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Detection of Financial Inclusion Vulnerable Rural Areas through an Access to Cash Index: Solutions Based on the Pharmacy Network and a CBDC. Evidence Based on Ávila (Spain)

Sergio Luis Náñez Alonso * , **Javier Jorge-Vazquez** and **Ricardo Francisco Reier Forradellas**

Department of Economics-DEKIS Research Group, Catholic University of Ávila, Canteros St., 05005 Ávila, Spain; Javier.jorge@ucavila.es (J.J.-V.); ricardo.reier@ucavila.es (R.F.R.F.)

* Correspondence: sergio.nanez@ucavila.es

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Abstract: The ability to access quality financial services and cash has been indicated by various organizations, such as the World Bank or UN, as a fundamental aspect to guarantee regional sustainable development. However, access to cash is not always guaranteed, especially in rural regions. The present study is based in the Ávila region of Spain. A parameter called the "*access to cash index*" is constructed here. It is used to detect rural areas where the ability to access cash and banking services is more difficult. Based on the "*access to cash index*", two sustainable solutions are proposed: The first (in the short term), based on extending access to cash, takes advantage of the existing pharmacy network. With this measure, a notable reduction of more than 55% of the average distance required to access this service is verified here. The second is based on the implementation of a central bank digital currency. Here, the results show an acceptance of 75%. However, it is known that elderly people and those without relevant education and/or low incomes would reject its widespread use. Such a circumstance would require the development of training and information policies on the safety and effectiveness of this type of currency.

Keywords: financial inclusion; vulnerable rural areas; sustainable solutions; central bank digital currency; social sustainability; pharmacy network; sustainable development; sustainable access to cash

1. Introduction

In recent years, the fight against corruption and tax avoidance has been one of the most recurring pillars of the reformist agendas of most developed countries. A measure that has recently become popular to combat the shadow economy and minimize tax fraud has been the progressive elimination of cash payments. Recently, the Spanish government presented a non-law proposal for the "*gradual elimination of cash payment, with the horizon of its final disappearance*" in the bulletin of the Congress of Deputies [1]. However, the European Central Bank (ECB) quickly stepped up to remind the Spanish government that "*ending cash could be a problem when there are failures in the underlying technical infrastructures used by payment service providers*" and that "*cash is appreciated as a payment instrument because it is accepted by all, fast and facilitates control over the payer's spending*" The ECB added a reminder: "*It is the only means of payment that allows citizens liquid and instant transactions without having to pay fees for their use*". Also, Article 127 of the Treaty on the Functioning of the European Union [2] includes in its second section that it is the basic function of the European System of Central Banks (ESCB) "*to define and execute the monetary policy of the Union [. . .] and promote the proper functioning of payment systems*". The destruction of jobs in the financial sector and the massive number of bank branch closures have

increased the number of people without a bank branch in their municipality by 20%, a form of financial exclusion that affects 1.13 million Spaniards in rural areas. The wave of mergers between financial institutions, which could extend to credit cooperatives, has led to the networks of offices in rural areas focusing on other activities. Likewise, the progressive digitization of the banking sector has multiplied the effects of the existing digital divide between urban and rural areas, also contributing to financial exclusion [3].

Furthermore, according to [4], Castile and León is the Spanish region that is most affected by financial exclusion, since 16% of the population (392,003 people) there does not have access to a bank branch in their municipality. Exclusion is even more pronounced in the provinces of Zamora, Segovia, and Ávila, where more than one-fifth of the inhabitants must move outside their locality to access a bank branch. In these three provinces, 29%, 37%, and 40% of bank branches were closed, respectively, between 2008 and 2017.

As can be observed in Figure 1, Ávila has a population density of 19.9 inhabitants per square kilometer. This is much lower than the European average (108 inhabitants per square kilometer) and that of the Spanish average, which is 93 inhabitants per square kilometer [5]. Ávila, together with Teruel and Huesca (Aragon), Cuenca and Guadalajara (Castilla La Mancha), and Segovia, Soria Palencia, and Zamora (Castile and León) are the provinces with the lowest population density. This implies a greater dispersion of the resident population and therefore greater difficulty in accessing banking services. This was deduced considering the data previously provided for bank closures. This is the reason that the authors have chosen Ávila: It is a largely rural region in a developed country and has a low population density, with obvious difficulties in accessing banking services. Figures A1 and A2 in Appendix A show European regions that present a population density like those analyzed in our study region. On the one hand, Alentejo in Portugal, as well as Beira Baixa, stand out in southern Europe. In the case of France, the areas of the Alps, Lózere, and Creuse stand out. In Austria, Osttirol, Lungau, and Liezen have a similar population density to the study region considered here. In Greece, the areas of Fokida and Evrytaria are also noteworthy. Regarding northern Europe, practically all of Finland, Sweden, and Norway have a similar population density to the studied region here. Additionally, Estonia, Latvia, and Lithuania are similar, and the Scottish Highlands and surrounding islands are also similar in terms of their population density [6].

Beyond the entailing legal difficulties of the implementation of the proposal considered here, i.e., the legal difficulties of the elimination of cash, the authors propose to analyze the possible effect that this measure would have in a Spanish province, namely, Ávila. To this end, the entailing problems of elimination of cash will be analyzed from the perspective of financial inclusion, moreover, taking into account, as argued in [7], that an inclusive financial system "*enhances efficiency and welfare by providing avenues for secure and safe saving practices and by facilitating a whole range of efficient financial services. Through efficient allocation of productive resources, an inclusive financial system increases investment, raises economic growth and promotes capital formation*".

A map is prepared here that collates the areas with the greatest difficulty of accessing cash in Ávila, so that it can be used by the relevant authorities. An access to cash index in the province is designed here. One of the ideas shown by the authors here is to improve access to cash using the existing extensive network of pharmacies in the region. This idea is similar to the use of start-ups in Ecuador between 2014 and 2019, which consisted of establishing "*transactional kiosks operating in remote and rural areas*" and "*the use of smartphones or tablets*". In the case of Ecuador, 31.5% of the population lives in rural areas. Only 42% of people living in rural areas have access to cash due to the lack of financial services in these areas [8]. Finally, via a questionnaire, the use of cash and the acceptance of a central bank digital currency (CBDC) as a means of payment to replace cash is analyzed here.
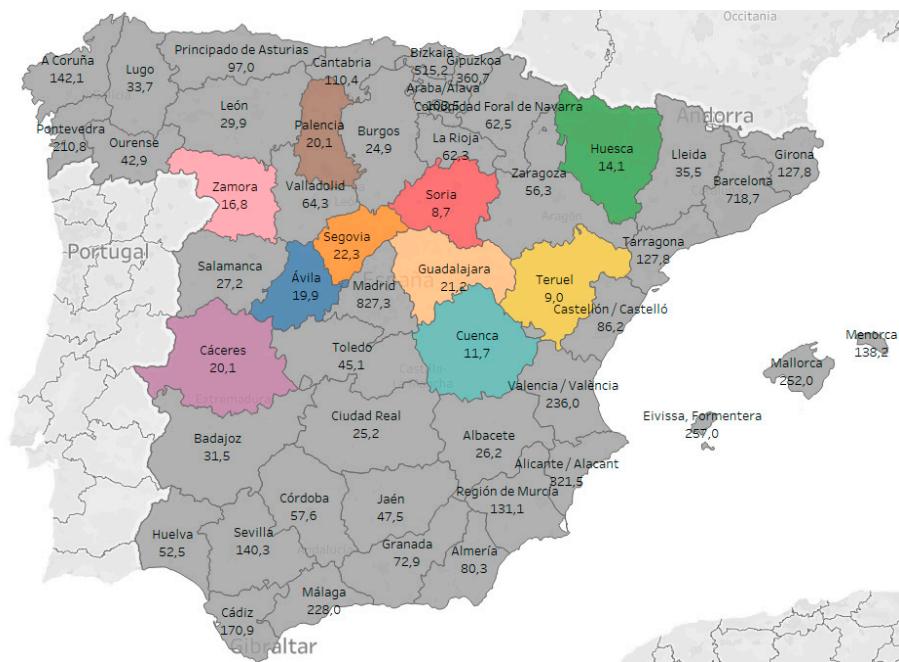
Figure 1. Population density (persons per square kilometer) in 2019 by Spanish province. Source: Author´s elaboration based on data from Eurostat and Tableau Desktop Professional Edition.

The article has the following structure: The advantages and disadvantages derived from the elimination of cash, financial inclusion, and the use of cash are considered. For the methodology here, the detection of vulnerable areas regarding access to cash is carried out. This methodology section includes data collection, analyses, and cash access maps. An access to cash index is established and the detection of vulnerable areas is thus carried out. A proposal for sustainable solutions to increase the access to cash index in vulnerable areas is suggested. An expansion of cashback points with the existing pharmacy network and the implementation of a CBDC to increase access to cash are both highlighted. Finally, the results and conclusions of this work are discussed.

2. Advantages and Disadvantages Derived from the Elimination of Cash

A first approach to the problem of financial inclusion unquestionably requires its definition. In general terms, financial inclusion implies the need to provide the entire population with access to adequate financial services at an affordable cost according to three criteria: Justice, transparency, and equity [9–11]. In fact, according to the World Bank, financial inclusion means "*access to useful and affordable financial products that meet the needs of people (transactions, payments, savings, credit and insurance) and is provided in a responsible and sustainable manner*" [12]. Furthermore, financial inclusion has been declared by the World Bank itself and the UN as a factor that will help achieve 7 of the 17 Sustainable Development Goals (SDGs) [13]. The work in [14] identifies five different ways in which the phenomenon of financial exclusion materializes: Access exclusion, condition exclusion, price exclusion, marketing exclusion, and self-exclusion. In the present work, attention will be mainly focused on the first dimension, that is, on the exclusion of certain segments of population from the financial system, mainly for reasons of distance or demographic dispersion. In this way, the use of cash is configured as a fundamental pillar of financial inclusion. According to [15], "*a cashless transaction refers to an economic setting whereby goods and services are transacted without cash*".

At this point, a broad set of advantages and disadvantages can be identified as results of eliminating the use of cash.

As the elimination of cash is appreciable, it brings with it a set of advantages and disadvantages that have been widely analyzed in the economic literature. Thus, [16] has affirmed that a society without

cash would pose a challenge for a central bank, where this challenge is related to financial stability. In turn, [17] has pointed out that this elimination of cash as a form of money would bring associated problems that may "*compromise privacy*" but also undoubted advantages, such as "*crime reduction*", pertaining to crimes related to money laundering or tax evasion, along with a possible lowering of taxes resulting from higher state collection. In [18], the transition costs of a society that changes from using cash to going without cash were analyzed, detecting that, depending on the type of transaction, cash was preferred over other means of payment.

In [19], it was argued that one of the advantages of eliminating cash would be a greater ease of applying monetary policy, as well as reducing the "*cost of using cash (estimated to be at least € 50 billion euros per year in the Euro system*"), but this also points out the exclusion of certain groups as a great disadvantage, as "*electronic money is a service usually connected to a bank account and the bank can and does exclude people from that service.*" In [20], it was pointed out that one of the advantages of implementing forms of payment other than cash is bringing advantages to areas where access to cash is difficult, especially if using contactless mobile or card payments; however, that can also pose problems for those people who do not handle this technology well. In [21] and [22], it was concluded that the main advantage of reducing or eliminating cash is the reduction in costs: "*During this decade, many banks have fostered cashless payment methods in the hope of reducing overall payment costs*". In [23], advantages derived from the elimination of cash were pointed out in their analysis, where one may "*tax the underground economy, promote business efficiency and cover up criminal or lobbyist activities*". In the investigations of [24–26], the main disadvantages of a cashless society were identified as "*user privacy problems*", as well as "*hacking problems*"; despite this, for these authors, the advantages were superior when noting that "*there are major social and economic benefits to a cashless society, such as reduction in cash related crimes and monetary benefits [. . .] cash is bulky and heavy to carry by the customer. A cashless solution, even a smart card, may well be smaller and lighter*".

In [27], the advantage that "*cashless payment might have a positive impact on economic activities*" was indicated, while [28] pointed out "*reduced policy control of the monetary system*" as a disadvantage of the reduction or elimination of the use of cash and also the possible security problems derived from "*cybercrime*". In [29], it was affirmed in their study that a cashless society can pose a problem when applying monetary policy by the central bank, as well as highlighting dangers derived from personal data protection. At this point in the analysis, we can therefore indicate that there is no doubt that cash "*is essential for the operation of a modern economy, but its nature has varied substantially over time*" [30]. According to [31], the elimination of cash brings some advantages, such as the following: "*Unlike traditional cash transactions, cashless payments discourage robbery and other cash related crimes*".

In the study by [32], the fall in the use of cash in two countries was analyzed, namely, Canada and Sweden. The authors concluded that "*cash does not play a significant role in monetary policy, and so its disappearance generally would have no material adverse effect on monetary policy*", but that "*the emergence of a cashless society could affect key concerns of a central bank, including seigniorage, monetary policy, payments and financial stability considerations*". Also, Ref. [33] has argued that electronic money brings about privacy problems for users. In [34], advantages of a cashless society were pointed out, including "*a great and rapid development of payment technology, a reduction of the shadow economy (with the consequent increase in revenue from the state), personal security by not having to carry cash "in your pocket"; and the reduction of crime*". However, the same author identified "*the financial exclusion of the poor and elderly), the difficulty of accessing banking services in rural areas, as well as the increase in cybercrime and the decrease in user privacy*" as the main disadvantages. Along these same lines, Ref. [35] pointed out that Swedish merchants continue to accept cash but that cash will have surely disappeared in favor of other means of payment by 2023. Additionally, the aforementioned study identified positive factors derived from cash elimination pertaining to crime reduction and technological development; however, as disadvantages, it pointed to the exclusion of certain groups, such as the elderly, the disabled, or immigrants. In the study carried out by [36], it was concluded that "*possible proposals that advocate the total elimination of cash in the eurozone should be carried out gradually and with strong public support for sectors of the population with lower levels*

of income and education", thus hinting at the disadvantage related to social inclusion. The European Central Bank issued a speech in February 2019 [37] (European Central Bank: *"The possibility of paying in cash is still very important for certain social sectors that, for various and legitimate reasons, prefer to use cash instead of other means of payment. It is widely accepted and fast and allows the payer to control their expenses. In addition, it is a means of payment that allows citizens to settle operations instantly, and the only means of payment in money from the central bank and at its nominal value that does not entail the legal possibility of charging a commission for its use. Also, paying in cash does not require a functional technical infrastructure and can always be used, which is very important in case of interruption of electronic payments"*. Available at: https://eurancla/legal-content/EN/TXT/PDF/?uri=CELEX:52019AB0004&from=ES), in which it highlighted all the advantages that cash payments currently represent, especially for certain groups. The work of [38] confirmed that the use of cryptocurrencies as a means of payment (instead of cash) can help to increase the collection of the state since the "*grey economy*" is reduced. In [39], their study analyzed the effects of a "*cashless*" society on corruption and related crimes, concluding that the elimination of cash helps to reduce this type of crime. The work carried out in [40] pointed in the same direction, i.e., that a decrease in the use of cash and an increase in digital means of payment, alluding to a central bank digital currency (CBDC), could bring about the disadvantage of an increase in cybercrime, as well as consequences that are adverse to financial stability; however, on the other hand, it would allow some advantages to be achieved; among them, a reduction in the shadow economy and greater collection of the state, technological development, and an increase in speed of the application of monetary policy by the central bank. In [41], it was recently indicated that "*central banks need to foster innovation to tackle current shortcomings in payments and ensure that households and businesses have access to a diverse set of safe and efficient payment methods*".

