, payment statistics provided by the ECB for each country are useful administrative data on the diffusion of non-cash payment services. We use data on the number of debit and prepaid cards scaled to the population of each country. It is worth noticing that cards are counted on the card-issuing side regardless of the cardholder's residency or the location of the account to which the card is linked. In addition, there are some specific data quality/discontinuity issues that must be handled, in particular in the definition of Payment Service Providers (PSPs).

Using these three different sources, in our analysis we select the following variables for the years 2007-2016 (see Table 1 in the Appendix for the summary statistics):

- 1) *The number of bank branches per 100,000 adults* (BRANCHES). The rationale is that banks remain one of the key institutions for access to formal financial services; having an accessible bank branch is an important initial point of access to financial services and therefore to their use. The source is the FAS database.
- 2) *The number of ATMs per 1,000 km²* (ATMs). The idea is to complement data on the diffusion of branches with this other important point of access such as automated teller machines of all formal financial institutions, which can extend financial services to remote locations. The source is the FAS database.
- 3) *The percentage share of adults having an account* (EXT_DEP). The goal is to measure the extensive margin in the diffusion of deposit services. The source is the Findex database. A computation based on linear interpolation of data available in the waves (2011, 2014 and 2017) is performed for the missing data 2012, 2013, 2014, 2015 and

2016. Data on years previous to 2011 are compiled using 2011 wave.

- 4) *Outstanding amount of bank deposits in percentage of GDP (INT_DEP)*, that we use as a measure of the intensive margin in the use of deposits. The source is the FAS database.
- 5) *The percentage share of adults being a borrower or using a credit card (EXT_LOA)*, through which we measure the extensive margin in the diffusion of loan services. The source is the Findex database. The same estimation process for missing data described for EXT_DEP applies.
- 6) *Outstanding amount of bank loans in percentage of GDP (INT_LOA)*, that we use to measure the intensive margin in the use of loans. The source is the FAS database.
- 7) *The number of debit cards issued by Payment Service Providers (PSPs) resident in that country (including both cards issued in the country and cards issued abroad) scaled to the population (DEB_CARD)*. Debit cards are issued by banks or other intermediaries and enable purchases at accredited stores and interest-free cash withdrawals from ATM machines. Unlike credit cards, the amounts due are debited directly from the debtor's account upon each purchase or withdrawal. Customers can also pay bills, top up their mobile phones and access other services at ATMs. Given these features, the use of debit cards for measuring financial inclusion is motivated by their use in digital transactions across larger markets and wider geographic areas, with benefits in terms of financial inclusiveness of individuals. The source is ECB Statistical Data Warehouse.¹¹
- 8) *The number of prepaid cards issued scaled to the population (PRE_CARD)*. Prepaid cards enable holders to make payments and withdrawals based on amounts previously deposited at the issuing company. To have a prepaid card it is not required to be a current account holder. Payments and withdrawals are automatically debited from the amounts paid in by holders to the issuing company until they are used up. Prepaid cards can be used to make and receive payments in the same way as an account, for example through bank transfers or direct debits. We introduce prepaid cards in our measures of financial inclusion because of their role in the digital payments and their potential increasing substituting role for bank accounts. The source is ECB Statistical Data Warehouse.¹²

¹¹ Data for France show discontinuity in time series for the period 2014-2016. We impute new data by using the number of debit cards in Germany as benchmark and the relative position of France with respect to Germany in the percentage of debit cards holders reported in Findex database.

¹² Missing or discontinuous data for prepaid cards for Spain and France in the period 2013-2016 have been

The collected variables reflect a mix of administrative and survey-based, as well as supply versus demand-side data on financial services. Moreover, some variables (for instance the number of adults having an account) are sometimes intended as the final outcome of “the degree of financial inclusion” in a country, while other variables are considered as the input through which that outcome is obtained. This mix is essential in order to get a complete picture of the state of financial inclusion in a country; the goal is to measure a phenomenon whose dimensions embrace, among others, aspects like the *access*, the *availability* and the *usage* of financial services.

4. A synthetic measure of financial inclusion

Usual indicators of financial inclusion are based on the well-known development indexes used by the United Nations Development Program (UNDP), such as the Human Development Index, the Human Poverty Index, etc. These indexes reflect a multidimensional approach that synthetizes several dimensions, each of which is measured by a specific normalized dimension index of the type

$$d_{i,c} = w_i \frac{D_{i,c} - m_i}{M_i - m_i} \quad (1)$$

where $D_{i,c}$ is the actual value of dimension i ($1 \leq i \leq k$) in the country c ; M_i and m_i are, respectively, the theoretical upper and lower limits for the value of the i -th dimension, and w_i is the weight attached to dimension i , with $0 \leq w_i \leq 1$. While several works make use of some kind of weighted average between the specific dimension indexes¹³, we follow Sarma (2012), who employs the Euclidean distance in the k -dimensional space of the point $d_c = (d_{1,c}, d_{2,c}, \dots, d_{k,c})$ from both the ideal point $M = (M_1, M_2, \dots, M_k)$ and the worst situation $m = (m_1, m_2, \dots, m_k)$. In particular, the financial inclusion index for a given country can be expressed by the following formula:

replaced by the corresponding data in 2012.

