# Questioni di Economia e Finanza

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(Occasional Papers)

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# REGIONAL DIFFERENCES IN RETAIL PAYMENT HABITS IN ITALY

by Guerino Ardizzi[*], Elisa Bonifacio[*], Cristina Demma[§] and Laura Painelli[*]

## Abstract

Economic operators have a number of different procedures and instruments for regulating their cashless monetary transactions safely and quickly. Nevertheless, divergences in the use of non-cash payment instruments persist among European countries and, in Italy, between the Centre and North and the southern regions. In this paper, we study which factors are associated with the backwardness of South and Islands in the use of non-cash payment instruments. We focus on the period 2013-18, when there was a widespread increase in non-cash transactions among the main advanced economies, spurred by technological innovation and the new legal framework supporting security, efficiency and transparency in digital payments. We find that the main factors associated with a lower demand for cash are technological innovation in payments and the population's digital skills and education levels; criminality and tax evasion are also significantly and positively correlated to the use of cash, but their correlations with the observed heterogeneity among Italian provinces are not predominant.

## Contents

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[*] Bank of Italy, Directorate General for Currency Circulation and Retail Payments, Retail Payment Instruments and Services Directorate.

[§] Bank of Italy, Economic Research Unit, Palermo Branch.

## 1. Introduction[1]

The world of retail payments has evolved rapidly in recent years. Economic agents have different procedures for regulating cashless economic transactions while instruments enabling safe payments are spreading faster and faster. Nevertheless, cash continues to play a leading role, especially for small transactions (Rocco, 2019). In the euro area, the leading role of cash may depend on the fact that, according to ECB estimates, only 30 per cent of monetary circulation is destined for transactional purposes (ECB, 2017), while the main part is utilized as a store of value and for precautionary purposes (Bech *et al.*, 2018).

The use of alternative instruments to cash for transactional purposes is growing in the main advanced economies; nevertheless, we can observe a wide territorial heterogeneity in the use of these payment methods. In 2018, Italy was the last country in the euro area for payment instruments other than cash expressed as the number of transactions per inhabitant (111 payments against 265 transactions in the Eurozone). The territorial heterogeneity appears broad even among the Italian regions: the use of instruments other than cash is significantly lower in the South and Islands. These differences may reflect development factors, such as income levels, or structural factors such as the different production structure – also in terms of average firm size – and the supply of bank services (Ardizzi and Iachini, 2013).

We analyse which factors can contribute to explaining these territorial gaps, given that the limited diffusion of payment instruments could negatively affect economic growth (Hasan et al, 2013; Panetta, 2013; Schmiedel et al., 2012). The increase in the use of non-cash payment instruments actually has a positive impact on the economy, because they come at a lower cost and ensure greater efficiency and transparency in economic transactions. The use of non-cash payment instruments can significantly reduce the costs for the production, distribution and storage of banknotes and the risks associated with security (Signorini, 2019) and lead to a significant reduction in the social cost of exchanges: according to the Survey on the social costs of payments conducted by ECB in 2010, in Italy more than half of this value is due to the use of cash, compared with 40 per cent on average in the European countries participating in the Survey (Bank of Italy, 2012).[2] The results of the second survey on the social cost of payments for the period 2009-2016 confirm that, relative to the average amount per transaction, cash is the most expensive instrument and indicates an overall saving of resources due to the gradual migration to electronic instruments (Bank of Italy, 2020).

The use of non-cash payment instruments could also support economic growth and reduce the delay in the digitalization of the Italian economy (Signorini, 2019) which, according to data processed by the European Commission, is very limited by international standards (see Section 2). Furthermore, technological innovation in payments supports banking efficiency in terms of lower operational costs for the benefit of the economic system as a whole (Ardizzi et al., 2019a).

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[2] The social cost of payments is defined as the sum of the costs incurred by the general public for the resources used by the various economic operators for the settlement of transactions. More in detail, social costs are calculated as the sum of the costs borne by the individual participants (private costs) included in the survey, net of the intermediate flows between operators (i.e. the fees paid by merchants to banks).

Finally, the traceability and transparency of non-cash transactions limit illicit transactions and help in hampering the development of the illegal and underground economy (Immordino and Russo, 2018).

Broadly speaking, there is a positive correlation between total factor productivity and the number of electronic payments, also at international level (Ardizzi, 2012; Ardizzi and Iachini, 2013), and the inclusion of data on electronic payments enables a better measurement of macroeconomic indicators (Aprigliano et al., 2019; Ardizzi et al., 2019b) and of the degree of financial inclusion of the population (Nuzzo and Piermattei, 2019).