As found in [42], the disadvantages derived from dependence solely on technology, as well as the risk of hacking, can be corrected by public campaigns that "*enhance the adoption of mobile payment services*" and that "*service providers should focus on promoting the benefits.*" Another advantage derived from the elimination of cash was reinforced by [43], with "*empirical evidence supporting this claim: Credit and debit card payments are negatively related to VAT evasion*", where a CBDC would reinforce this situation and serve to increase collection from the state via taxes.

On the other hand, [44] pointed out that the elimination of cash can have a positive consequence, i.e., that "*eliminating cash leads to inefficient investments*"; however, they also pointed out that this would lead to certain social problems, such as the demand for illegal goods and their associated transactions, which would be carried out via more complex ways. However, the authors pointed out that "*the move towards a cashless society has, no doubt, its positive effects*". The position of these authors agrees with that maintained by [45], considering an Italian case that indicates that "*the cashless society is the right direction and it is not far from achievement. Italy, by heading towards it, can give a stimulus to the economy and finally align to the other European countries that are benefiting from cashless transactions*".

From this section, we can extract that, despite the advantages derived from the elimination of cash, there are other series of disadvantages that should not be ignored by governments and banking authorities; especially those related to financial inclusion. This article therefore contributes to continuing the open debate on whether to eliminate cash or not, and the corresponding effects are analyzed based on the current situation in an area of Spain where it is already difficult to access cash.

The advantages and disadvantages derived from the elimination of cash are summarized in Table 1.

Table 1. Advantages and disadvantages derived from the elimination of cash.

Advantages of Eliminating Cash	Disadvantages of Eliminating Cash
Greater ease of the central bank to apply monetary policy.	Absolute dependence on electronic means for payments: network outages, power outages etc.
Higher collection of the state, when "transactions" from the underground economy emerge.	Increase in inequality I: Exclusion of unprofitable clients for financial institutions.
Crime reduction: Money laundering crimes, tax evasion and other illegal activities such as drug or arms trafficking.	Increase in inequality II: Difficulty in making transactions on the part of the elderly, people with disabilities, poor people with problems accessing bank accounts, etc.
Technological innovation: new means of payment and official virtual currencies.	Privacy problems: access to data and customer transactions when everything is registered.
Greater physical security for businesses, avoiding robberies since they do not have cash on their premises.	Security problems: Hacking and theft of customer data.
Cost savings in issuing banknotes and coins.	Financial instability problems.

Source: Author´s elaboration.

3. Financial Inclusion and Use of Cash

As stated in [12], "*half of the world adult population (3.5 billion inhabitants) does not have a bank account in a financial institution*". The way in which financial inclusion has traditionally been measured has been through instruments such as a multidimensional index of financial inclusion (MIFI), which is a harmonized index of financial inclusion that is comparable between countries and for the same country when analyzing different periods. A MIFI evaluates the use, access, and quality of a country's financial services using 18 World Bank indicators [46]. These 18 indicators are grouped into three blocks or components. First, we find the use, which in turn presents three indicators: The existence of financial, savings, and credit products. This information is provided by the World Bank through the Global Findex database [47]. Second, the quality. This is based on four indicators, which are the following: Trust in the financial system, the cost of financial services, access points, and the required documentation. Finally, and thirdly, there is access. This indicator measures the number of personal service points (bank branches and the like) and access to services through machines such as automated teller machines (ATMs) and the like. This information is obtained from studies such as the "*International Monetary Fund's Financial Access Survey*" (FAS), provided by the International Monetary Fund. According to [48], access is measured with four indicators: (1) The number of ATMs per 100,000 adults, (2) the number of bank branches for those 100,000 adults, (3) the number of bank branches for each 1000 square meters, and (4) the number of ATMs per 1000 square meters. In our study, focused on Spain and more specifically on the province of Ávila, we have carried out measurement by carrying out a more complete study through an index of access to cash, which is an analysis method that goes beyond these indicators.

Beyond the Global Findex database and the International Monetary Fund's Financial Access Survey, numerous scientific-economic studies have already been carried out on access to banking services, especially for access to cash, and the effects of the elimination of cash on certain areas and groups. Most of them have focused on less developed countries.

In all the previous studies (see Table 2), it was highlighted that access to cash, both in physical and digital formats, is very important for citizens and merchants, and in general for the economy. However, in many of these investigations, it was highlighted that the path to a cashless society needs to be carefully studied. Specifically, avoiding the exclusion of particularly vulnerable population groups, such as the elderly, the young, or the poor. In the case of the elderly, this relates to their mobility limitations (difficulty in getting around and getting cash) or difficulty in managing digital applications (technological gap). In the case of young people, this pertains to them not being profitable customers for the bank when considering that they must operate or maintain a digital account but do not generate enough business for the bank. Regarding the poor, this exclusion pertains to restrictions on access to

financial channels and to the technological devices necessary to carry out transactions. Therefore, any policy that is taken regarding the elimination of cash and progress towards a "*cashless society*" must be made considering these factors.

Table 2. Studies on access to banking services and use/demand for cash.

Study	Country	Year	Author/s	Results/Conclusions
Comparative Analysis of the Changes in Cash Demand in Hungary.	Hungary	2020	[49]	*The realistic goal for Hungary should primarily be to decelerate the expansion, as experiences show that a nominal decrease in cash volume requires the long-term and concurrent existence of several factors.*
¿Es la Eurozona un área óptima para suprimir el efectivo? Un análisis sobre la inclusión financiera y el uso de efectivo.	Eurozone	2019	[36]	*Possible proposals that advocate the total elimination of cash in the Eurozone should be carried out gradually and with strong public support for sectors of the population with lower levels of income and education.*
The Acceptance Model toward Cashless Society in Thailand.	Thailand	2019	[50]	*The acceptance of the cashless society in Thailand is high, and the industry is encouraged to try to continue in this direction.*
Building a Cashless Society: The Swedish Route to the Future of Cash Payments	Sweden	2019	[35]	*consumers […] are seemingly more interested in using electronic services than cash. The laws and the system governing cash handling stimulate a reduction of cash. Demographics: Young people prefer electronic payments vs. elderly, who have a higher tendency to use cash. The alternatives to cash that are likely to become more attractive for consumers.*
A great leap of faith: The cashless agenda in Digital India	India	2019	[51]	*The author shows concern about the rapid expansion of electronic money and the effects it can have on society, beyond the economic analysis of inclusion and use.*
Influence of Cashless Society Socialization toward Trust Transaction Culture in Jakarta, Indonesia	Indonesia	2018	[52]	*People in Jakarta will not be too significant to trust the non-cash transaction system. It can be found that the heterogeneous Jakarta community with educational, occupational, and social levels is the factor determining the use of cash or not.*
Malaysia Towards Cashless Society.	Malaysia	2018	[53]	*Consumers these days trust more on the cashless transaction. A cashless society, with all its benefits and drawbacks, is undeniably maturing in Malaysia.*
Mobile money, cashless society and financial inclusion: case study on Somalia and Kenya.	Somalia and Kenya	2017	[54]	*The dissimilarity in the infrastructure, regulation, economic, social structure and political conditions can have great impact on the success and failure of the Mobile Money services. The success of mobile money operator means many unbanked people is reached, poor people get new financial service options and therefore their life will get better.*
A Coinless Society as a Bridge to a Cashless Society: A Korean Experiment. In *Cash in East Asia*	South Korea-east Asia	2017	[55]	*Korea is well equipped with cashless payments. Korea has a high potential to realize not only a coinless society but also a cashless society.*
Prospects of Nigeria's ICT Infrastructure for E-Commerce and Cashless Economy.	Nigeria	2016	[56]	*Cashless policy needs to be fully implemented while public-private sectors collaboration and partnership should be strengthened especially at the national level. Education should be inculcated in the school curriculum right from the primary education to the tertiary institutions in order to increase the knowledge base and develop human capacity of the economy.*
Mapping mobile money in Rwanda: The Mvisa project.	Rwanda	2016	[57]	*The goal of mVISA is to meet the needs of underserved and unbanked Rwandans by providing relevant, affordable and accessible financial services. It will allow clients to easily access their bank's account via their phone and encourage non- account holders mainly rural folks to become bankable. The general public needs to know where to find an mVisa agent who can pay real cash withdrawn or transferred from remote accounts.*

Source: Author´s elaboration based on referenced studies.

Methodology: Detection of Vulnerable Areas of Access to Cash

According to [48], access to cash is measured with four indicators: (1) The number of ATMs per 100,000 adults, (2) the number of bank branches per those 100,000 adults, (3) the number of bank branches per 1000 square meters, and (4) the number of ATMs per 1000 square meters. In the present study, the geographic scope of research is centered in the province of Ávila (Spain) as an example

of an aging province with a low population density. Data extraction was carried out based on the methodology described below. However, once the data were collected, the construction of a specific "*access to cash index*" was carried out based on the methodologies proposed by [58], applied to the case of South Wales (United Kingdom), by [59], applied in the city of Bristol (United Kingdom), and by [60], applied in Australia, and following some questions have been dealt with by considering the methodologies of [61], which was applied in Sweden, or [62], which was applied in Portugal. However, variations have been introduced to adapt the methodology to the particularities in which the banking and savings system operates in Spain.

The method used here will allow identification of areas where citizens have easy access to cash and areas where access is more difficult. This will outline the areas that public authorities should influence if they intend to reduce cash, and where they should focus their efforts on improving the financial inclusion of their citizens, based on the experience of the province of Ávila, using the indicator methodology of the International Monetary Fund to collect data, combined with the proposed and analyzed access to cash index.

The construction of the access to cash index was carried out as follows:

1. All information related to banking services in the province of Ávila was analyzed and collected. This included bank offices, savings banks (this figure does not exist in the studies of the authors cited above), and ATMs that dispense cash. In this case, no distinction was made between free ATMs or fee-charging ATMs, and there was no penalty in the index, as other authors have included, when considering fee-charging ATMs (The reason for the non-differentiation was the following: In the Spanish banking system, clients of a bank can withdraw cash at ATMs of another bank or savings bank of which they are not clients with or without a commission, provided that the financial entity is part of the same means of payment system (for example, EURO 6000 or System 4B). However, if certain amounts are exceeded in the cash withdrawal (60, 80, or 100 euros), the client who withdraws money from a bank/savings bank of which he is not a client does not bear the commission. The cash withdrawal fee is borne by the customer's bank/cashier, and if it exceeds the previous figures, the fee is not passed on to the customer. This is the reason why the withdrawal of cash is "*free*" or without commission or cost). Postal mail offices were also taken into account, since they provide banking services to citizens, and, additionally, businesses that offer "cashback" services were included, although, it should be noted that this is not a mode that is widely used in Spain, unlike in Anglo-Saxon areas of the world. The appendix presents tables with the data collected for each of the categories (see Table A1).
2. Once all these data were collated, we proceeded to reflect them on a map. The territorial extension features the municipal term, which is the center of the population. This can be seen in the next section of results analysis.
3. Calculation of the access to cash index was carried out. Once the number of bank branches, ATMs, post offices, or cashback points found in each municipal term were quantified, we could calculate an index of access to cash in each of the municipalities in the province of Ávila.

For the construction of the index, the type of infrastructure (bank branches, ATM, etc.) was multiplied by a score established for each type of installation, depending on the cost and accessibility of withdrawing cash from that type of infrastructure. This is reflected in the following equation Equation (1):

$$\text{Access to cash index} = \sum(\text{bank branch} \times 1) + (\text{ATM} \times 3) + (\text{post office} \times 2) + (\text{cashback point} \times 1) \tag{1}$$

The system that was developed to assign a score to each type of element (bank Branch, ATM, etc.) was based on the combination of three criteria: Temporary availability, universal availability, and the need to carry out or not carry out another type of transaction. These criteria were based on those used

by [58], which was applied to the case of South Wales (UK), and by [59], applied to the city of Bristol (UK).

Regarding the temporary availability when assigning a score, this refers to how many hours said element is available for use by people who want to access the banking service. ATMs are available 24 h a day, 365 days a year, while post offices, bank branches, and cashback points are subject to time restrictions that are normally determined by business hours, as well as closing for some days of the week (banks and post offices are not open on Sundays).

Regarding universal availability, we referred to whether the user must bear some type of cost when accessing said service when they are not a customer of the entity that offers the service. In the case of ATMs, as we have already mentioned, in the Spanish banking system, customers of a bank can withdraw cash at ATMs of another bank or savings bank of which they are not customers, either with a commission or without it, provided that the entity they are interacting with is a part of the same system of means of payment (for example, EURO 6000 or System 4B). However, if certain amounts are exceeded in the cash withdrawal (60, 80, or 100 euros), the client who withdraws money from a bank/savings bank of which he is not a client does not bear the commission. The commission for cash withdrawals is borne by the client's bank/savings bank, and if it exceeds the previous figures, the commission will not be passed on to the client, meaning that the cash withdrawal is "*free*" or without commission or cost. In any case, "*it is important that reasonable access to cash services is maintained for people in regional or remote locations as long as such access is needed*", and ATMs play a very important role in this regard [60]. In the case of "*Correos*", the state-owned postal service in Spain, there is no such limit, as it can operate with all banking companies, and in the case of cashback points, there are limits that depend on the agreement that the business/trade has with a certain financial institution. Here, this situation is similar to that in Australia [60], where "*for many regional and remote communities, Australia Post's service is the only reasonably accessible cash deposit point*".