¹³ In general, the linear operator expressed by the arithmetic mean is not used because it is recognized that the different dimensions should not be characterized by perfect substitutability, and hence different combinations of variables pertaining to different dimensions should not lead to same levels of financial inclusion. Amidzic et al. (2014), for instance, use a non-linear exponential geometric mean.

$$\begin{aligned}
FI_c &= \frac{1}{2} \left[\frac{\sqrt{d_{1,c}^2 + d_{2,c}^2 + \dots + d_{k,c}^2}}{\sqrt{w_1^2 + w_2^2 + \dots + w_k^2}} + \left(1 - \frac{\sqrt{(w_1 - d_{1,c})^2 + (w_2 - d_{2,c})^2 + \dots + (w_k - d_{k,c})^2}}{\sqrt{w_1^2 + w_2^2 + \dots + w_k^2}} \right) \right] = \\
&= \frac{X_1 + X_2}{2}
\end{aligned} \tag{2}$$

where X_1 gives the Euclidean distance from the worst point m and X_2 is the distance from the ideal point M . The index shown in (2) satisfies fundamental properties: it varies from 0 to 1, it is a unit-free measure, it is a monotonous and homogeneous (of degree zero) function of d . Given these properties, it can be used to measure and compare financial inclusion across different countries and different points in time.

A relevant aspect in designing a proper financial index is the weights assignment, that should reflect the relative importance of the various dimensions. The most basic approaches assign weights with non-parametric – that is arbitrary – methods. Moreover, very often weights are set all equal to guarantee identical importance to the various dimensions. Recently, some works have derived weights by means of parametric methods (Amidzic et al., 2014; Camara and Tuesta, 2014). In our work we use principal component analysis (PCA); in particular, the first component

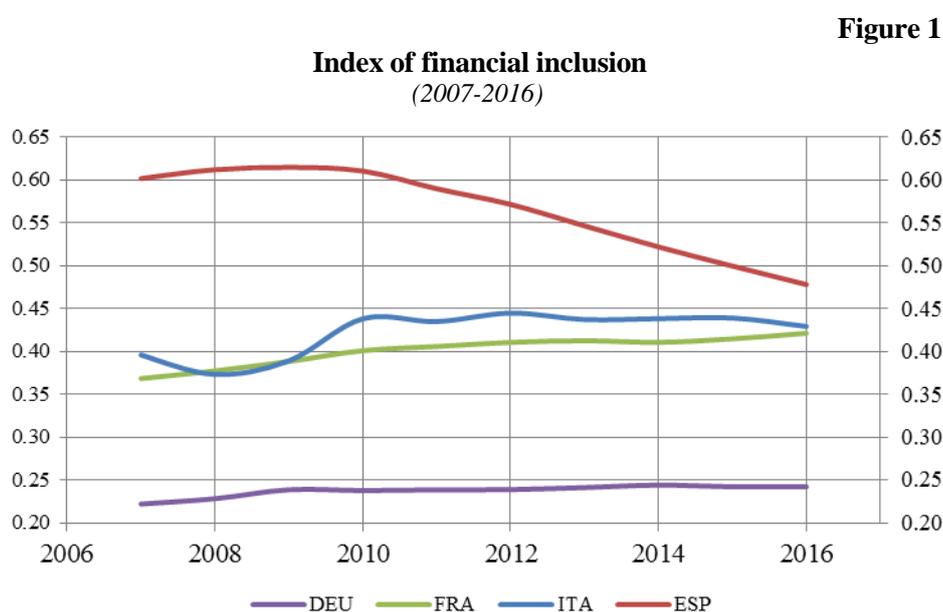
$$Y^{(1)} = a_1 D_1 + a_2 D_2 + \dots + a_k D_k \tag{3}$$

represents the linear combination that projects the k -dimensional variables D in a one-dimensional space maximizing the variance of Y . Among the multiple possible solutions of the maximization problem, coefficients $a = (a_1, a_2, \dots, a_k)$ are chosen to satisfy the normalization constraint $a' a = a_1^2 + a_2^2 + \dots + a_k^2 = 1$. We set $w_i = a_i^2$ so that our weights: a) represent the contribution of each specific dimension to the variance of the projection of the set D in a one-dimensional space; b) satisfy $0 \leq w_i \leq 1$ for all i ; c) are already normalized in that they sum up to 1 ($\sum_{i=1}^k w_i = w_1 + w_2 + \dots + w_k = 1$).

For each variable, the maximum value to be imputed in (1) has been set equal to the maximum historical value of each variable in the FAS, Findex and Euro area payment statistics databases considering only the 19 euro area countries. The minimum value for all variables has been set equal to zero.

4.1 Usual dimensions of financial inclusion

In this paragraph we illustrate and discuss the financial inclusion indexes computed by considering the variables from 1) to 6) listed above, that are the variables usually utilized when measuring financial inclusion. Figure 1 plots the indicators in the decade 2007-2016 and presents Spain as the country with the highest values of financial inclusion, ranging from 0.60 in 2007 to 0.48 in 2016. Conversely, Germany is the country with the lowest values of financial inclusion, ranging stably from 0.22 in 2007 to 0.24 in 2016, exactly the half of the value of Spain in that year.



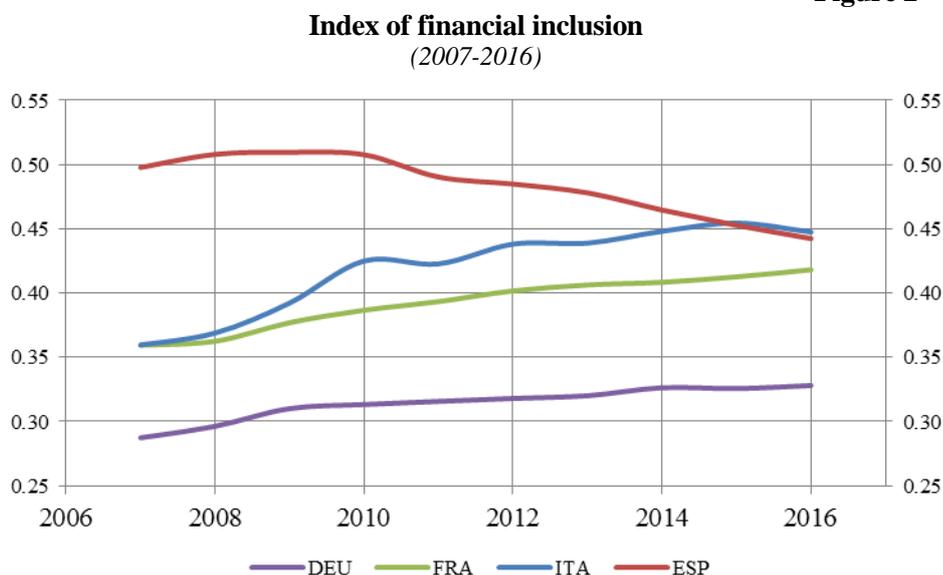
Source: computations on data taken from IFM Financial Access Indicators and World Bank Global Findex database. The list of the variables used to compute the indicators includes: branches per 100,000 adults, ATMs per 1,000 Km², percentage of adults with an account, deposits over GDP, percentage of adults that borrowed from a financial institution, loans over GDP.