We depart from the analysis carried out by Ardizzi and Iachini (2017) that studied whether the North-South gap within Italy can explain the widespread use of cash during 2005-12. We analyse the dynamics of non-cash payments in Italy between 2013 and 2018, which differ from the previous years for several reasons. First of all, in this period, in the main advanced economies the volume of non-cash payments grew at significantly higher rates than in the years 2005-12 (see Figure a1 in the Appendix).[3] Secondly, during the period that we analyse, a new legal framework supported security, efficiency and transparency in digital payments, spurring the use of these instruments.[4] Furthermore, banks in Italy have started offering technologically innovative payment services, such as smartphone applications and mobile payments, since the first years of this decade (Figure a2). Technological innovation and the new legal framework could change retail payment habits, as proven by the significant increase in the use of non-cash payment instruments, making it interesting to study which factors can contribute to explaining territorial gaps in Italy between 2013 and 2018. Finally, we study this period because we consider data reported to the Bank of Italy by banks and financial intermediaries; the latter have been reporting homogenous data on payments at regional level since 2013.

Since we cannot control properly for endogeneity issues, our results cannot be interpreted as a causality nexus but as correlations.

The paper is organized as follows. In Section 2 we illustrate the territorial differences in the use of non-cash payment instruments among EU countries and among the Italian regions. In Section 3 we analyse the literature and discuss which factors are able to influence payment choices; in Section 4 we estimate some econometric specifications that allow us to verify which elements can explain provincial disparities in the use of the different means of payment in Italy. Section 5 concludes.

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[3] With the exception of Sweden, where growth occurred at the same rate in both periods. Furthermore, we cannot analyse the dynamics of non-cash transaction in Japan between 2013 and 2018 because data on non-cash transactions for this country are available until 2012.

[4] We refer to the entry into force of these measures: the 'end date' SEPA Regulation (Regulation EU 2012/260) requiring banks and firms to use pan-European payment instruments by 1 February 2014 (with some exceptions); the Payment Account Directive (Directive 2014/92/EU); the Revised Payment Services Directive (PSD2; Directive 2015/2366/EU); the Interchange Fee Regulation (Regulation (EU) 2015/751); the 2012 'Development-bis' Decree, the Economic Development Ministry Decree of 24 January 2014 (the 'POS Decree') and the Stability Law for 2016 (and following implementing decrees) requiring Italian merchants to accept payments by card (with some exceptions).

## 2. Territorial heterogeneity in retail payment habits

### 2.1 International comparison: Italy-euro area

In 2013-18 in the euro area, against the background of an average annual growth of the population of 0.3 per cent and of 2.9 per cent of per capita GDP, the number of per capita non-cash transactions increased by about 6 per cent.

As to the geographical breakdown, the weight of the different euro-area countries remained almost the same, with more mature economies with per capita number of transactions well above the euro-area average (265 in 2018); nevertheless, the countries with lower numbers of per capita transactions showed growth rates of between 8 and 37 per cent in the same period. Italy recorded a growth of 8.4 per cent, with 111 per capita transactions in 2018.

The payment instruments' mix also stayed almost unchanged (Figure 1.a): the number of card transactions increased the most between 2013 and 2018 in the whole area (+10.4 per cent), while the use of cheques decreased by 8 per cent; e-money transactions grew by 9 per cent in the same period, although this figure reflects a non-harmonized definition among different countries: for instance, Italian e-money transactions include prepaid cards, while in other countries, where the occurrence is more limited or non-existent, they are included in the figure for payment cards.

**Figure 1**

### Number of payments in 2018



a) Non-cash payments
*(number of transactions)*

E-money payment transactions
Other payment services
Cheques
Direct debits
Credit transfers
Card payments