In line with the use of this score, similar initiatives are being carried out in the United Kingdom through the "*Community Access to Cash Pilots initiative*" program [63]. According to [64], "*the needs of local communities are critical. That is why we are supporting the Community Access to Cash Pilots initiative as an additional industry measure to improve access, helping local areas develop and support solutions*". Regarding the need to carry out another type of transaction, we referred to whether it was necessary for another activity (e.g., purchase, refueling of gasoline, etc.) to be carried out by the user in order to obtain the banking service to withdraw cash. In this case, this circumstance does not occur with ATMs, and neither in bank nor post offices; only in cashback points. In the United Kingdom, cashback points are widely established and "*the 2019 Local Shop Report shows that 62% of convenience stores currently offer cashback services and 100% of the stores surveyed accepted cash as a method of payment*" [65], and that "*convenience stores are often the only local source for cash in communities*". Therefore, they are a place that is widely used by local people to obtain cash, despite the limited operating hours.

Therefore, combining these explanations with the summary contained in Table 3, a score was obtained that was later used in Equations (1) and (2). In Equation (2), an additional score was inserted and this is explained in the corresponding section.

Table 3. Multiplier coefficient depending on the type of infrastructure.

Infrastructure that Allows Access to Cash	Score by Type of Infrastructure Present in the Municipality	Explanation of the Awarded Score
Bank Branches/ Savings bank	1	Opening hours limit, they only deliver cash to clients of the bank or cashier, generally with time limits for this type of operations, in some cases with cost per operation of cash and not to any client.
ATM	3	Available 24 h, available to anyone, not just customers. No cost (withdrawal fee) for clients. When you are not a customer of that entity, but you withdraw a certain amount in cash or more, the cash withdrawal operation is free (without commission).
Post Office	2	Opening hours limit. They operate with many entities.
Cash Back Point	1	Opening hours limit. It involves making a purchase in the business.

Source: Own elaboration based on methodology proposed by Tischer, Evans, and Davies (2019), and Evans, Tischer, and Davies (2020) (Note that the methodology initially proposed by the authors was adapted to the Spanish case and to the operation of the Spanish banking system, where two items were eliminated, and it is specified here that cashback practices in Spain are not widespread).

4. Data Collection and Analysis

To collect the necessary data, primary sources of information were used. In this case, the sources of information were the webpages of the financial entities (to extract the data from bank branches and ATMs by municipality). In the case of post offices, the website of the state postal agency "*Correos*" was used, and in the case of cashback points, the website of the ING group and those of the businesses adhering to the cashback format that operate in the province of Ávila were used. Regarding the bank and savings bank branches, the province of Ávila has a total of 112 (The bank branches have been obtained by consulting the websites of the following entities: Bankia BFA, Banco Santander-Popular, Banco Sabadell, Bankinter, BBVA (Banco de Bilbao-Vizcaya), as well as the Bank of Spain (2020). Most municipalities do not have a bank branch (86%), as seen in Table 4, which is a factor that hinders access to cash. This means that if the inhabitants of these municipalities want to have cash, they must either use their private vehicle or use public transport. The opposite extreme includes only two municipalities (Ávila, the capital and, Arévalo, the second most populous municipality, with more than five branches).

Table 4. Scale of bank branches by municipality, and percentage of municipalities with bank branch.

Number of Bank Branches	Number of Municipalities and Bank Branches	% of Municipalities (with Bank Branches)
0 branches	214	86.3
1 branch	17	6.9
2 branches	3	1.2
3 branches	5	2.0
4 branches	6	2.4
5 branches	3	1.2
More than 5 branches	2	0.8

Source: Own elaboration based on data extracted from Bankia BFA, Banco Santander-Popular, Banco Sabadell, Bankinter, BBVA (Banco de Bilbao-Vizcaya Argentaria), Caixabank, Unicaja Banco, ING Direct, Citibank, Deutsche Bank, Ibercaja, Cajamar and Caja rural de Salamanca.

In the case of automatic teller machines (ATMs) operational ATMs were obtained by consulting the webpages of the following entities: Bankia BFA, Banco Santander-Popular, Banco Sabadell, Bankinter, BBVA (Banco de Bilbao-Vizcaya Argentaria), Caixabank, Unicaja Banco, ING Direct, Citibank, Deutsche Bank, Ibercaja, Cajamar and Caja rural de Salamanca (last consultation date: July 2, 2020), There are

150 ATMs in the province of Ávila. As can be seen, as in the case of bank branches, 87.5% of the municipalities lack access to an ATM, and this is a factor that again restricts access to cash (see Table 5). This means that for the inhabitants of these municipalities, when they want to obtain cash, must use their private vehicle or use public transport to move to another municipality. At the opposite extreme are four municipalities with more than five ATMs, and therefore access to cash is easier.

Table 5. Scale of automatic teller machines (ATMs) by municipality, and percentage of municipalities with ATMs.

Number of ATMs	Number of Municipalities and ATMs	% of Municipalities (ATMs)
0 ATMs	217	87.5
1 ATM	13	5.2
2 ATMs	4	1.6
3 ATMs	4	1.6
4 ATMs	3	1.2
5 ATMs	3	1.2
More than 5 ATMs	4	1.6

Source: Own elaboration based on data extracted from Bankia BFA, Banco Santander-Popular, Banco Sabadell, Bankinter, BBVA (Banco de Bilbao-Vizcaya Argentaria), Caixabank, Unicaja Banco, ING Direct, Citibank, Deutsche Bank, Ibercaja, Cajamar and Caja rural de Salamanca.

Regarding post offices, the dependencies existing in the province of Ávila of the state operator of Correos were included (see Table 6). There are a total of eight offices in the province of Ávila, distributed between Ávila (capital) and the most populated municipalities, such as Arévalo or Arenas de San Pedro. This means that access to cash through the banking service that Correos can provide is only available in 3.2% of the municipalities analyzed here, and that the rest, i.e., 96.8% of municipalities, cannot access cash through the post offices of Correos (The post offices were obtained by consulting the website of the state agency Correos (last consultation date: 2 July 2020)).

Table 6. Scale of post offices by municipality, and percentage of municipalities with post office.

Number of Post Offices	Number of Municipalities and Post Offices	% of Municipalities (Post Offices)
0 offices	240	96.8
1 or more offices	8	3.2

Source: Own elaboration from data extracted from the state postal agency "Correos".

Regarding access to cash through cashback points (All the points that offer cashback services in the province of Ávila were extracted by searching the web portals of bank operators regarding the following businesses: DIA supermarkets, SHELL gas stations, GALP gas stations, ONCE kiosks, tobacconists, and other small businesses (last consultation date: 2 July 2020)), it was found that the distribution is somewhat more consistent than other means, such as post offices (see Table 7). However, a similar situation was found with ATMs. Most municipalities also do not have access to cash through cashback services (89.1%). This modality to obtain cash is also underdeveloped in Spain, contrary to what happens in other countries, such as the United Kingdom or Ireland [66].

Table 7. Scale of cash back points by municipality, and percentage of municipalities with cash back point.

Number of Points with Cash Back	Number of Municipalities and Cash Back Points	% of Municipalities (Cash Back)
0 cashback points	221	89.1
1 cashback point	19	7.7
2 cashback points	4	1.6
3 cashback points	1	0.4
4 cashback points	0	0.0
5 cashback points	0	0.0
More than 5 cashback points	2	0.8

Source: Own elaboration from data contained on the website of DIA Supermarkets, SHELL Gas Stations, GALP Gas Stations, ONCE Kiosks, Tobacconists and Other small businesses.

4.1. Cash Access Maps

As indicated in the second section of the methodology, once all these data were obtained (banks, ATMs, post offices, and cashback points) they were reflected on maps. The extension of this is municipal term, which is the center of the population. These maps will allow us to find areas that have greater difficulty in accessing cash.

These maps should be given priority when looking for a solution where one wants to reduce or eliminate cash. The reason for this is that they highlight areas where there are no other banking services, such as a bank office or ATM to deposit money, make withdrawals, or check balances, among other operations.

These maps should be given priority when offering other alternatives, such as financial education to use electronic banking, mobile coverage in the event of starting a virtual currency with an electronic wallet, etc.

In addition, the sum of the data collection of all these combined maps allows us to elaborate on them in the following section, based on the described methodology, to evaluate the index of access to cash.

As we can see in Figure 2, the points of access to cash in the province of Ávila follow a well-defined pattern. They are concentrated in the nuclei with the largest populations and are also centralized at the ends of the province, e.g., in the north of Madrigal de las Altas Torres and Arévalo and in the southeast of Las Navas del Marqués, Cebreros, El Tiemblo, and la Adrada, mainly. In the southern area, only the municipality of Arenas de San Pedro was identified. In the southwest, the towns of Barco de Ávila and Piedrahíta were identified, and in the east (the border area with the province of Salamanca) we did not find any notable towns. Consequently, it is expected that there will be areas in which access to cash will be difficult, requiring travel by public or private transport in order to access banking services. In order to respond to this difficulty and define which areas would be more problematic when accessing cash and to be able to solve this, it is not enough to reflect the situation in the previous maps. It is necessary to take into account the different options together for access to cash (post offices, bank or savings bank branches, ATMs, and cashback points) but also to weigh the availability with a score based on various parameters, namely, the hourly availability, the need to be a customer or not, and the requirement to carry out other transactions, such as refueling or making a purchase, together with the necessary movement from one municipality to another.
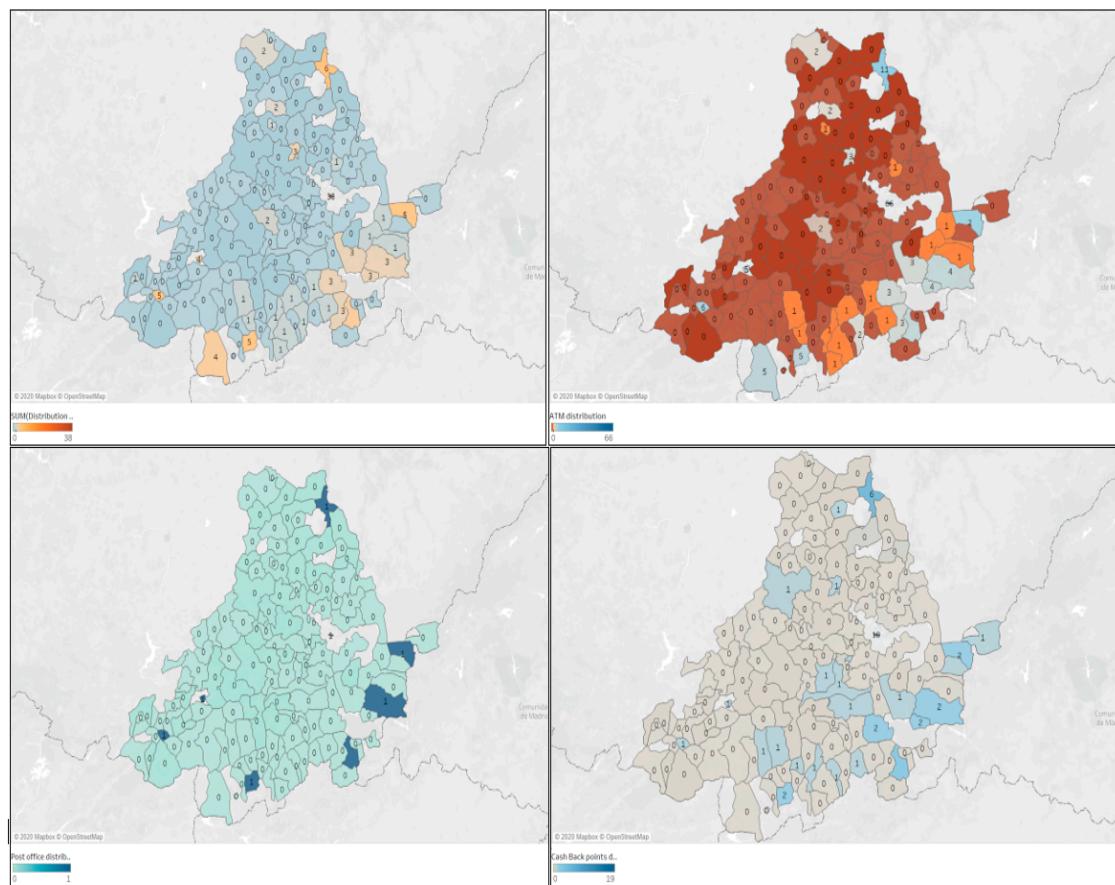
Figure 2. Distribution of bank branches, automated teller machines (ATMs), post offices, and cashback points. Source: Author's own elaboration using Tableau Desktop Professional Edition.

4.2. Access to Cash Index and the Detection of Vulnerable Areas

As already indicated in the previous section, in order to obtain greater accuracy regarding the existing facilities or restrictions in terms of access to cash from a territorial perspective, it is not enough just to graphically represent the points on the map. On the contrary, it is an essential requirement to weigh the point of access to cash in each municipality under study (considering post offices, bank or savings bank branches, ATMs, and cashback points) by a coefficient, i.e., that shown in Table 3 of the methodology section. Thus, applying Equation 1, the cash access index for each municipality was obtained. Additionally, it allows the detection of municipalities that are distant from points of access to cash, therefore, suggesting either no access point in the municipality, difficulties relating to having to travel by public or private transport to access banking services, time availability requirements, issues relating to whether it is necessary to be a customer or not, or the need to carry out other actions, such as refueling or making a purchase. The index results will show the most problematic areas regarding inability to access cash.