Analyzing in detail the sub-indexes of each variable given by (1), it is evident that this result is almost entirely driven by the behavior of the ratio of loans over GDP: while in Spain the ratio was 134 over the period 2007-2016, in Germany the average value was 38. In this respect, credit booms such as the one observed in Spain during the years 2005-2009 - with the loan to GDP ratio remaining at high levels up to 2012 (Akin et al., 2014; Estrada and Saurina, 2016) - should not be seen as a driver of financial inclusion; we basically agree with Beck (2016), who underlines how the total amount of credit can be rather considered as a measure

of “financial depth” - the amount of resources available in the economic system – and not a measure of financial inclusion. We also share Beck et al.’s (2018) view, for which the enhancement in the state of financial inclusion depends more on the ability of individual’s to access saving practices rather than access credit. We therefore decide to drop all the variables associated to credit (the extensive margin – measured by loans over GDP - and the intensive margin proxied by the percentage of adults that borrowed from a financial institution).

Figure 2 shows the indexes computed by considering only ATMs, branches, the volume of deposits and the percentage of depositors. Also in this new picture Spain presents the highest values of financial inclusion in our sample, going from 0.50 in 2007 to 0.44 in 2016. Germany has the lowest values ranging from 0.29 in 2007 to 0.33 in 2016. In this case, what mainly determines these results is the variable “number of branches”; with respect to Germany, Spain has very high values of the number of branches per 100,000 adult persons. While in Spain the number of branches per 100,000 adults was on average 100.42 over the period 2007-2016, in Germany the average value was 34.62 in the same period.

Figure 2



Source: computations on data taken from IFM Financial Access Indicators and World Bank Global Findex database. The list of the variables used to compute the indicators includes: branches per 100,000 adults, ATMs per 1,000 Km², percentage of adults with an account, deposits over GDP.

Like for the credit variables, we can provide arguments against the suitability of the

number of branches per 100,000 adults as a good measure of financial inclusion. First of all, we observe a different average size of bank branches in our sample; while in Italy – for instance - bank branches tend to be big-sized with a full operation covering many banking and financial services, Spain geographical banking structure consists of a large amount of small branches characterized by reduced operation in terms of services.¹⁴ Therefore, in countries like Spain the number of branches is structurally higher than in countries like Italy.

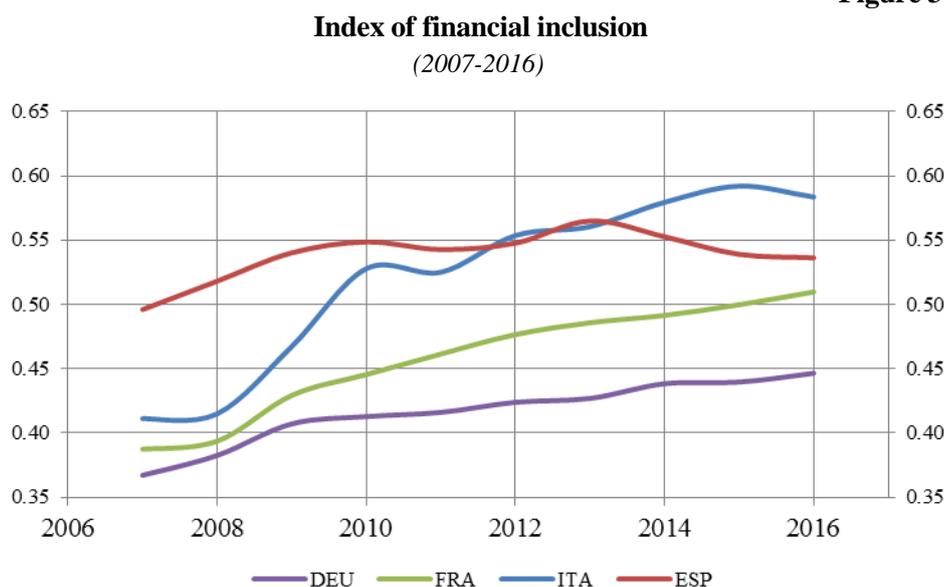
Secondly, we have to consider that during the recent years and especially in advanced economies, we are observing a massive reduction of the number of bank branches, whose operation has been progressively replaced by the services provided by the internet home banking.¹⁵ The latter consideration leads to the conclusion that, at least for the most recent years, we should consider the number of home banking accounts instead of the number of branches as a measure of financial inclusion. Series on this phenomenon are collected by the Findex initiative¹⁶, but unfortunately only since the last wave and therefore they are not included in our dataset. These considerations suggest, however, that the number of branches cannot be considered a representative variable of financial inclusion.