(b) Credit transfers initiated electronically
*(% of total number of transactions)*
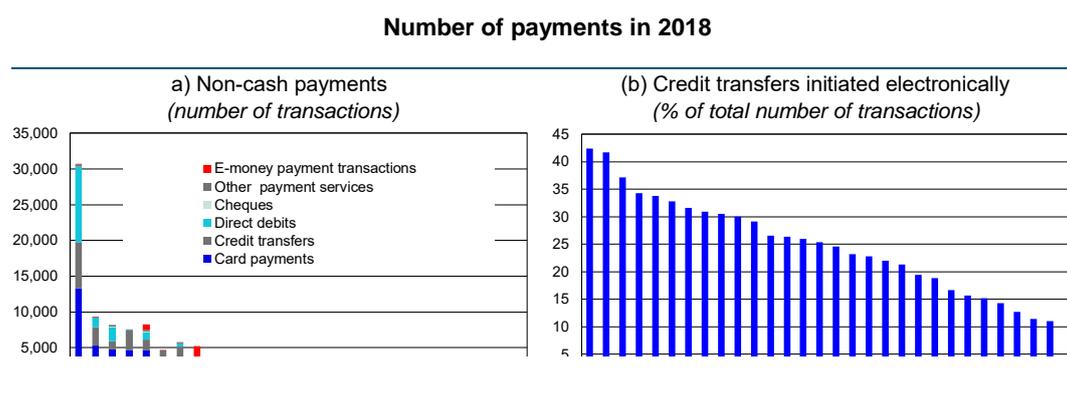
Source: ECB, Blue Book, 2019.

As a matter of fact, a better measure of the degree of use of e-money transactions is the number of credit transfers initiated electronically. In 2018 in the euro area, these transactions represented 21.3 per cent of total services, while in Italy they were well under the euro-area average, at 11.4 per cent (Figure 1.b).

A comparison among EU countries shows that some of them are affected by a generalized digital delay, which results in a lower use of electronic payments.

Every year the European Commission publishes the results of the Digital Economy and Society Index (DESI)[5] that monitors Europe's overall digital performance and tracks the progress of EU countries as regards their digital competitiveness. In 2018, the DESI index showed that, even if all EU countries had improved their digital performance, some of them still had a long way to go and that the EU as a whole needs to improve to be able to compete on the global stage (Figure 2). Italy is among those

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[5] The DESI overall index is calculated as the weighted average of the five main DESI dimensions: 1) Connectivity (25 per cent), 2) Human Capital (25 per cent), 3) Use of internet (15 per cent), 4) Integration of Digital Technology (20 per cent) and 5) Digital Public Services (15 per cent).

that performed worse (24th position out of 28), especially as regards the regular use of internet (three out of ten people are not regular internet users yet) and human capital, as more than half of the population still lacks basic digital skills. This behaviour affects the use of online services.

**Digital Economy and Society Index (DESI) 2019**



Source: European Commission.
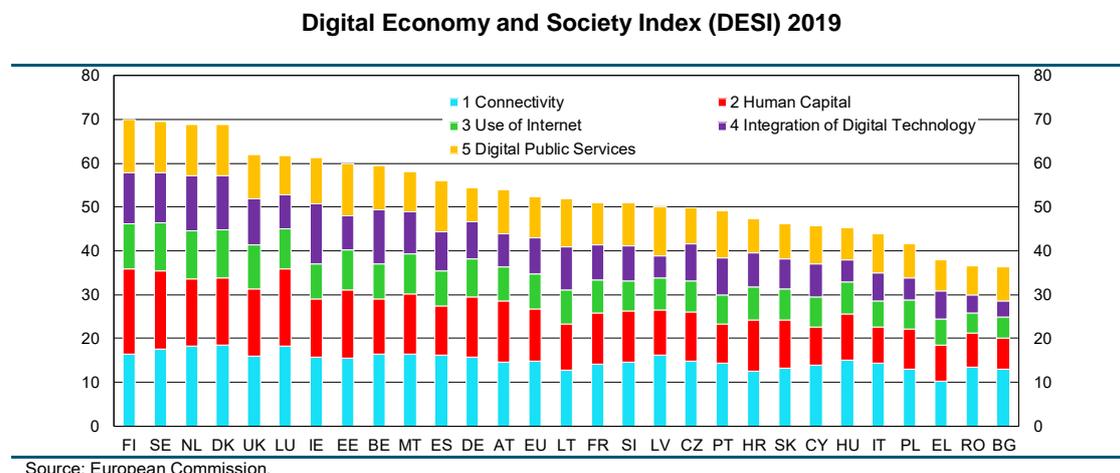
## 2.2 Regional differences in Italy

The differences in retail payment habits are also particularly marked for the Italian regions. Although in recent years the use of non-cash payment instruments has grown throughout the country, the South and Islands continues to be the geographical area with the most intense use of cash and conversely the lowest use of alternative instruments.