From Figure 3, it can be seen how both the capital, Ávila, and the northern area near Arévalo and the province of Valladolid, as well as the southeastern area of the province (El Tiemblo, Cebreros, Las Navas del Marqués, and La Adrada areas) present access to cash index values with optimal levels. There are municipalities with an index value of 0, where areas within a few-kilometer radius would have an inability access to cash. However, as can be seen in Figure 3, some areas surrounding the capital are 22 km away from a cash access point.
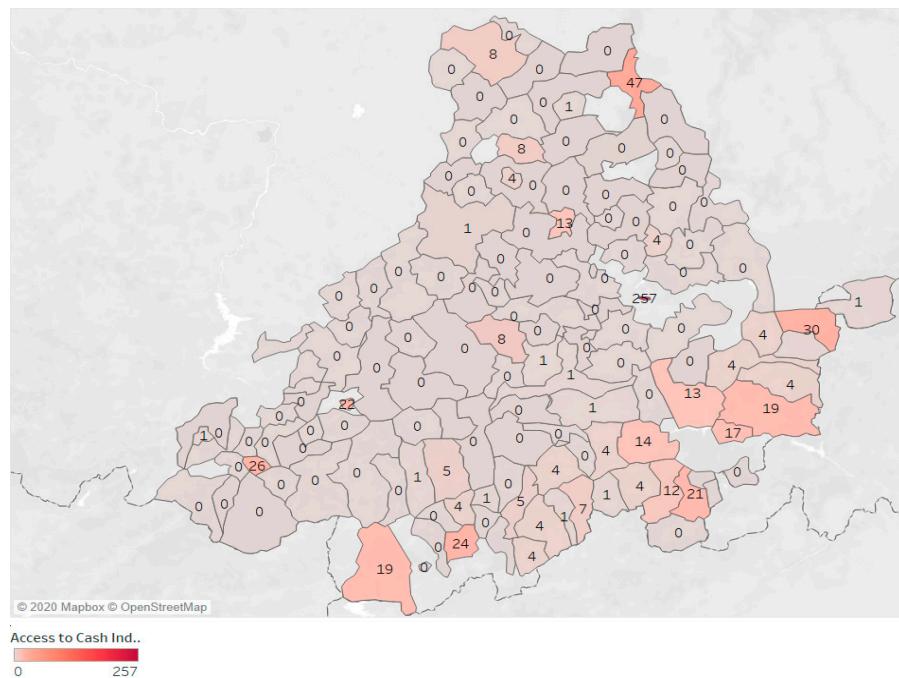
Figure 3. Access to cash index in the province of Ávila. Source: Own elaboration using Tableau Desktop Professional Edition.

In the central area of the province, the situation is like that of the surrounding area. In this case, the number of kilometers required to travel to access cash amounts to 26 km. The southeast region is well served by cash access points and this is reflected in the index values for this region. Las Navas del Marqués, Cebreros, El Tiemblo, and La Adrada have acceptable cash access index values and this means that the distance to be traveled is lower than 15 km, as shown in Figure 4. The southern part of the province (Arenas de San Pedro, Candeleda) and the southeast (Piedrahíta and Barco de Ávila) also have average distance values for access to cash of 14 km. Regarding the northern area of the province and based on the calculated cash access index value, the area made up of Arévalo and Madrigal de las Altas Torres reflects that there will be an availability of access to cash in 11 km around the area. The area with the greatest difficulties in accessing cash, according to the proposed method, are in the west of the province and the entire southeast area bordering Salamanca Province. As we can see in Figure 4, the residents of this area may require trips of up to 30 km to find an access point for cash. If the average is prepared considering the capital and the four divisions made, as well as the central area, it can be extracted that inhabitants of this province will have access to cash within a radius of 19.6 km on average.
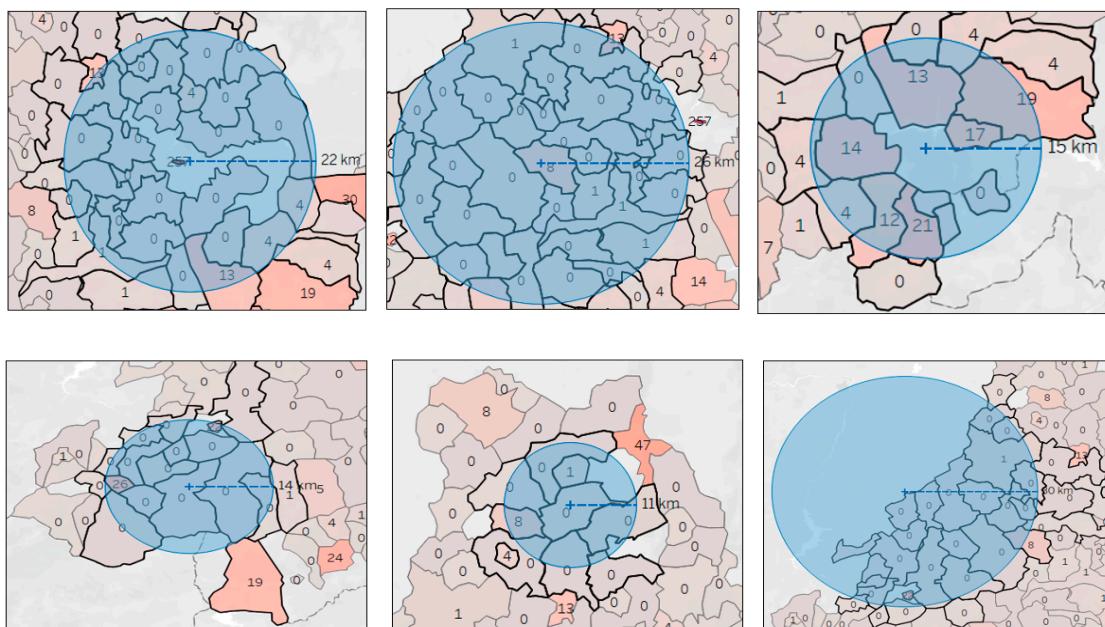
Figure 4. Distance necessary to access cash according to the geographical area of the province of Ávila (area around the capital of the province, central zone, southeast area, south zone, north zone, and west of the province). Source: Author's own elaboration using Tableau Desktop Professional Edition.

5. Proposal for Sustainable Solutions to Increase the Access to Cash Index in Vulnerable Areas

As [67] has pointed out, it is necessary that "governments should vigorously pursue financial inclusion goals by implementing regulatory and supervisory policies [. . .] by encouraging technology innovations that lower adoption costs and widen outreach, and by ensuring that systems take care of the concerns of consumers." As these authors have argued, such an intervention must be proactive and focus on issues such as the "proximity to financial services; extent of their dimension and coverage; product features and quality; promotion of usage; household financial capacity and expansion of financial literacy." Along these lines, the measures proposed below attempt to respond to the challenges associated with the problems of the proximity and scope of financial services in terms of size and coverage, as well as access to digital financial services. Precisely, expanding access points and digitizing payments are two of the objectives of the UFA2020 initiative of the World Bank (For more information, see: https://www.worldbank.org/en/topic/financialinclusion/brief/achieving-universal-financial-access-by-2020), which seeks to promote universal financial access.

At this point and having identified the difficulties in some areas for accessing cash, two solutions are proposed here to increase the rate of access to cash and thus guarantee an essential part of financial inclusion and access to banking services:

1. In the short term, we recommend using the Spanish pharmacy network to provide access points for cash, given the extensive presence of the network in the territory.
2. In the medium- to long-term, we recommend the possible implementation of a virtual currency backed by the Central Bank that is present on users' mobile phones, with which they can make payments using digital cash (Like the Chinese virtual currency (CBDC) that is already operating in tests).

5.1. Expansion of Cashback Points through the Pharmacy Network

Spain has "*one of the most extensive pharmacy networks, not only in Spain, but in Europe; above countries like France or Germany*" [68]. Thus, the proposal to minimize cash access difficulties that affect a large part of the resident population in areas with a low demographic density or those with a certain degree of isolation consists of taking advantage of the existing pharmacy network as a point of access to

cash. In a simulation exercise, we proceeded to redefine Equation 1 with the incorporation of a new component (pharmacy), thus obtaining the following expression:

$$\text{Access to cash index} = \sum(\text{bank branch} \times 1) + (\text{ATM} \times 3) + (\text{post office} \times 2) + (\text{cashback point} \times 1) + (\text{pharmacy} \times 1). \tag{2}$$

The pharmacy component is assigned a coefficient of 1 in this case, given that it has a time limit and it may also be necessary to make a purchase in order to receive the cash, as is the case in some cashback points. Pharmacies have a time restriction, normally determined by business hours, as well as closing for some days of the week (i.e., the same assumption as bank branches and post offices, which are not open on Sundays). The full explanation of the scoring has carried out by explaining Equation (1). First, as we can see in Table 8, the percentage of municipalities without this possible point of access to cash is 20 points lower than in the case of the rest of the points collected in Equation 1, so the access to cash index values would be significantly improved and the kilometers of travel required to obtain cash would be reduced with the addition of pharmacies as points of access to cash.

Table 8. Pharmacy scale by municipality, and percentage of municipalities with Pharmacy.

Pharmacy	Number of Municipalities and Pharmacies	% of Municipalities (Pharmacies)
0 pharmacies	156	62.9
1 pharmacy	83	33.5
2 pharmacies	5	2.0
3 or more pharmacies	4	1.6

Source: Own elaboration from data extracted from the Ávila Official College of Pharmacists.

The network of pharmacies in the province of Ávila is presented here as a solution to increase the rate of access to cash. Here, the pharmacy data have been extracted from the official website of the College of Pharmacists, with the most recent data available as of 22 June 2020. Each pharmacy is listed by municipality, as well as its current status (open or closed) and if it has any limits on the opening hours or opening days.

Nearly 40% of the territory has at least one pharmacy in its municipal area. Based on these data, a map of the pharmacy network in the province of Ávila can be drawn up. It can be clearly seen that these pharmacies are better distributed throughout the whole territory than the aforementioned areas for cash access (see Figure 5). In this way, if the pharmacy network served as an access point to cash, the access rate to cash (in this case, in the province of Ávila) would be significantly increased. Especially, access would increase in not only places where some point of access to cash already existed, but especially in places where there was no existing way to access cash, causing the displacement of citizens.

This can be easily verified in Figure 6, which shows how the access to cash index has changed after implementing this measure.
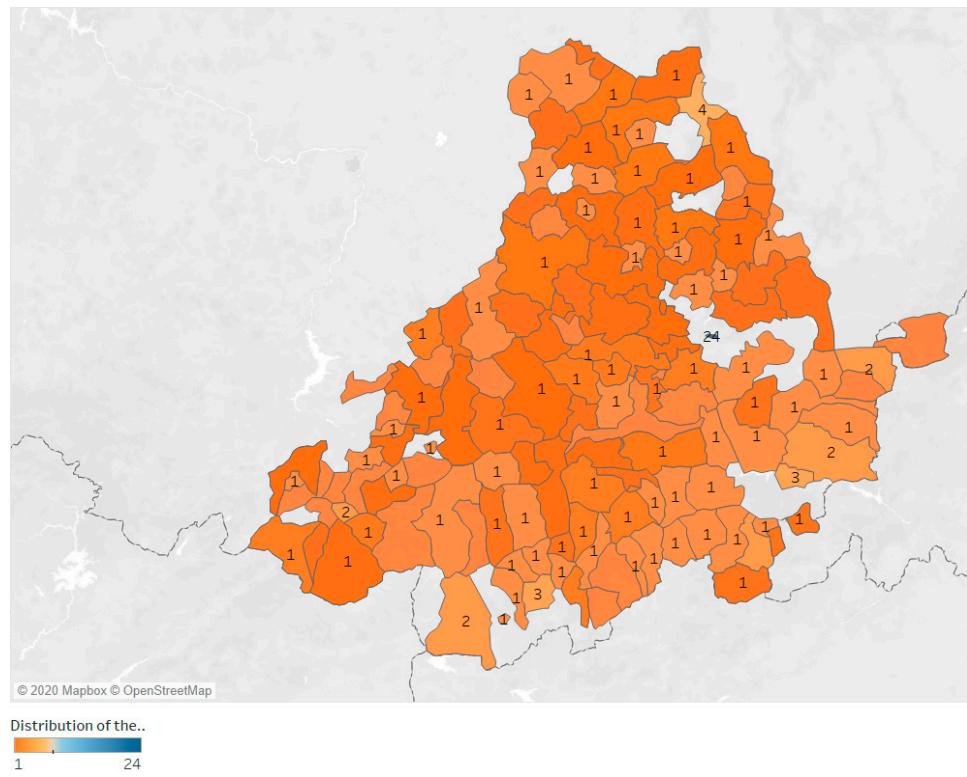
Figure 5. Distribution of the pharmacy network in the province of Ávila. Source: Author's own elaboration using Tableau Desktop Professional Edition.
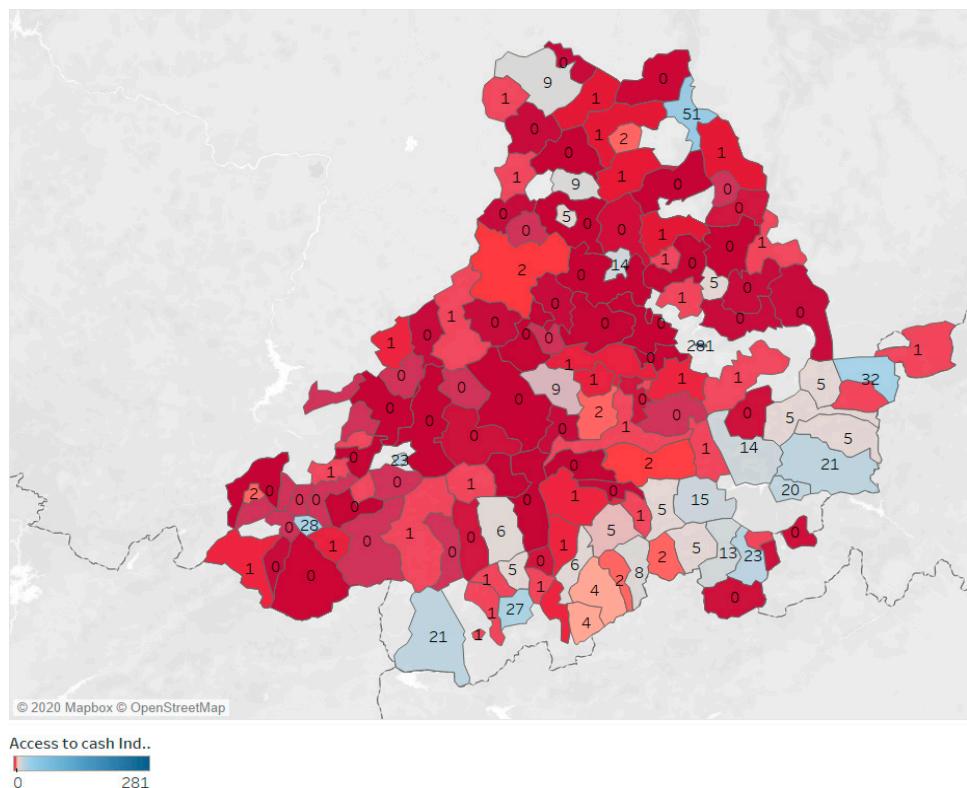

Figure 6. Access to cash index if the pharmacy network is used as a "cashback" point. Source: Author's own elaboration using Tableau Desktop Professional Edition.