If we drop the number of branches in the indexes, we obtain a more homogeneous picture in terms of financial inclusion disparities between the four countries, as shown in Figure 3. Spain is no longer the country with the highest values of financial inclusion during the entire period, but it is overtaken by Italy from 2012. France, Germany and Italy start from very near values of the financial index in 2007, to end up with higher values of the index at the end of the sample period. Despite significant changes occurring in the behavior of the index along the path from Figure 1 to Figure 3, the last version of the index still shows a picture that, in our opinion, might well be considered as poorly representative of the comparative state of financial inclusion in the four economies.

¹⁴ The structural small size of Spanish bank branches is confirmed by ECB Banking Structural financial indicators statistics, for which in 2017 in Spain the ratio between the number of employees of domestic credit institutions and the number of domestic branches was 6.66 versus 10.27 employees per branches in Italy. In 2013 the ratios were 6.40 in Spain and 9.65 in Italy. See ECB, “Structural Indicators for the EU Banking Sector”, May 2018.

¹⁵ On the relationship between the increase of online banking services and the reduction of bank branches in Italy see Carmignani et al. (2018).

¹⁶ The information collected is “*the use of a mobile phone or the internet to access a financial institution account in the past year*”.

Figure 3

Source: computations on data taken from IFM Financial Access Indicators and World Bank Global Findex database. The list of the variables used to compute the indicators includes: ATMs per 1,000 Km², percentage of adults with an account, deposits over GDP.

4.2 Including electronic cards in the financial inclusion index

So far we presented indexes that take into account the variables most commonly used in the academic literature to come up with synthetic measures of financial inclusion. We have gradually eliminated the variables that in our opinion misrepresent the dimensions in which financial inclusion should be properly represented and we have ended up with a version of the financial inclusion index that embodies a limited number of variables and shows an ascending path over time for the four main European countries (see Table 2). We now include two new variables – the number of debit and prepaid cards per capita - that are not usually considered when financial inclusion is measured but we think they can provide important information on the phenomenon we are studying.

The rationale to introduce electronic cards in financial inclusion analysis is fourfold: first, electronic cards are the principal instrument in digital payments; their nature to be prepaid instruments offers to the more prudent clients the possibility of safer payments (limiting the risk to the maximum charged in the card). These more prudent clients could be those less confident in financial institutions, thus potentially more affected by financial self-exclusion.

Table 2

List of the variables used in the indicators plotted in Figure 1-4

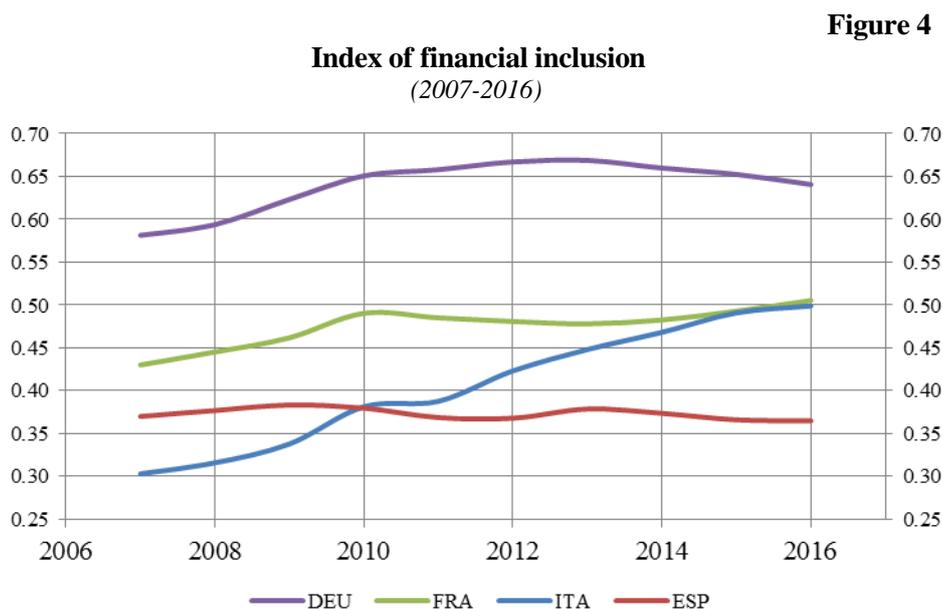
Figure 1	Figure 2	Figure 3	Figure 4
Outstanding amount of bank loans in percentage of GDP;	Outstanding amount of bank loans in percentage of GDP;	Outstanding amount of bank loans in percentage of GDP;	Outstanding amount of bank loans in percentage of GDP;
Percentage share of adults that borrowed from a financial institution;	Percentage share of adults that borrowed from a financial institution;	Percentage share of adults that borrowed from a financial institution;	Percentage share of adults that borrowed from a financial institution;
Number of bank branches per 100,000 adults;			
Number of ATMs per 1,000 Km ² ;	Number of ATMs per 1,000 Km ² ;	Number of ATMs per 1,000 Km ² ;	Number of ATMs per 1,000 Km ² ;
Percentage share of adults having an account;			
Outstanding amount of bank deposits in percentage of GDP.	Outstanding amount of bank deposits in percentage of GDP.	Outstanding amount of bank deposits in percentage of GDP.	Outstanding amount of bank deposits in percentage of GDP;
			<i>Number of debit cards issued scaled to the population;</i>
			<i>Number of prepaid cards issued scaled to the population.</i>

Secondly, the prepaid nature of these electronic instruments often provide access for financially excluded individuals because of their lower fees and lower customer due diligence requirements. Thirdly, debit cards have an increasing role in replacing accounts in financial institutions. There is an increased diffusion of prepaid cards with International Bank Account Number (IBAN) that allow people to receive and make periodic payments (i.e. bills).¹⁷ Fourthly, electronic cards allow economic transactions across larger markets

¹⁷ In Italy, along with an increasing share of population being electronic cardholders, we observe an increasing share of population that is replacing current accounts with prepaid cards. Using data from Bank of Italy's "Survey on Household Income and Wealth" (Banca d'Italia, 2018), based on a sample of around 8,000 households (20,000 individuals) in each wave, we obtain that the share of population having a prepaid cards while not having an account with a bank or a post office institution constantly increased during the last

and wider geographic areas with benefits in terms of financial inclusiveness of individuals.