To measure of the use of cash, we use the cash-card ratio, an indicator proposed by Ardizzi and Iachini in 2013, which is calculated as the amount of withdrawals from ATMs as a share of the sum of the same withdrawals plus the value of payments at Points of Sale (POS).

We could have taken into account other indicators for the use of cash, such as those drawn from the Study on the Use of Cash by Households (SUCH) or the Survey on Household Income and Wealth (SHIW). In particular, the SUCH is a survey conducted by the ECB in 2016 – harmonized at European level – to estimate the number and the value of cash transactions, considering transactions with retailers. In Italy, the SUCH survey involved a sample of around 4,500 people. The SHIW is instead carried out by the Bank of Italy every two years, on a sample of about 8,000 households and makes it possible to calculate the percentage of expenditure made using cash. Unlike the SUCH, the SHIW is not limited to transactions carried out with retailers. Both surveys allow information on cash payments for transactional purposes to be obtained but, due to their sample nature, they may be not statistically representative at the provincial level, on which the econometric analysis developed in Section 4 is based. The cash-card ratio is instead an indicator calculated on data reported to the Bank of Italy by all banks and financial intermediaries at provincial level and is therefore statistically representative at this territorial level. We consider the cash-card ratio as an indicator of the demand of customers for cash who, even if they have payment cards, use them to withdraw banknotes rather than to pay via POS. The higher the cash-card ratio, the

higher the demand for cash for transaction purposes.[6] Our measure of the use of cash is significantly and positively correlated with the percentage of cash purchases on total expenditures declared by the sample of Italian households in the SHIW for the period 2014-2016 (similar to the period considered in this study).

From 2013 to 2018, the demand for cash for transaction purposes measured by the cash-card ratio fell in all the Italian regions (Figure 3.a); the decrease was roughly of the same magnitude in the Centre and North and in the South and Islands regions. However, in the latter area, the cash-card ratio remained substantially higher than the national average.

Conversely, in the same period, the number of non-cash transactions per inhabitants increased in all Italian regions. While growth was more evident in the South and Islands (46 versus 40 per cent in Italy), in 2018 the southern regions continued to be characterized by the lowest use of non-cash payments instruments (Figure 3.b). In 2018, the number of non-cash payments per capita in Lazio (the region with the highest value) was four times greater than in Basilicata (the region with the lowest value). In all the Italian regions this figure was lower than the euro-area average, implying a widespread delay throughout the national territory.

**Figure 3**

**Cash-card ratio and non-cash payments per inhabitant in Italian regions**
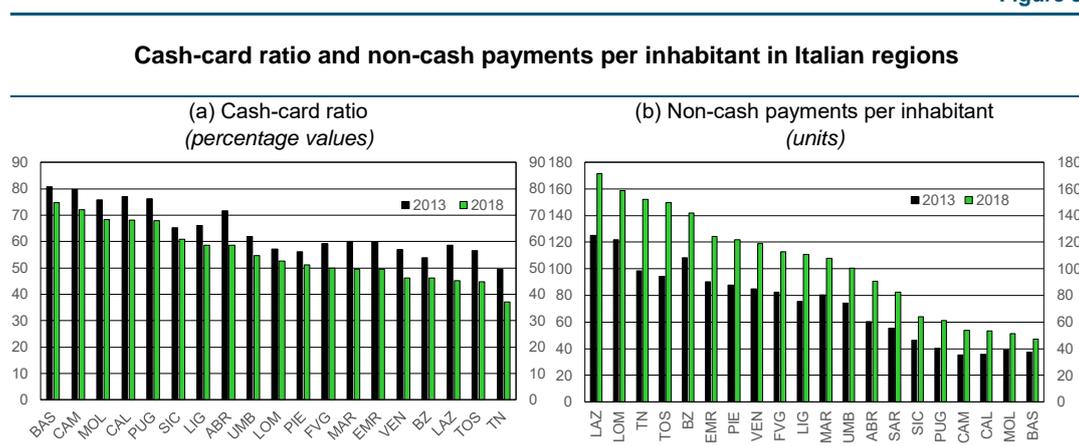


Sources: Supervisory Reports and Italian National Institute of Statistics (ISTAT).