As can be seen, the access to cash index values of all the areas previously analyzed have significantly improved with the addition of pharmacies. Both the capital area, as well as the north of the province, the southeast, and south, and even the west area adjacent to Salamanca and the downtown area (which were the areas with the worst access to cash index values) show improvement.

As shown in Figure 7, the distance to travel around the capital to access cash has been reduced from the 22 km shown in Figure 3 to the 5 km shown in Figure 7. This denotes an improvement in the ability to access cash. The same can be said for the rest of the zones (i.e., comparing Figure 7 to Figure 4). The value of 26 km around the downtown area has decreased to 11 km. In the southeast area, a reduction of 15 km to 10 km can be seen. In the southern area, a reduction of 14 km to 6.1 km can be seen. In the north zone, a reduction from 11 km to 6 km can be seen. However, the area showing great improvement is the western area. In Figure 3, the distance to be traveled to access a cash point was 30 km. If the pharmacy network is incorporated, as proposed, as a solution, the distance is reduced, as we can see in Figure 7, to 14 km. If the average is analyzed again, taking into consideration the pharmacy network, and again the capital and the four divisions made are taken into consideration, as well as the central area, the inhabitants of this province will have access to cash within 8.7 km on average (a notable reduction from the 19.6 km if the pharmacy network is not available).
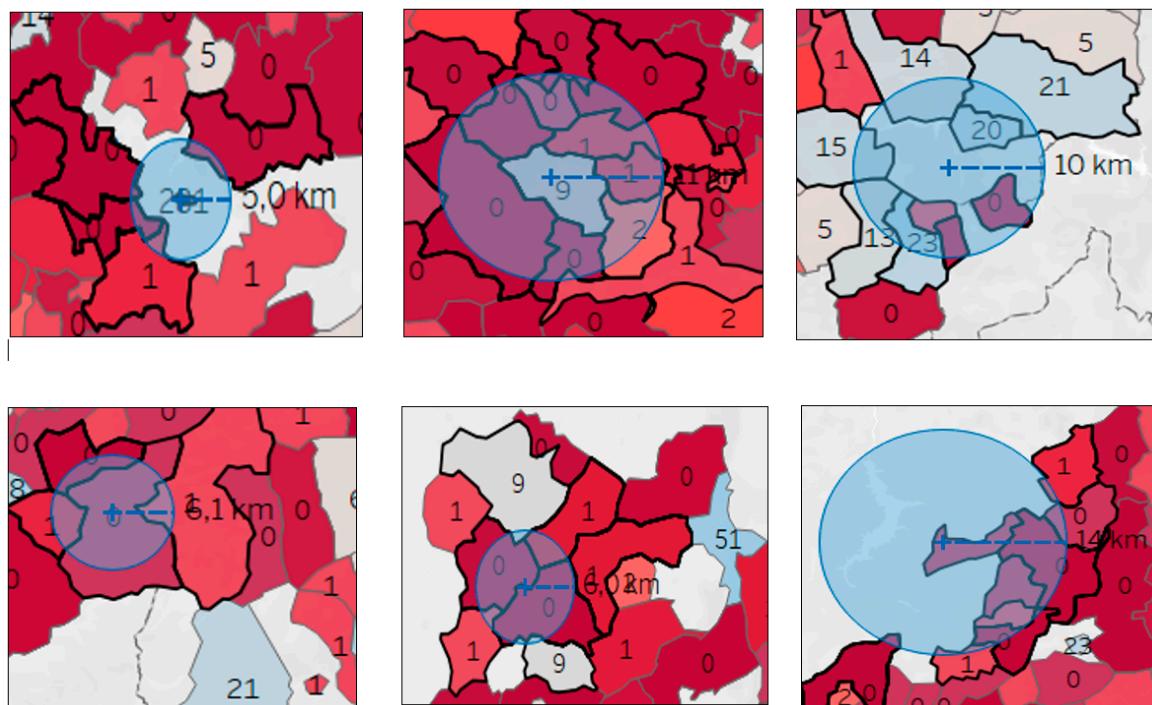
Figure 7. Distances necessary to access cash according to the geographical area of the province of Ávila after adding the pharmacy network as a cash source. Areas around the capital of the province, central zone, southeast area, south zone, north Zone, and west of the province are shown. Source: Author's own elaboration using Tableau Desktop Professional Edition.

5.2. Implementation of a CBDC to Increase Access to Cash

As [69] pointed out, "the accelerated pace of development of digital infrastructure, together with increasingly rapid and widespread access and interconnection to networks among citizens, companies and institutions are shaping a digital ecosystem that drives numerous disruptive processes and transformation in all the productive sectors of the economy, to the point of envisioning an eminent change in business models and the pattern of economic growth", questioning the traditional forms and balances of economic and social organization [70]. In this favorable context for the development of digital financial services, another possible solution to increase access to cash could be

the implementation of a CBDC (central bank digital currency). This, in any case, does not depend on the Spanish authorities, but on the European Central Bank. The implementation or not of a CBDC presents a series of advantages, such as "*improving access to financial services when there is geographic dispersion, increasing the rate of bank penetration and access to financial services or as an alternative to the drop in the use of cash*" [40]. This alternative, given the geographical dispersion and the difficulty of accessing cash in this province, could be a solution (at least in the medium- to long-term). Also, in order to implement a CBDC, other issues such as the one pointed out by [71] must be considered, since in the generation and maintenance of CBDCs it is necessary to "*invest a large amount of electrical energy*". Therefore, despite the advantages of saving in physical costs (paper money and metal) derived from the implementation of a CBDC, it is also possible that an environmental cost is incurred, derived from a greater increase in electricity required for the currency's generation and maintenance. An example of the latter is found in [72], where they pointed out that in 2014 that "*bitcoin mining has consumed as much electric energy as Ireland required in 2014*". Another problem brought about by CBDCs is the one pointed out by [73], since "*there is concern about the tax evasion of those who use bitcoin instead of more traditional online payment methods*", and some may derive its use for the "laundering of money", as suggested by [74].

However, as pointed out in [40], there are countries that have already carried out tests on the possible implementation of a CBDC and its effects, such as Uruguay with the "*e-Peso*" or the Bahamas with the "*Project Sand Dollar*". However, the country with the most weight in the world and the most advanced implementation of a CBDC is China, where "*in January 2020, senior officials from the People's Bank of China confirmed that the bank has concluded the development and testing of China's sovereign digital currency*" [75]. Each user will have a wallet on their mobile with which they can make payments through QR codes and this will also allow them to send or receive money and even initiate transactions by putting two mobile phones in contact. In the present study, in order to assess the possible acceptance of a CBDC as a solution to the difficulties of an inability access to cash, a survey was carried out with the inhabitants of the province of Ávila to find out if they would accept its implementation (see Table 9).

Table 9. Knowledge and acceptance of a central bank digital currency (CBDC) in the province of Ávila.

1. Do you Know What a Virtual Currency Is?	Frequency	Percentage
No, I don't know what a digital currency is.	172	33.6
Yes, I know what a digital currency is.	340	66.4
2. If the European Central Bank launched a virtual currency, would you continue to use traditional cash, would you reduce it use in favor of digital or would you replace traditional cash with digital?	**Frequency**	**Percentage**
I Would reduce the use of traditional cash	220	43
I would continue to use traditional cash (coins and bills)	128	25
I would substitute traditional cash for digital cash	164	32
Total	**512**	**100**

Source: Own elaboration from data collected via online survey.

In total, 512 people participated in the survey (see Tables A2–A7 in Appendix A) (The population of Ávila is made up of 158,930 people. Thus, with 50% homogeneity, a 5% margin of error, and a 95% confidence level, at least 384 surveys would be necessary for the result to be representative. In our case, this number was far exceeded, as 512 people participated. Therefore, the sample is representative). The population was segmented according to sex, studies, job occupation, family income, and the size of the municipality. The two questions that were asked were the following: Do you know what a virtual currency is? If the European Central Bank launched a virtual currency, would you continue to use traditional cash, would you reduce cash use in favor of digital cash, or would you replace traditional cash with digital cash? See Tables A8 and A9 the in appendix for more details. All statistical data related to the variance, skewness, standard error of skewness, kurtosis, and kurtosis standard error can be found by consulting Table A10 in the appendix of this article.

As can be seen from the data extracted from the survey carried out, first of all, 66% of those surveyed affirmed that they either know what a digital currency is or have heard something about this type of currency and, in short, answered the question affirmatively.

Second, but not least, regarding a scenario where a CBDC was implemented (the question stated that China is currently conducting a successful test), 32% of respondents said that they would replace traditional cash with digital cash. Next, 43% of respondents indicated that if a CBDC was introduced that they would reduce their use of traditional cash in favor of digital cash. Only one in four surveyed citizens (25%) would continue to use traditional cash (coins and bills) instead of a CBDC. In this context, we proceeded to analyze the 25% of people who would pose difficulties when accepting a CBDC in order to analyze their profile.

The 128 people out of the 512 respondents who answered "*I would continue to use traditional cash (coins and bills)*" and therefore would not accept a CBDC were mostly men. Therefore, a CBDC would have more acceptance among women. Regarding the age range, we see a clear trend, where those under 18 would accept a CBDC (none preferred traditional cash) and as people get older, their rejection of CBDC grows, except in the 45 to 54 age range.

Therefore, new generations would be more willing to accept a CBDC while older people tend to prefer traditional cash (the 55–64 age range features the highest percentage of CBDC rejection). Regarding the level of education and studies, the trend is also clear, where only 1.6% of people with university studies rejected the CBDC, while people without an education or those with more basic studies (less education) preferred traditional cash. These results are reflected in Table 10.

Table 10. Sex, age, and level of education (studies) of people who would reject the use of a CBDC as a substitute for traditional cash in the province of Ávila.

Sex			Age			Training Level (Studies)		
Sex	Total	Percentage	Age Range (years)	Total	Percentage	Training level (studies)	Total	Percentage
Man	78	60.9	<18	0	0	Primary	2	1.6
Woman	48	37.5	18–24	18	14.1	High school	30	23.4
			25–34	24	18.8	University	2	1.6
			35–44	26	20.3	No studies	92	71.9
			45–54	14	10.9	Do not know, no answer	2	1.6
			55–64	38	29.7			
			>65	8	6.3			

Source: Own elaboration from data extracted from the survey.

From the data shown in Table 11 regarding the occupations of the interviewees, it can be seen that the vast majority of people who rejected the implementation of the CBDC and, therefore, prefer the use of cash, were active workers (people who currently have a job). Regarding income, for the vast majority of people who reject the use of a CBDC and prefer cash, it was observed that these results are concentrated in the lowest family income ranges (a total 62.5% between the two other defined ranges), indicating that there is a relationship between lower income and the rejection of a CBDC and inversely higher income and acceptance of it. In the case of the municipality of residence, the vast majority of respondents were concentrated in municipalities with more than 50,000 inhabitants. This is logical, given that most of the Ávila's population is concentrated in its capital. The results of the study are like those obtained by other authors. At a lower educational level and at a lower level of income, there is a greater use of cash. This same situation was shown by [76] in a study carried out in the United States of America. The same is true in the case of Canada, according to a study by [77], or in the case of [78], in their study in Germany. More recently, this also coincides with the results obtained by [36] in their study on the eurozone, indicating in their conclusions that "*... it is observed that the probability of using cash is higher for individuals with lower levels of income and education*" and also that "*possible proposals that advocate the total elimination of cash in the eurozone should be carried out gradually and with strong public*

support for sectors of the population with lower levels of income and education". Also, in the recent study of [79], conclusions were reached in the same direction, where "*digital financial inclusion reduces farmers' vulnerability*" and "*digital financial inclusion can reduce fluctuations in consumption and thereby alleviate farmers' vulnerability*". In the study of [42], carried out in South Africa, it was indicated that the greatest beneficiaries of a "cashless society" would be women, where a "*cashless society may enhance consumers' optimism levels towards new mobile payment services, but also reduce safety concerns as a result of carrying cash, especially for women.*" In our study, women show a very high level of acceptance (higher than men) for a CBDC (or in other words, a lower rejection). Finally, in the study carried out by [45] in Italy, a conclusion similar to ours was reached: "*We expect a larger use of cashless payment from a population with a higher GDP*" and therefore, a greater use of cash in people with minor a GPD.

Table 11. Socioeconomic characterization of the population that would reject the use of CBDC in the province of Ávila.

Current Main Occupation			Income of the Family Unit			Size of the Municipality of Residence		
	Total	Percentage		Total	Percentage		Total	Percentage
Active worker	74	57.8	<€14,000	44	34.4	<1000	20	15.6
Self-Worker	12	9.4	€14,000,001–25,000	36	28.1	1000–10,000	6	4.7
Student	18	14.1	€25,000.001–€35,000	22	17.2	10,000.1–50,000	26	20.3
Retired	10	7.8	€35,000.001–€50,000	14	10.9	50,000.1–100,000	76	59.4
Unemployed	6	4.7	€50,000.001–€100,000	12	9.4			
Others	6	4.7	>€100,000	0	0.0			
Do not know, no answer	2	1.6						

Source: Own elaboration from data extracted from the survey.

However, this measure to guarantee access to cash in the long term should be accompanied by others, such as encouraging sustainable means of transport in these areas, as indicated [80], and a series of tax incentives in the rural environment, as pointed out [81]. All this will contribute to improving access to "*quality*" banking services and reduce the shock of the depopulation situation experienced by large areas in the interior of Spain that are collectively referred to today as "*depopulated Spain*". Lastly, in [82], in an applied study in Canada, it was pointed out that "the public remains indifferent to the various bank deposit monies (media of exchange) [. . .] in other words, the non-zero-sum nature of electronic methods of payment is not inconsistent with a uniform currency". Thus, a CBDC could have a perfect place in society.