Figure 4 plots the index that includes data on electronic cards ownership. The new picture shows Germany as the country with the best performance in terms of financial inclusion over the whole sample period, with its index increasing from 0.58 in 2007 to 0.64 in 2016. Italy - the worst country in 2007 – shows a substantial development during the period, overtaking Spain and almost reaching France in 2016 (the index in that year is 0.50 for Italy and 0.51 for France). Once again, the index proved to be highly sensitive to the indicators selection: as it is evident in Figure 4, the introduction of new variables that capture additional aspects changes considerably the picture with respect to what is generally represented by the usual measures of financial inclusion. Nonetheless, we think that the picture illustrated in Figure 4 can be considered more representative of the comparative state of financial inclusion across the main European countries.



Source: computations on data taken from IFM Financial Access Indicators, World Bank Global Findex database and ECB Euro area payment statistics. The list of the variables used to compute the indicators includes: ATMs per 1,000 Km², percentage of adults with an account, deposits over GDP, debit cards and prepaid cards.

decade: it was 0.2 per cent in 2008 and 2010, 0.7 per cent in 2012, 0.9 per cent in 2014 and 1.4 per cent of the overall population in 2016. The latter share is higher for people living in the south of Italy and for households with an education level lower than the university degree (2 and 1.6 per cent respectively). If we consider just the population that do not have a current account, the share of people holding a prepaid cards increased from the 1.5 per cent in 2008 to the 11.5 per cent in 2016.

5. Measuring intra-national inequalities and multidimensional deprivations

Two key problems regarding country-level synthetic measures of financial inclusion are their inadequacy in identifying specific sub-groups of population that need easier access to financial services, and the necessity to complement synthetic indexes with distribution and concentration measures able to quantify the degree of multidimensional deprivation, i.e. the cumulative disadvantages due to the exclusion of individuals from *some* or the *whole set* of financial products (alternatively, the increasing contribution originating from the use of a set of complementary or substituting financial products).

Among the data sources we have considered, only Findex database allows us to disaggregate indicators of financial inclusion by key demographic characteristics such as gender, age, education, income, and rural residence. Moreover, the availability of individual Findex data allows us to compute deprivation scores that take into account all the dimensions for which an individual fails to achieve a minimum standard, overcoming in this way the shortcomings deriving from the use of aggregate or per-capita statistics.

In this paragraph we firstly propose an exercise that measures the “financial inclusion gap” between specific sub-groups of population and the overall population. We focus on two key aspects of financial inclusion: the share of adult population (*POP*) having a bank or postal account (*%ACC*) and the degree of diffusion of debit cards (*%DEBC*).

The first two columns of Table 3 illustrate the statistics provided by Findex data. In terms of diffusion of debit cards (*%DEBC_{POP}*), the four countries show generally a lower performance with respect to the diffusion of accounts (*%ACC_{POP}*). Germany is the country with the highest share of population having an account during the entire period. In France and Spain, the share of adult population with an account was lower in 2017 than in 2014. Concerning the ownership of debit cards, France is the country with the highest percentage in 2011 and 2017, whereas Germany shows the highest value in 2014. Among the four countries, Italy is the only one that shows a stable increase in both the variables. Starting from very low values – especially in the ownership of debit cards - in 2011 (35 per cent of the adult population) – Italy experienced a massive increase in the ratios, reaching in 2017

levels similar to the other main euro area countries.

The gap measure is computed for the specific categories of population that potentially may have more difficulties in accessing financial services¹⁸: females (*F*), people with primary education or less (*E*), people with lower income - less than 40% of the average income - (*P*), and people living in rural areas (*R*).¹⁹ For each country we compute the following measures:

$$\%F_{GAP} = ((\%ACC_F/\%ACC_{POP}) + (\%DEBC_F/\%DEBC_{POP})) \times 1/2 \quad (4)$$

$$\%E_{GAP} = ((\%ACC_E/\%ACC_{POP}) + (\%DEBC_E/\%DEBC_{POP})) \times 1/2 \quad (5)$$

$$\%P_{GAP} = ((\%ACC_P/\%ACC_{POP}) + (\%DEBC_P/\%DEBC_{POP})) \times 1/2 \quad (6)$$

$$\%R_{GAP} = ((\%ACC_R/\%ACC_{POP}) + (\%DEBC_R/\%DEBC_{POP})) \times 1/2 \quad (7)$$

Table 3 shows the computed indicators. Concerning the specific sub-segments of (potentially) disadvantaged people, the less educated people have a greater gap with respect to the overall adult population²⁰ than females and poor people in Germany, Spain and France. On the contrary in Italy the segment farther from the average is that of poor people²¹, but their gap has been reducing over time. Finally, people living in rural areas do not show a significant gap in holding an account or a debit card in all the four main euro area countries.

¹⁸ Among the potentially disadvantaged segments in terms of financial inclusion, it would have been interesting to consider the immigrant population (see Osili and Paulson, 2006 for the US). Unfortunately, Findex survey does not provide data about this group.

¹⁹ For a study on the preferred methods of payments by different sub-groups of population across the European countries see Esselink and Hernandez (2017).

²⁰ Also for the US, Osili and Paulson (2006) show that education is an important factor in affecting financial inclusion for disadvantaged segments. In particular, they show that the US the immigrants that are more educated and that come from countries with more effective institutions are more likely to make use of basic banking services and to use formal financial markets and services more extensively.