6. Discussion of Results

This research has sought to contribute to the study of the problem of financial exclusion and the difficulties of an inability to access to cash that are suffered in Spain by the populations of certain areas characterized by low demographic densities and a high proportion of elderly people. For this purpose, the population residing in the province of Ávila has been taken as a study sample, whose interest is justified when considering the existence of a representative demographic structure that is characterized by an aging population that is dispersed throughout the territory in small urban centers. At the same time, this province constitutes evidence of the financial exclusion problems that have arisen from the recent restructuring process of the Spanish banking system that has led to the closure of 40% of the bank branches that operate in this territory. In recent years, European countries have launched numerous initiatives to combat corruption, money laundering, and tax fraud. Among them, the progressive elimination of cash through the limitation of payments through this means stands out. Despite this, cash and its use in day-to-day transactions continues to represent a very widespread form of payment for a large part of the population, and there are different international organizations, such as the BIS or the World Bank, which advocate its maintenance. The methodology proposed in this research goes beyond the measurements made by the "*International Monetary Fund's Financial Access*

Survey" (FAS). The construction of an index of access to cash via the consideration of a diverse set of cash dispensing infrastructures that have been suitably weighted according to parameters, such as ease of access, has allowed the construction of maps that have detected and identified the most vulnerable areas at risk of financial exclusion. Consequently, this has facilitated the identification of territories where it would be recommended to implement public policies to guarantee equal access to cash for the entire population, or at least to minimize access costs. Even though the empirical data were collected from throughout the province of Ávila, a limitation exists, since the data were collected from one part of the country only. More studies are required to test and validate the results of the study in other regions (for example, those indicated in the introduction with a similar population density). On the one hand, this study has only been based on including the existing pharmacy network in order to increase the access to cash index. However, other possible solutions, e.g., the use of mobile ATMs (e.g., in a bus or van) that run through the area, have not been analyzed. On the other hand, this study has only investigated the moderating effect of gender, age, household income, education, and the size of the municipality of residence. Other variables could have been included (for example, if COVID-19 has affected the use of cash), so more research may be required in the future.

7. Conclusions

Beyond the multiple advantages that the reduction or elimination of cash could bring, such as cost savings, the greater effectiveness of monetary policy, or the reduction in crime, most studies have agreed on the advisability of analyzing any change that leads to a cash-free society in detail. In addition to the absolute dependence on electronic means for payments, the risk of financial exclusion of certain vulnerable groups (elderly, youth, people without resources, etc.) with difficulty in accessing new technologies and financial services necessarily requires that any initiative in this sense contemplates such risks.

In order to solve this problem, the present investigation has identified and analyzed the implications of two possible solutions: In the short term, it has been proposed to take advantage of the extensive network of pharmacies for use as access points to cash (as cashback facilities) and, in the medium and in the long term, the introduction of a CBDC as an alternative means of payment to cash.

In the application of the proposed methodology, it has been verified that the population residing in the province of Ávila, which is one of the Spanish provinces that has been most affected by financial exclusion, faces significant difficulties in accessing cash. In fact, 81.5% of the municipalities of the province of Ávila present a score of zero points in the access to cash index proposed here. Each inhabitant of this province must travel, on average, approximately 20 km to access a cash dispensing point. This problem is aggravated when considering the southwest quadrant of the province of Ávila, where the distance is increased to an average of 30 km.

Taking advantage of the pharmacy network to provide cashback points would facilitate access to cash in the study population, who are currently at risk of financial exclusion. With this measure, a notable reduction in costs associated with accessing cash has been verified, as the average distance that would be necessary to access this service is reduced by more than 55% compared to other cash source locations. A reduction of more than 20 percentage points in the number of municipalities in Ávila with a score of zero in the access to cash index was also found here. Said improvement is possible when considering the extensive pharmacy network in the province, which, in the case of the province of Ávila, covers nearly 40% of the territory, with at least one pharmacy in each municipal area.

Finally, it has been verified that the implementation of a CBDC as an alternative means of payment to cash would enjoy good acceptance by the population under study here. Specifically, 75% of respondents said they would substitute digital money for cash or at least reduce their use of it. Conversely, one in four respondents, whose profile coincides with the elderly, uneducated, and/or low-income people, would reject its widespread use. Such a circumstance would require the development of training and information actions to raise awareness of the safety and effectiveness of this type of currency.

Appendix A

Figure A1. Population density (persons per square kilometer) in southern and central Europe. Source: Author´s elaboration based on data from Eurostat (2019) and Tableau Desktop Professional Edition.
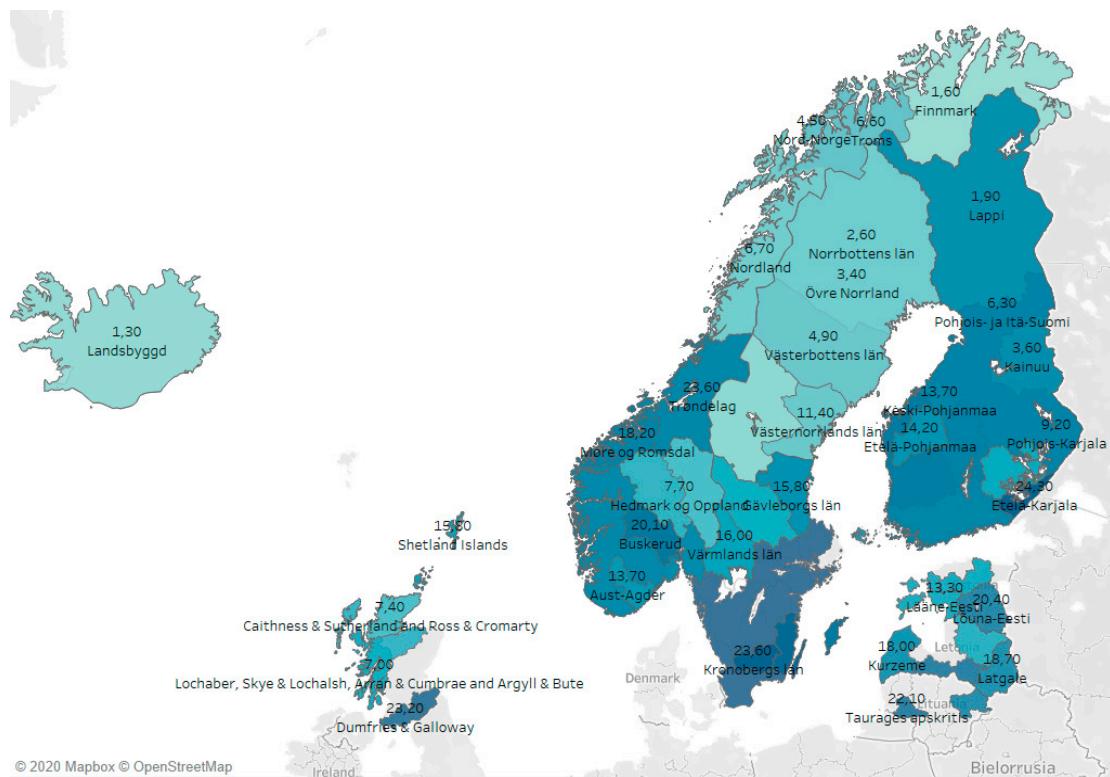
Figure A2. Population density (persons per square kilometer) in northern and central Europe. Source: Author´s elaboration based on data from Eurostat (2019) and Tableau Desktop Professional Edition.

Table A1. Bank branches, post offices, ATMs, cashback points, and pharmacies by municipality. Calculation of access to cash index.

Municipality	Bank Branches	Post Offices	ATMs	Cash Back	Access Cash Index	Pharmacies	Access Cash Index (Pharmacies)
Adanero	0	0	0	0	0	1	1
La Adrada	3	0	3	0	12	1	13
Albornos	0	0	0	0	0		0
Aldeanueva de Santa Cruz	0	0	0	0	0		0
Aldeaseca	0	0	0	0	0	1	1
La Aldehuela	0	0	0	0	0	1	1
Amavida	0	0	0	0	0		0
El Arenal	1	0	1	0	4	1	5
Arenas de San Pedro	5	1	5	2	24	3	27
Arevalillo	0	0	0	0	0		0
Arévalo	6	1	11	6	47	4	51
Aveinte	0	0	0	0	0		0
Avellaneda	0	0	0	0	0		0
Ávila	38	1	66	19	257	24	281
El Barco de Ávila	5	1	6	1	26	2	28
El Barraco	3	0	3	1	13	1	14
Barromán	0	0	0	0	0	1	1
Becedas	1	0	0	0	1	1	2
Becedillas	0	0	0	0	0		0
Bercial de Zapardiel	0	0	0	0	0		0
Las Berlanas	0	0	0	0	0	1	1
Bernuy-Zapardiel	0	0	0	0	0		0
Berrocalejo de Aragona	0	0	0	0	0		0
Blascomillán	0	0	0	0	0		0
Blasconuño de Matacabras	0	0	0	0	0		0
Blascosancho	0	0	0	0	0		0
El Bohodón	0	0	0	0	0		0
Bohoyo	0	0	0	0	0	1	1
Bonilla de la Sierra	0	0	0	0	0		0
Brabos	0	0	0	0	0		0
Bularros	0	0	0	0	0		0
Burgohondo	1	0	1	0	4	1	5
Cabezas de Alambre	0	0	0	0	0	1	1
Cabezas del Pozo	0	0	0	0	0		0
Cabezas del Villar	0	0	0	0	0	1	1

Table A1. *Cont.*

Municipality	Bank Branches	Post Offices	ATMs	Cash Back	Access Cash Index	Pharmacies	Access Cash Index (Pharmacies)
Cabizuela	0	0	0	0	0		0
Canales	0	0	0	0	0		0
Candeleda	4	0	5	0	19	2	21
Cantiveros	0	0	0	0	0	1	1
Cardeñosa	0	0	0	0	0	1	1
La Carrera	0	0	0	0	0		0
Casas del Puerto	0	0	0	0	0		0
Casasola	0	0	0	0	0		0
Casavieja	0	0	0	1	1	1	2
Casillas	0	0	0	0	0	1	1
Castellanos de Zapardiel	0	0	0	0	0		0
Cebreros	3	1	4	2	19	2	21
Cepeda la Mora	0	0	0	0	0		0
Cillán	0	0	0	0	0		0
Cisla	0	0	0	0	0		0
La Colilla	0	0	0	0	0		0
Collado de Contreras	0	0	0	0	0		0
Collado del Mirón	0	0	0	0	0		0
Constanzana	0	0	0	0	0		0
Crespos	1	0	1	0	4	1	5
Cuevas del Valle	0	0	0	1	1	1	2
Chamartín	0	0	0	0	0		0
Diego del Carpio	0	0	0	0	0	1	1
Donjimeno	0	0	0	0	0		0
Donvidas	0	0	0	0	0		0
Espinosa de los Caballeros	0	0	0	0	0		0
Flores de Ávila	0	0	0	0	0	1	1
Fontiveros	2	0	2	0	8	1	9
Fresnedilla	0	0	0	0	0		0
El Fresno	0	0	0	0	0	1	1
Fuente el Saúz	0	0	0	0	0		0
Fuentes de Año	0	0	0	0	0		0
Gallegos de Altamiros	0	0	0	0	0		0
Gallegos de Sobrinos	0	0	0	0	0		0
Garganta del Villar	0	0	0	0	0		0
Gavilanes	0	0	0	1	1	1	2
Gemuño	0	0	0	0	0	1	1
Gil García	0	0	0	0	0		0
Gilbuena	0	0	0	0	0		0
Gimialcón	0	0	0	0	0		0
Gotarrendura	0	0	0	0	0		0
Grandes y San Martín	0	0	0	0	0		0
Guisando	0	0	0	0	0	1	1
Gutierre-Muñoz	0	0	0	0	0		0
Hernansancho	0	0	0	0	0	1	1
Herradón de Pinares	0	0	0	0	0		0
Herreros de Suso	0	0	0	1	1	1	2
Higuera de las Dueñas	0	0	0	0	0	1	1
La Hija de Dios	0	0	0	0	0		0
La Horcajada	0	0	0	0	0	1	1
Horcajo de las Torres	0	0	0	0	0	1	1
El Hornillo	0	0	0	0	0	1	1
El Hoyo de Pinares	1	0	1	0	4	1	5
Hoyocasero	0	0	0	0	0	1	1
Hoyorredondo	0	0	0	0	0		0
Hoyos de Miguel Muñoz	0	0	0	0	0		0
Hoyos del Collado	0	0	0	0	0		0
Hoyos del Espino	0	0	0	1	1	1	2
Hurtumpascual	0	0	0	0	0		0
Junciana	0	0	0	0	0		0
Langa	0	0	0	1	1	1	2
Lanzahíta	1	0	1	0	4		4
El Losar del Barco	0	0	0	0	0		0
Los Llanos de Tormes	0	0	0	0	0		0
Madrigal de las Altas Torres	2	0	2	0	8	1	9
Maello	0	0	0	0	0	1	1
Malpartida de Corneja	0	0	0	0	0	1	1
Mamblas	0	0	0	0	0		0
Mancera de Arriba	0	0	0	0	0		0
Manjabálago	0	0	0	0	0		0
Marlín	0	0	0	0	0		0
Martiherrero	0	0	0	0	0		0
Martínez	0	0	0	0	0	1	1
Mediana de Voltoya	0	0	0	0	0		0
Medinilla	0	0	0	0	0		0
Mengamuñoz	0	0	0	0	0		0
Mesegar de Corneja	0	0	0	0	0		0
Mijares	1	0	2	0	7	1	8
Mingorría	1	0	1	0	4	1	5
El Mirón	0	0	0	0	0		0
Mironcillo	0	0	0	0	0		0
Mirueña de los Infanzones	0	0	0	0	0		0

Table A1. *Cont.*

Municipality	Bank Branches	Post Offices	ATMs	Cash Back	Access Cash Index	Pharmacies	Access Cash Index (Pharmacies)
Mombeltrán	0	0	0	0	0	1	1
Monsalupe	0	0	0	0	0		0
Moraleja de Matacabras	0	0	0	0	0		0
Muñana	2	0	2	0	8	1	9
Muñico	0	0	0	0	0		0
Muñogalindo	0	0	0	0	0	1	1
Muñogrande	0	0	0	0	0		0
Muñomer del Peco	0	0	0	0	0		0
Muñopepe	0	0	0	0	0		0
Muñosancho	0	0	0	0	0		0
Muñotello	0	0	0	0	0		0
Narrillos del Álamo	0	0	0	0	0		0
Narrillos del Rebollar	0	0	0	0	0		0
Narros de Saldueña	0	0	0	0	0		0
Narros del Castillo	0	0	0	0	0		0
Narros del Puerto	0	0	0	0	0		0
Nava de Arévalo	0	0	0	0	0	1	1
Nava del Barco	0	0	0	0	0		0
Navacepedilla de Corneja	0	0	0	0	0		0
Navadijos	0	0	0	0	0		0
Navaescurial	0	0	0	0	0		0
Navahondilla	0	0	0	0	0		0
Navalacruz	0	0	0	0	0		0
Navalmoral de la Sierra	0	0	0	1	1	1	2
Navalonguilla	0	0	0	0	0	1	1
Navalosa	0	0	0	0	0	1	1
Navalperal de Pinares	1	0	1	0	4	1	5
Navalperal de Tormes	0	0	0	0	0	1	1
Navaluenga	3	0	3	2	14	1	15
Navaquesera	0	0	0	0	0		0
Navarredonda de Gredos	1	0	1	1	5	1	6
Navarredondilla	0	0	0	0	0	1	1
Navarrevisca	1	0	1	0	4	1	5
Las Navas del Marqués	5	1	7	2	30	2	32
Navatalgordo	0	0	0	0	0		0
Navatejares	0	0	0	0	0		0
Neila de San Miguel	0	0	0	0	0		0
Niharra	0	0	0	1	1	1	2
Ojos-Albos	0	0	0	0	0		0
Orbita	0	0	0	0	0		0
El Oso	0	0	0	0	0		0
Padiernos	0	0	0	0	0	1	1
Pajares de Adaja	0	0	0	0	0		0
Palacios de Goda	0	0	0	0	0	1	1
Papatrigo	1	0	0	0	1	1	2
El Parral	0	0	0	0	0		0
Pascualcobo	0	0	0	0	0		0
Pedro Bernardo	1	0	1	0	4		4
Pedro-Rodríguez	0	0	0	0	0		0
Peguerinos	0	0	0	1	1		1
Peñalba de Ávila	0	0	0	0	0		0
Piedrahíta	4	1	5	1	22	1	23
Piedralaves	1	0	1	0	4	1	5
Poveda	0	0	0	0	0		0
Poyales del Hoyo	0	0	0	0	0	1	1
Pozanco	0	0	0	0	0		0
Pradosegar	0	0	0	0	0		0
Puerto Castilla	0	0	0	0	0	1	1
Rasueros	0	0	0	0	0		0
Riocabado	0	0	0	0	0		0
Riofrío	0	0	0	0	0		0
Rivilla de Barajas	0	0	0	0	0		0
Salobral	0	0	0	0	0		0
Salvadiós	0	0	0	0	0		0
San Bartolomé de Béjar	0	0	0	0	0		0
San Bartolomé de Corneja	0	0	0	0	0		0
San Bartolomé de Pinares	1	0	1	0	4	1	5
San Esteban de los Patos	0	0	0	0	0		0
San Esteban de Zapardiel	0	0	0	0	0		0
San Esteban del Valle	1	0	1	1	5	1	6
San García de Ingelmos	0	0	0	0	0		0
San Juan de Gredos	0	0	0	0	0		0
San Juan de la Encinilla	0	0	0	0	0		0
San Juan de la Nava	0	0	0	0	0	1	1
San Juan del Molinillo	0	0	0	0	0		0
San Juan del Olmo	0	0	0	0	0		0
San Lorenzo de Tormes	0	0	0	0	0		0
San Martín de la Vega del Alberche	0	0	0	0	0	1	1
San Martín del Pimpollar	0	0	0	0	0		0

Table A1. *Cont.*

Municipality	Bank Branches	Post Offices	ATMs	Cash Back	Access Cash Index	Pharmacies	Access Cash Index (Pharmacies)
San Miguel de Corneja	0	0	0	0	0		0
San Miguel de Serrezuela	0	0	0	0	0		0
San Pascual	0	0	0	0	0		0
San Pedro del Arroyo	3	0	3	1	13	1	14
San Vicente de Arévalo	0	0	0	0	0		0
Sanchidrián	0	0	0	1	1	1	2
Sanchorreja	0	0	0	0	0		0
Santa Cruz de Pinares	0	0	0	0	0	1	1
Santa Cruz del Valle	0	0	0	0	0	1	1
Santa María de los Caballeros	0	0	0	0	0		0
Santa María del Arroyo	0	0	0	0	0		0
Santa María del Berrocal	0	0	0	0	0	1	1
Santa María del Cubillo	0	0	0	0	0		0
Santa María del Tiétar	0	0	0	0	0	1	1
Santiago del Collado	0	0	0	0	0		0
Santiago de Tormes	0	0	0	0	0		0
Santo Domingo de las Posadas	0	0	0	0	0		0
Santo Tomé de Zabarcos	0	0	0	0	0		0
La Serrada	0	0	0	0	0		0
Serranillos	0	0	0	0	0	1	1
Sigeres	0	0	0	0	0		0
Sinlabajos	0	0	0	0	0		0
Solana de Ávila	0	0	0	0	0	1	1
Solana de Rioalmar	0	0	0	0	0		0
Solosancho	0	0	0	1	1	1	2
Sotalbo	0	0	0	1	1		1
Sotillo de la Adrada	4	1	4	3	21	2	23
El Tiemblo	3	0	4	2	17	3	20
Tiñosillos	1	0	0	1	2	1	3
Tolbaños	0	0	0	0	0		0
Tormellas	0	0	0	0	0		0
Tornadizos de Ávila	0	0	0	0	0	1	1
La Torre	0	0	0	0	0		0
Tórtoles	0	0	0	0	0		0
Umbrías	0	0	0	0	0		0
Vadillo de la Sierra	0	0	0	0	0		0
Valdecasa	0	0	0	0	0		0
Vega de Santa María	0	0	0	0	0		0
Velayos	0	0	0	0	0	1	1
Villaflor	0	0	0	0	0		0
Villafranca de la Sierra	0	0	0	0	0	1	1
Villanueva de Ávila	0	0	0	0	0	1	1
Villanueva de Gómez	0	0	0	0	0		0
Villanueva del Aceral	0	0	0	0	0		0
Villanueva del Campillo	0	0	0	0	0		0
Villar de Corneja	0	0	0	0	0		0
Villarejo del Valle	0	0	0	0	0	1	1
Villatoro	0	0	0	0	0	1	1
Viñegra de Moraña	0	0	0	0	0		0
Vita	0	0	0	0	0		0
Zapardiel de la Cañada	0	0	0	0	0		0
Zapardiel de la Ribera	0	0	0	0	0		0

Source: Author´s elaboration based on data from Bankia BFA, Banco Santander-Popular, Banco Sabadell, Bankinter, BBVA (Banco de Bilbao-Vizcaya Argentaria), Caixabank, Unicaja Banco, ING Direct, Citibank, Deutsche Bank, Ibercaja, Cajamar, Caja rural de Salamanca. The state postal agency "Correos" and the Ávila Official College of Pharmacists.

Table A2. Descriptive statistics of the survey carried out: Age.

Age	Frequency	Percentage	Valid Percentage	Accumulated Percentage
<18	8	1.6	1.6	1.6
>65	16	3.1	3.1	4.7
18–24	68	13.3	13.3	18
25–34	174	3. 4	3. 4	52
35–44	114	22.3	22.3	74.2
45–54	60	11.7	11.7	85.9
55–64	72	14.1	14.1	100
Total	512	100	100	

Source: Author's elaboration based on data from an online survey.

Table A3. Descriptive statistics of the survey carried out: Sex.

Sex	Frequency	Percentage	Valid Percentage	Accumulated Percentage
Man	226	44.1	44.1	44.1
Woman	284	55.5	55.5	99.6
I prefer not to say	2	0.4	0.4	100
Total	512	100	100	

Source: Author´s elaboration based on data from an online survey.

Table A4. Descriptive statistics of the survey carried out: Training level (studies).

Training Level (Studies)	Frequency	Percentage	Valid Percentage	Accumulated Percentage
Do not know, no answer	8	1.6	1.6	1.6
Primary	10	2	2	3.5
High school	80	15.6	15.6	19.1
No studies	2	0.4	0.4	19.5
University	412	80.4	80.4	100
Total	512	100	100	

Source: Author´s elaboration based on data from an online survey.

Table A5. Descriptive statistics of the survey carried out: Current main occupation.

Current Main Occupation	Frequency	Percentage	Valid Percentage	Accumulated Percentage
Self-worker	26	5.1	5.1	5.1
Unemployed	32	6.3	6.3	11.3
Student	66	12.9	12.9	24.2
Retired	22	4.3	4.3	28.5
Do not know, no answer	4	0.8	0.8	29.3
Others	22	4.3	4.3	33.6
Active worker	340	66.4	66.4	100
Total	512	100	100	

Source: Author´s elaboration based on data from an online survey.

Table A6. Descriptive statistics of the survey carried out: Income of the family unit.

Income of the Family Unit	Frequency	Percentage	Valid Percentage	Accumulated Percentage
<€14,000	88	17.2	17.2	17.2
€14,000,001-25,000	4	0.8	0.8	18
€25,000.001-€ 35,000	166	32.4	32.4	50.4
€ 35,000.001-€ 50,000	104	20.3	20.3	70.7
€50,000.001-€ 100,000	98	19.1	19.1	89.8
>€100,000	52	10.2	10.2	100
Total	512	100	100	

Source: Author´s elaboration based on data from an online survey.

Table A7. Descriptive statistics of the survey carried out: Size of the municipality of residence.

Size of the Municipality of Residence	Frequency	Percentage	Valid Percentage	Accumulated Percentage
<1000	34	6.6	6.6	6.6
1000–10,000	36	7	7	13.7
10,000.1–50,000	112	21.9	21.9	35.5
50,000.1–100,000	330	64.5	64.5	100
Total	512	100	100	

Source: Author´s elaboration based on data from an online survey.

Table A8. Descriptive statistics of the survey carried out: Do you know what a virtual currency is?

Do you Know What a Virtual Currency Is?	Frequency	Percentage	Valid Percentage	Accumulated Percentage
No, I don't know what a digital currency is.	172	33.6	33.6	33.6
Yes, I know what a digital currency is.	340	66.4	66.4	100
Total	512	100	100	

Source: Author´s elaboration based on data from an online survey.

Table A9. Descriptive statistics of the survey carried out: If the European Central Bank launched a virtual currency, would you continue to use traditional cash, would you reduce it use in favor of digital or would you replace traditional cash with digital?

If the European Central Bank Launched a Virtual Currency:	Frequency	Percentage	Valid Percentage	Accumulated Percentage
I would reduce the use of traditional cash	220	43	43	43
I would continue to use traditional cash (coins and bills)	128	25	25	68
I would substitute traditional cash for digital cash	164	32	32	100
Total	512	100	100	

Source: Author´s elaboration based on data from an online survey.

Table A10. Variance, asymmetry, standard error of skewness, kurtosis, and kurtosis standard error.

	Age	Sex	Training Level (Studies)	Current Main Occupation	Income of the Family Unit	Size of the Municipality of Residence
Variance	1859	0.260	0.216	1448	1574	1357
Skewness	0.421	−0.077	−2066	1910	0.363	−0.511
Standard error of skewness	0.131	0.131	0.131	0.131	0.131	0.131
Kurtosis	−0.546	−1676	7086	3217	−0.678	0.526
Kurtosis standard error	0.261	0.261	0.261	0.261	0.261	0.261

Source: Author´s elaboration based on data from an online survey and SPSS Statistics.

References

1. BOE-Boletín Oficial del Estado. Diario de sesión del Congreso de los Diputados de España, del día 24 de abril de 2020. 2020. Available online: http://www.congreso.es/public_oficiales/L14/CONG/BOCG/D/BOCG-14-D-73.PDF (accessed on 2 June 2020).
2. BOE-Boletín Oficial del Estado. Tratado de Funcionamiento de la Unión Europea. 2020. Available online: https://www.boe.es/doue/2010/083/Z00047-00199.pdf (accessed on 2 June 2020).
3. European Parliament. Financial Exclusion in Rural Areas. 2020. Available online: https://www.europarl.europa.eu/doceo/document/E-8-2017-005311_ES.html (accessed on 8 August 2020).
4. Instituto Valenciano de Investigaciones Económicas. La Población Sin Acceso a Una Sucursal Bancaria en Su Municipio Aumenta un 34% Desde 2008. 2020. Available online: https://www.ivie.es/es_ES/la-poblacion-sin-acceso-una-sucursal-bancaria-municipio-aumenta-34-desde-2008/ (accessed on 3 July 2020).
5. Eurostat. Population Density by NUTS 3 Region: Spain. 2020. Available online: https://ec.europa.eu/eurostat/web/products-datasets/-/demo_r_d3dens (accessed on 8 August 2020).
6. Eurostat. Population Density by NUTS 3 Region: Europe. 2020. Available online: https://appsso.eurostat.ec.europa.eu (accessed on 8 August 2020).
7. Sarma, M. Index of Financial Inclusion—A measure of financial sector inclusiveness. In *Centre for International Trade and Development, School of International Studies Working Paper*; Jawaharlal Nehru University: Delhi, India, 2012.
8. Citibank. Outstanding Leaders in Financial Inclusion: Ecuador. 2020. Available online: https://seepnetwork.org/files/galleries/1433_SPANISH-FINAL-RFR-compressed.pdf (accessed on 8 August 2020).
9. Solo, T.M. Financial exclusion in Latin America—or the social costs of not banking the urban poor. *Environ. Urban* **2008**, *20*, 47–66. [CrossRef]
10. Le, T.H.; Chuc, A.T.; Taghizadeh-Hesary, F. Financial inclusion and its impact on financial efficiency and sustainability: Empirical evidence from Asia. *Borsa Istanb. Rev.* **2019**, *19*, 310–322. [CrossRef]
11. Yin, X.; Xu, X.; Chen, Q.; Peng, J. The Sustainable Development of Financial Inclusion: How Can Monetary Policy and Economic Fundamental Interact with It Effectively? *Sustainability* **2019**, *11*, 2524. [CrossRef]

12. World Bank. Inclusión Financiera Es Un Factor Clave Para Reducir la Pobreza e Impulsar la Prosperidad. 2020. Available online: https://www.bancomundial.org/es/topic/financialinclusion/overview (accessed on 1 July 2020).

13. United Nations. La Guía de los Vagos Para Salvar el Mundo. 2020. Available online: https://www.un.org/sustainabledevelopment/es/takeaction/ (accessed on 3 June 2020).

14. Martin-Oliver, A. Financial exclusion and branch closures in Spain after the Great Recession. *Reg. Stud.* **2019**, *53*, 562–573. [CrossRef]

15. Akhalumeh, P.; Ohiokha, F. Nigeria's cashless economy: The imperatives. *Int. J. Manag. Bus. Stud.* **2012**, *22*, 31–36.

16. Storti, C.C.; De Grauwe, P. 13 Monetary policy in a cashless society. In *Technology and Finance: Challenges for Financial Markets, Business Strategies and Policy Makers*; Routledge: London, UK, 2003; Volume 17, p. 250.