²¹ Banca Etica analysis (2018) confirms the positive correlation in the Italian provinces between financial exclusion and poverty as well as low level of education.

Table 3

Shares of population with an account and with a debit card and ratios of potentially disadvantaged segments to adult population according to financial inclusion measures

Country	year	%ACC_{POP}	%DEBC_{POP}	%F_{GAP}	%E_{GAP}	%P_{GAP}	%R_{GAP}
Germany	2011	0.98	0.88	1.00	0.97	1.00	
Germany	2014	0.99	0.92	1.01	0.93	0.96	1.00
Germany	2017	0.99	0.91	1.00	0.86	0.97	1.01
France	2011	0.97	0.99	1.03	0.93	1.01	1.02
France	2014	0.97	0.88	0.98	0.82	0.94	1.00
France	2017	0.94	0.92	0.98	0.82	0.99	1.01
Italy	2011	0.71	0.35	0.86	0.84	0.83	1.09
Italy	2014	0.87	0.64	0.90	0.82	0.86	0.98
Italy	2017	0.94	0.85	0.95	0.98	0.93	1.01
Spain	2011	0.93	0.62	0.94	0.73	0.90	0.94
Spain	2014	0.98	0.83	0.98	0.91	0.96	1.00
Spain	2017	0.94	0.85	0.96	0.93	0.97	1.01

Source: computations on data taken from World Bank Global Findex database.

Moreover, since the individual financial inclusiveness may suffer from the accumulation of multiple deprivations, it is also important to consider the joint distribution of financial deprivations at the individual level. Therefore, we run an additional exercise using individual Findex survey data to compute deprivation distribution measures (see Aaberge and Brandolini, 2015 and Atkinson, 2003).

In particular, let us assume that individuals may suffer from deprivation in n different dimensions, and let X_i be equal to 1 if an individual suffers from deprivation in the dimension i and 0 otherwise. Let us also assume that the random discrete variable

$$X = \sum_{i=1}^n X_i \quad (8)$$

has cumulative distribution function F . Therefore, if we define $q_k = P(X = k)$, we can name

$$F(k) = \sum_{j=0}^k q_j, \quad k = 0, 1, \dots, n \quad (9)$$

the *deprivation count distribution*, that gives for each $k = 0, 1, \dots, n$ the proportion of persons who don't suffer simultaneously from the first k deprivations. It follows that, if we define $F_{c_1}(k)$ and $F_{c_2}(k)$ as the cumulative count distributions of, respectively, country c_1 and c_2 , then, if we have

$$F_{c_1}(k) \geq F_{c_2}(k) \quad (10)$$

for all or some k , then we say that distribution $F_{c_1}(k)$ dominates $F_{c_2}(k)$. It means that in country c_1 we observe a higher proportion of population with less joint deprivations for that dimensions.

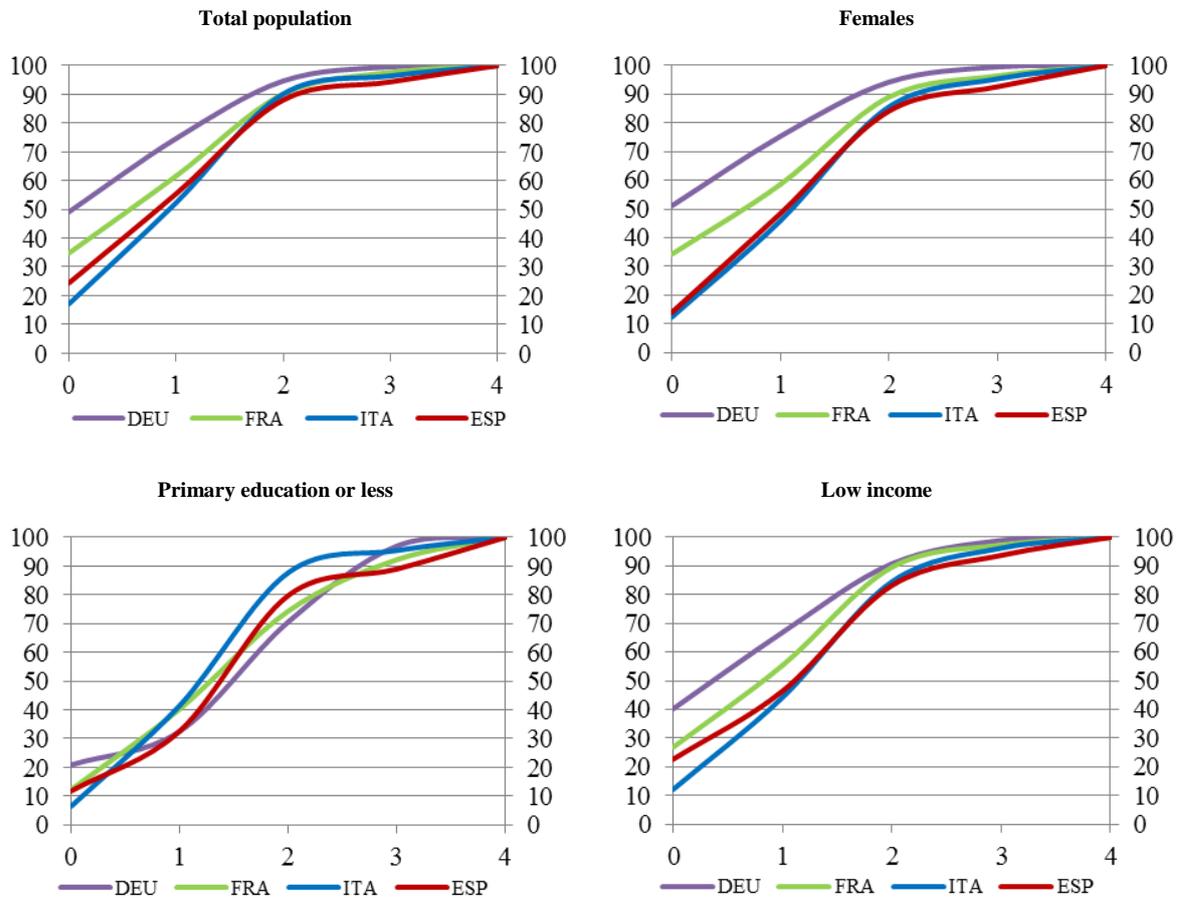
We exploit Findex individual data to compute the indicators for the overall population and the sub-segments that turned out to be more potentially disadvantaged based on the previous analysis (females, people with low education and people with low income; Table 3). We considered four dimension of deprivation that, in our opinion, can be considered as representative of an increasing degree of inclusiveness and awareness about the financial services: the ownership of an account, the ownership of a debit card, the use of the internet to access an account (proxying online banking services) and the use of the internet to make payments, that we use as a proxy for the ownership of a pre-paid card (given the diffusion of the use of pre-paid cards for on-line payments; direct data on pre-paid cards are not available in Findex) .

Figure 5 illustrates the deprivation count distributions for the main European countries in 2017²²; Germany, followed by France, shows a *dominant* distribution– i.e. a higher percentage of individuals with less *joint* deprivations – for all the samples except for that of people with low levels of education.

²² The analysis is performed using only the 2017 wave of Findex since two dimensions, the use of the internet to access an account and the use of the internet to make payments, are not present in the previous Findex waves.

Figure 5

Deprivation count distributions
(2017; cumulative percentage of total population)



Source: computations on individual data taken from the World Bank Global Findex database. On the horizontal axis it is shown the number of deprivations considering the following four dimensions: the ownership of an account, the ownership of a debit card, the use of the internet to access an account and the use of the internet to make payments.

Considering the overall population, the segment of females and that of people with low levels of income, Italy's cumulative distribution starts lower than that of Spain, but then intersects and becomes higher; this indicates that, while there is a higher probability to have zero (or just one) deprivations in Spain, in Italy we observe a lower probability to have a higher number of simultaneous joint deprivations than in Spain.

Finally, coherently with the previous analysis, Figure 5 confirms that education seems to matter more in countries like Germany, France and Spain, while in Italy the variable that seems to affect more the differences in the degree of financial inclusion across individuals is the (low) level of income.

6. Data quality issues and challenges for statisticians

So far we have discussed measures of financial inclusion making a comparison of the four main euro area countries in the last decade. We have tried to avoid unconvincing specifications by getting rid of potentially misrepresenting variables of financial inclusion and we have shown differences among sub-groups of population in accessing financial services. However, available information is far from ideal; in this paragraph, we discuss potential improvements of statistical information on financial inclusion in the main euro area countries.

Data on financial inclusion are basically of two kinds: administrative sources (such as FAS data and ECB data on payment systems) and survey data (i.e. Findex). Any approach that aims at increasing comparability and introducing validity checks between administrative and survey data would be crucial in order to: a) check whether administrative data are able to cover all the providers of financial services (i.e. also those outside the traditional banking system, like post-offices); b) confirm the validity of estimates of survey data often based on very small samples.

Administrative data usually do not provide information on sub-categories of population. While information on social conditions of clients (income, type of work) is very difficult to collect and codify, other information – such as gender, residency and economic activity of the counterpart - could be less costly to collect from reporting agents. FAS data collection presents some details for counterparts of the financial inclusion variables (gender, residency, sector), but most of the countries are not actually able to comply with these data requests.

Findex survey allows detailed analysis of variation in financial inclusion across different groups of population at international level. In more recent waves Findex has introduced questions on the role of new technologies and payment systems in financial inclusion. However, we currently do not have time series long enough to analyse time variation on these aspects. There are potentially alternative sources at the euro area level, the Eurosystem's Household Finance and Consumption Survey (HFCS), which collects household-level data on households' financial decisions and consumption and contains information on the availability and the median dimension of deposit accounts, and the EU

statistics on income and living conditions (EU-SILC), that annually collects comparative statistics on income distribution and social inclusion in the European Union. The main reason for which we have used Findex data is due to the limited number of available waves of HFCS (2013 and 2016), even if HFCS would be preferable given the larger sample size and micro-data availability. On the other hand, EU-SILC, formally launched in 2004, collected data on financial inclusion aspects (bank account and credit card ownership) only once in 2008 for an ad-hoc module.²³ As for survey data, Bank of Italy's Survey of Household Income and Wealth (SHIW) is a very rich source of information on the diffusion of accounts and payment instruments (containing also a question on prepaid cards since 2004) and on the diffusion of home and trade banking. Not all this information is published in the tables of survey results. In addition, SHIW and EU-SILC lack to cover new interesting areas of payments, such as mobile money.

In what follows we consider specific proposal to enhance statistics on financial inclusion.

- a) It would be very useful to have data on prepaid cards with IBAN, since they are a potential alternative to bank accounts. Information contained in SHIW on the share of people having a prepaid card while not having an account, also for specific sub-groups of populations, could be disseminated. Data on the diffusion of pre-paid cards could be introduced in Findex.
- b) Regarding mobile money, we do not have yet information at both national and harmonized Eurosystem level for what in FAS is defined as the "*e-money that is stored on a SIM-card and can be accessed via a mobile phone. These e-money services are provided by a tele-communication company or other entity that partner with mobile operators that offer these services through agents independent of the traditional banking network*". The transposition into national laws of the revised EU Payment Services Directive (PSD2) in 2018 foresee that, starting from 2019, Central Banks will collect from telephone companies data on mobile money payments. Nonetheless, it would be useful that surveys (HFCS, EU-SILC and SHIW), as well as statistical institutions (Istat,

²³https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Overindebtedness_and_financial_exclusion_statistics&oldid=220617.