17. Warwick, D.R. Toward a cashless society. *Futurist* **2004**, *38*, 38–42.

18. Garcia-Swartz, D.; Hahn, R.; Layne-Farrar, A. The Move Toward a Cashless Society: Calculating the Costs and Benefits. *Rev. Netw. Econ.* **2006**, *5*. [CrossRef]

19. Papadopoulos, G. Electronic Money and the Possibility of a Cashless Society. *SSRN Electron. J.* **2007**. [CrossRef]

20. Khan, J.; Craig-Lees, M. "Cashless" Transactions: Perceptions of Money in Mobile Payments. *Int. Bus. Econ. Rev.* **2009**, *1*.

21. Lorenz, W. Moving Away from Cash. *Card Technol. Today* **2009**, *21*, 12–14. [CrossRef]

22. Bonhage, B. Eurocheque: Creating a 'Common Currency' European Infrastructure for the Cashless Mass Payments System. In *Materializing Europe*; Badenoch, A., Fickers, A., Eds.; Palgrave Macmillan: London, UK, 2010.

23. Parihar, M. 'Cashless Society'—A Financial 'Paradigm Shift' Through Social Networking. *SSRN Electron. J.* **2011**. [CrossRef]

24. Alawiye-Adams, A. Evaluating the systemic transition to a cashless economy in Nigeria. *SSRN Electron. J.* **2012**. [CrossRef]

25. Akinola, O.S. Cashless society, problems and prospects, data mining research potentials. *Int. J. Comput. Sci. Telecommun.* **2012**, *3*, 49–55.

26. Feige, E. *The Myth of the Cashless Society: How Much of America's Currency Is Overseas? The Usage, Costs and Benefits of Cash: Theory and Evidence from Macro and Micro Data*; MPRA Paper No. 42169; Deutsche Bundesbank, Eurosystem: Munich, Germany, 2012.

27. Hasan, I.; De Renzis, T.; Schmiedel, H. Retail Payments and Economic Growth. *SSRN Electron. J.* **2012**, 1–37. [CrossRef]

28. Ezuwore-Obodoekwe, C.N.; Eyisi, A.S.; Emengini, S.E.; Chukwubuzo, A.F. A Critical Analysis of Cashless Banking Policy in Nigeria. *IOSR J. Bus. Manag.* **2014**, *16*, 30–42. [CrossRef]

29. Krüger, M.; Seitz, F. *Costs and Benefits of Cash and Cashless Payment Instruments: Overview and Initial Estimates*; Deutsche Bundesbank: Frankfurt, Germany, 2014.

30. McLeay, M.; Radia, A.; Thomas, R. El Dinero En La Economía Moderna: Una Introducción. *Rev. Econ. Inst.* **2015**, *17*, 333. [CrossRef]

31. Tee, H.; Ong, H. Cashless Payment and Economic Growth. *Financ. Innov.* **2016**, *2*, 16. [CrossRef]

32. Engert, W.; Fung, B.; Hendry, S. *Is a Cashless Society Problematic? Staff DiscussionPaper/Document d'analysedu personnel2018-12*; Bank of Canada: Ottawa, ON, Canada, 2018.

33. Masciandaro, D.; Cillo, A.; Borgonovo, E.; Caselli, S.; Rabitti, G. Cryptocurrencies, Central Bank Digital Cash, Traditional Money: Does Privacy Matter? *SSRN Electron. J.* **2018**. [CrossRef]

34. Fabris, N. Cashless Society—The Future of Money or a Utopia? *J. Cent. Bank. Theory Pract.* **2019**, *8*, 53–66. [CrossRef]

35. Arvidsson, N. The Future of Cash in Sweden. In *Building a Cashless Society*; Springer: Berlin/Heidelberg, Germany, 2019; pp. 75–84. [CrossRef]

36. Gómez-Fernández, N.; Albert, J. ¿Es la Eurozona un área óptima para suprimir el efectivo? Un análisis sobre la inclusión financiera y el uso de efectivo. *Cuad. Econ.* **2019**, *43*. [CrossRef]

37. European Central Bank. *Dictamen Sobre las Limitaciones a los Pagos en Efectivo, en Respuesta a la Solicitud del Banco de España, en Nombre de la Secretaría de Estado de Hacienda*; European Central Bank: Frankfurt, France, 2019; p. 1.

38. Náñez Alonso, S. Activities and Operations with Cryptocurrencies and Their Taxation Implications: The Spanish Case. *Laws* **2019**, *8*, 16. [CrossRef]

39. Goh, Y.Y.; Leong, S.H.; Pang, M.W.; Yew, S.K.; Yow, Z.L. The Effects of Cashless Payments on Corruption. Bachelor's Thesis, Universiti Tunku Abdul Rahmanutar, Kampar, Malaysia, April 2019.

40. Náñez Alonso, S.; Echarte Fernández, M.; Sanz Bas, D.; Kaczmarek, J. Reasons Fostering or Discouraging The Implementation Of Central Bank-Backed Digital Currency: A Review. *Economies* **2020**, *8*, 41. [CrossRef]

41. Bank for International Settlements. *BIS Annual Economic Report, 24 June 2020*; Werner Druck & Medien AG: Basel, Switzerland, 2020.

42. Humbani, M.; Wiese, M. A cashless society for all: Determining consumers' readiness to adopt mobile payment services. *J. Afr. Bus.* **2018**, *19*, 409–429. [CrossRef]

43. Immordino, G.; Russo, F.F. Cashless payments and tax evasion. *Eur. J. Political Econ.* **2018**, *55*, 36–43. [CrossRef]

44. Cohen, N.; Rubinchik, A.; Shami, L. Towards a cashless economy: Economic and socio-political implications. *Eur. J. Political Econ.* **2020**, *61*, 101820. [CrossRef]

45. Lombardi, M. Italy: A Cashless Society? 2018. Available online: http://tesi.luiss.it/21905/1/204071_LOMBARDI_MARIO_ITALY%20CASHLESS%20SOCIETY_%20.pdf (accessed on 24 August 2020).

46. World Bank. How to Measure Financial Inclusion. 2020. Available online: https://www.worldbank.org/en/topic/financialinclusion/brief/how-to-measure-financial-inclusion (accessed on 15 June 2020).

47. World Bank. Global Findex. 2020. Available online: https://globalfindex.worldbank.org/ (accessed on 15 June 2020).

48. International Monetary Fund. Financial Access Survey 2019. 2020. Available online: https://data.imf.org/?sk=E5DCAB7E-A5CA-4892-A6EA-598B5463A34C (accessed on 15 June 2020).

49. Végső, T. Comparative Analysis of the Changes in Cash Demand in Hungary. *Financ. Econ. Rev.* **2020**, *19*, 90–118. [CrossRef]

50. Chaveesuk, S.; Vanitchatchavan, P.; Wutthirong, P.; Nakwari, P.; Jaikua, M.; Chaiyasoonthorn, W. The Acceptance Model toward Cashless Society in Thailand. In Proceedings of the 9th International Conference on Information Communication and Management, Prague, Czech Republic, 23–26 August 2019; pp. 190–195.

51. Athique, A. A Great Leap of Faith: The Cashless Agenda in Digital India. *New Media Soc.* **2019**, *21*, 1697–1713. [CrossRef]

52. Hastomo, A.; Aras, M. Influence of Cashless Society Socialization toward Trust Transaction Culture in Jakarta, Indonesia. *Humaniora* **2018**, *9*, 1–13. [CrossRef]

53. Kadar, H.H.B.; Sameon, S.S.B.; Din, M.B.M.; Rafee, P.A.B.A. Malaysia towards Cashless Society. In *International Symposium of Information and Internet Technology*; Springer: Cham, Germany, 2018; pp. 34–42.

54. Gas, S. Mobile Money, Cashless Society and Financial Inclusion: Case Study on Somalia and Kenya. *SSRN Electron. J.* **2017**. [CrossRef]

55. Moon, W. A Coinless Society as a Bridge to a Cashless Society: A Korean Experiment. In *Cash in East Asia*; Springer: Berlin/Heidelberg, Germany, 2017; pp. 101–105. [CrossRef]

56. Omotoso, K.; Muyiwa, A. Prospects of Nigeria's ICT infrastructure for e-commerce and cashless economy. *Br. J. Econ. Manag. Trade* **2016**, *13*, 1–10. [CrossRef]

57. Burikoko, T. Mapping Mobile Money in Rwanda: The Mvisa Project. In Proceedings of the International Conference "InterCarto/InterGIS", Braunschweig, Germany, 10–14 March 1997; Volume 1, p. 145. [CrossRef]

58. Evans, J.; Tischer, D.; Davies, S. *Geographies of Access to Cash: Identifying Vulnerable Communities in a Case Study of South Wales*; Personal Finance Research Centre (PFRC), University of Bristol: Bristol, UK, 2020.

59. Tischer, D.; Evans, J.; Davies, S. *Mapping the Availability of Cash a Case Study of Bristol's Financial Infrastructure*; Personal Finance Research Centre (PFRC), University of Bristol: Bristol, UK, 2019.

60. Delaney, L.; O'Hara, A.; Finlay, R.; Reserve Bank of Australia. Cash Withdrawal Symptoms. 2019. Available online: https://www.rba.gov.au/publications/bulletin/2019/jun/pdf/cash-withdrawal-symptoms.pdf (accessed on 24 August 2020).

61. Swedish Government. 'Secured Access to Cash', Media Release. 16 April 2020. Available online: https://www.riksbank.se/en-gb/payments--cash/the-riksbanks-task-in-relation-to-payments/secure-access-to-cash---report-from-the-riksbank-committee/ (accessed on 24 August 2020).

62. Cadete de Matos, J.; D'Aguiar, L. Assessing Financial Inclusion in Portugal from the Central Bank's Perspective. In Proceedings of the Bank of Morocco—CEMLA—IFC Satellite Seminar at the ISI World Statistics Congress on "Financial Inclusion", Marrakech, Morocco, 14 July 2017; Available online: https://www.bis.org/ifc/publ/ifcb47a.pdf (accessed on 24 August 2020).

63. Community Access to Cash Pilots. 2020. Available online: https://communityaccesstocashpilots.org/ (accessed on 24 August 2020).

64. Ceeney, N. UK Finance Responds to the Launch of the Community Access to Cash Pilots Initiative, UK Finance. 2020. Available online: https://www.ukfinance.org.uk/press/press-releases/uk-finance-responds-launch-community-access-cash-pilots-initiative (accessed on 24 August 2020).

65. Lowman, J. Association of Convenience Stores Welcomes New Community Access to Cash Initiative. 2020. Available online: https://www.acs.org.uk/news/acs-welcomes-new-community-access-cash-initiative (accessed on 24 August 2020).

66. Vana, P.; Lambrecht, A.; Bertini, M. Cashback Is Cash Forward: Delaying a Discount to Entice Future Spending. *J. Mark. Res.* **2018**, *55*, 852–868. [CrossRef]

67. Datta, S.K.; Singh, K. Variation and determinants of financial inclusion and their association with human development: A cross-country analysis. *IIMB Manag. Rev.* **2019**, *31*, 336–349. [CrossRef]

68. Consulting, C. Acta Sanitaria: España Cuenta Con la Red de Farmacias Comunitarias Más Grande de Europa. 2020. Available online: https://www.actasanitaria.com/espana-cuenta-con-la-red-de-farmacias-comunitarias-mas-grande-de-europa/ (accessed on 15 June 2020).

69. Jorge, J.; Chivite, M.P.; Salinas, F. La transformación digital en el sector cooperativo agroalimentario español: Situación y perspectivas. *CIRIEC España Rev. Econ. Pública Soc. Coop.* **2019**, *95*, 39–70. [CrossRef]

70. Jorge Vázquez, J. La economía colaborativa en la era digital: Fundamentación teórica y alcance económico. In *Economía Digital y Colaborativa: Cuestiones Económicas y Jurídicas*; Náñez, S.L., Ed.; Università degli Studì Suor Orsola Benincasa: Naples, Italy, 2019.

71. Sánchez Cano, J. El Bitcoin y Su Demanda Exponencial de Energía. *Panor. Econ.* **2019**, *14*, 85. [CrossRef]

72. Dolader-Retamal, C.; Bel-Roig, J.; Muñoz-Tapia, J.L. La Blockchain: Fundamentos, Aplicaciones y Relación Con Otras Tecnologías Disruptivas. *Econ. Ind.* **2017**, *405*, 33–40.

73. Slattery, T. Taking a Bit Out of Crime: Bitcoin and Cross-Border Tax Evasion. *Brooklyn J. Int. Law* **2014**, *39*, 829.

74. Campbell-Verduyn, M. Bitcoin, Crypto-Coins, and Global Anti-Money Laundering Governance. *Crime Law Soc. Chang.* **2018**, *69*, 283–305. [CrossRef]

75. Diez de los Rios, A.; Zhu, Y. *CBDC and Monetary Sovereignty, No 2020-5*; Staff Analytical Notes from Bank of Canada; Bank of Canada: Ottawa, ON, Canada, 2020.

76. Schuh, S.; Stavins, J. Why are (Some) Consumers (Finally) Writing Fewer Checks? The Role of Payment Characteristics. *SSRN Electron. J.* **2009**, *34*, 1745–1758. [CrossRef]

77. Arango, C.; Huynh, K.; Sabetti, L. *How Do You Pay? The Role of Incentives at the Point-of-Sale*; Bank of Canada Working Paper 2011-23; Bank of Canada: Ottawa, ON, Canada, 2011.

78. Von Kalckreuth, U.; Schmidt, T.; Stix, H. Choosing and Using Payment Instruments: Evidence from German Microdata. *Empir. Econ.* **2013**, *46*, 1019–1055. [CrossRef]

79. Wang, X.; He, G. Digital Financial Inclusion and Farmers' Vulnerability to Poverty: Evidence from Rural China. *Sustainability* **2020**, *12*, 1668. [CrossRef]

80. Náñez Alonso, S.L. The Tax Incentives in the IVTM and "Eco-Friendly Cars": The Spanish Case. *Sustainability* **2020**, *12*, 3398. [CrossRef]

81. Náñez Alonso, S.L.; Reier Forradellas, R. Tax Incentives in Rural Environment as Economic Policy and Population Fixation. Case study of Castilla-León Region. In *Business, Economics and Science Common Challenges*; Bernat, T., Duda, J., Eds.; Filodiritto Editore: Bologna, Italy, 2020; pp. 205–210. [CrossRef]

82. Engert, W.; Fung, B. *A Uniform Currency in a Cashless Economy*; Staff Analytical Note/Note Analytique du Personnel—2020-7; Bank of Canada: Ottawa, ON, Canada, 2020; p. 5.