Eurostat, etc.), could collect information on this phenomenon²⁴, overcoming the issues related to the scarce level of socio-demographic details provided by administrative data.

- c) Administrative data on deposit accounts and on the use of debit and prepaid cards could be enriched asking reporting agents to specify some (easily available) characteristics (such as gender, economic activity and residence) of the counterparts. It could be considered whether these requirements could be introduced in the Eurosystem payment statistics Regulation.²⁵

7. Conclusions

During the last years financial inclusion has increasingly become a policy target in many countries. Since it has been considered an important part of the policy agenda, properly measuring financial inclusion has become critical. Given that financial inclusion is a fairly new topic in economic literature, there is still debate on how to properly measure the phenomenon, in particular *what* dimensions to consider and *how* to represent them. Usual indexes of financial inclusion generally fail in two directions: on the one hand they can misrepresent some aspects of financial inclusion by choosing inappropriate variables (for instance the amount of loans granted from the financial system or the percentage of borrowers in the economy); on the other hand usual measures of financial inclusion can disregard relevant aspects. In this work we focus on the role and diffusion of electronic cards, that are generally not included in the usual indexes of financial inclusion. The diffusion of electronic cards is crucial for financial inclusion, since they provide alternatives to usual saving practices by allowing to receive payments and store money and allowing less costly economic transactions across larger markets and wider geographic areas. We show that, taking these aspects into account, the comparative valuation of the degree of financial inclusion among the countries of our sample changes significantly. Germany is the country with the best performance in terms of financial inclusion over the whole sample period, while Italy, the worst country in 2007, shows a substantial improvement during the period,

²⁴ In Findex survey a question on the diffusion of mobile money accounts has been introduced in the 2017 wave, but the answer is missing for the main euro area countries.

²⁵ In particular, as an additional attribute of the information collected on the number of overnight deposits and on the number of debit and prepaid cards.

overtaking Spain and reaching France in 2016.

We also use Findex survey data disaggregated by key demographic characteristics - such as gender, age, education, income, and rural residence - to compute a measure of “financial inclusion gap” between specific sub-groups of (potentially) disadvantaged segments of population and the overall population. Among the various sub-groups, it turns out that the less educated people have the greater gap with respect to the overall adult population; this suggests that (financial) literacy may be a key aspect in determining the degree of financial inclusion in a given country.

The availability of individual Findex data allow us to compute multidimensional deprivation distribution measures that overcome shortcomings deriving from using aggregate or per-capita statistics. Considering the overall population, the segment of females and that of people with low level of income, Germany – followed by France – is the country that performs better, since we observe a higher percentage of individuals that do not jointly show one or more deprivations simultaneously. Differently from Germany, France and Spain, in Italy the level of education counts less than the level of income in influencing the level of multidimensional deprivations.

While administrative data provided by authorities do not include information on the demographic or social characteristics of the counterparts, survey data are not provided continuously in time and cannot be fully reliable due to the small size of some samples, especially for sub-groups of population. In the near future, in order to enhance the information on the topic, it would be useful to collect through administrative data the characteristics (gender, economic activity and residence) of the counterparts, and that Central Banks and surveys collect European-harmonized data on mobile money accounts and on the characteristics of the prepaid cards, especially those with IBAN, since they are increasingly figuring out as a potential alternative to bank accounts.

Further research on financial inclusion will have to deal with the role of financial literacy. We are aware that financial exclusion could be due to self-exclusion, and that what really matters is the correct choice and use of financial instruments by economic agents. Financial inclusion should not be a goal per se, but only to the extent it enables “financially included” individuals to “properly” participate to modern market economies.

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Appendix

Table 1

Summary statistics of the variables by country (2007-2016)

Country		BRANCHES	ATMs	EXT_DEP	INT_DEP	EXT_LOA	INT_LOA	DEB_CARD	PRE_CARD
Germany	Mean	34.62	234.98	56.44	42.33	15.07	38.05	1.23	1.04
	St. Dev.	3.45	10.43	0.72	4.48	2.96	0.78	0.08	0.16
	Min	28.95	217.27	55.90	35.74	12.54	37.29	1.08	1.77
	Max	41.61	248.55	57.90	48.33	19.25	39.54	0.77	1.22
France	Mean	69.52	100.68	50.16	65.89	17.55	72.13	1.02	0.35
	St. Dev.	6.20	7.35	0.96	9.41	1.31	7.26	0.11	0.17
	Min	51.36	87.32	49.43	51.51	15.11	56.30	0.84	0.04
	Max	75.36	107.06	52.16	78.94	18.64	78.07	1.22	0.57
Italy	Mean	64.84	160.10	24.02	68.63	8.41	83.96	0.64	0.22
	St. Dev.	4.23	19.40	10.44	15.13	4.55	6.78	0.11	0.14
	Min	57.10	124.99	15.47	50.69	4.58	71.84	0.51	0.02
	Max	71.57	184.57	41.50	88.47	15.30	92.27	0.88	0.43
Spain	Mean	100.42	109.49	40.55	81.25	14.09	134.33	0.66	0.09
	St. Dev.	15.91	11.68	6.50	8.92	3.11	21.62	0.06	0.05
	Min	72.93	89.36	35.04	65.32	11.43	102.17	0.57	0.01
	Max	117.22	123.18	49.93	92.34	18.23	159.67	0.76	0.18

Source: computations on data taken from IFM Financial Access Indicators, World Bank Global Findex database and ECB euro area payment statistics.