The growth in the number of non-cash transactions was driven, in all the areas of the country (Figure 4), by card payments, which represent about 60 per cent of transactions. The number of direct debits also increased; on the other hand, the use of cheques decreased. Credit transfers increased in the Centre and North of Italy while they remained stable in the South and Islands. Payment cards were increasingly used for transactions for limited amounts: between 2013 and 2018, the unit value of card payments decreased from €75 to €63 on average in Italy. The unit value is lower for prepaid cards and higher for credit cards. Among other instruments, the average amount of direct debits and bank drafts also decreased, while that of credit transfers[7] and bank cheques remained stable. Cheques, and bank drafts in particular, which are being used less and less, continued to be the preferred instrument for larger transactions.

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[6] Unlike Ardizzi and Iachini, we do not include transactions on credit cards because the Supervisory Reports on ATM withdrawals via credit card are not available at provincial level.
[7] In the North-West, the average amount of collection orders in Lombardy is very high.

Figure 4

**Number of non-cash payments by type of transaction in Italian areas**
*(percentage changes between 2013 and 2018)*
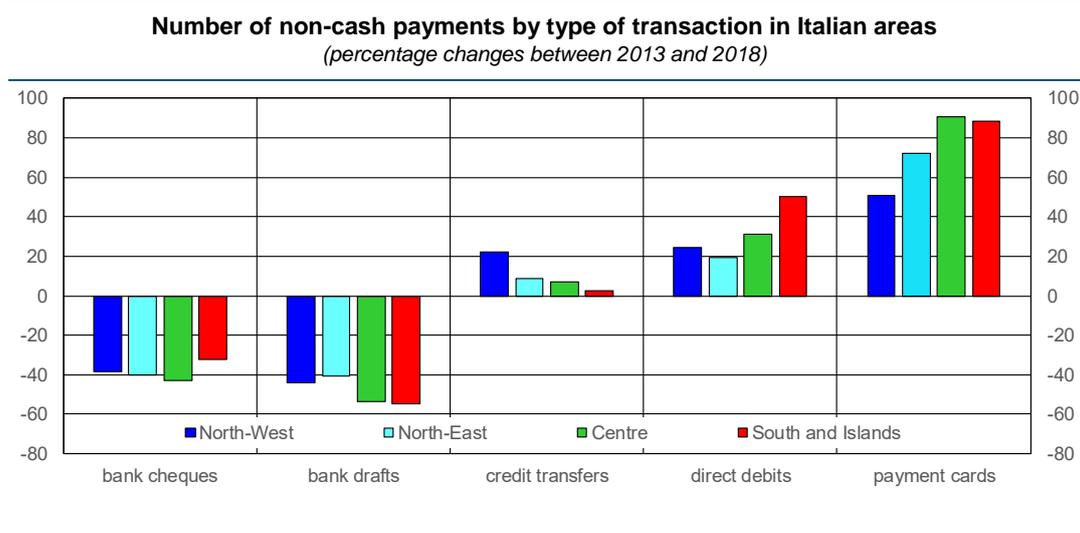


Source: Supervisory Reports.

## 3. Which factors could explain territorial differences in retail payment habits in Italy?

The high use of cash in Italy could mainly be driven by demand factors. The 2016 Survey on Household Income and Wealth carried out by the Bank of Italy makes it possible to link payment habits with households' socio-economic characteristics. Almost 40 per cent of Italian household consumption expenditure uses cash. This percentage is even higher for households living in the South and Islands (more than half), for low-income households and for those with low educational levels. In more detail, households belonging to the first two fifths of the income distribution made more than half of their expenditure in cash; this share rises to 66 per cent for households whose head has no educational qualifications and is higher for households with very young heads (under the age of 35) – also in connection with the lower levels of income inferred from the Survey – or, conversely, older (65 years and over).

Furthermore, the delay in the digitalization of the Italian economy, summarized by the DESI index, and the low basic digital skills of Italian population (see Section 2) could negatively affect the use of non-cash payment instruments – above all electronic ones – and, on the other hand, lead Italian households to use cash for their economic transactions.

This evidence is consistent with the results of Ardizzi and Iachini (2013 and 2017) that find that Italy's backwardness (South and Islands in particular) in the use of non-cash payment instruments is mainly explained by per capita income and innovative capacity, while the shadow economy is not relevant.

On the other hand, there does not seem to be a supply question. At the end of 2018, there were 3.2 million POS in Italy, the highest number in the EU and about twice the number for European countries of similar size (at the same date, the number of POS in Germany, France and Spain was 1.2, 1.8 and 1.6 million respectively).

Furthermore, the payment services offered by banks have evolved towards increasingly sophisticated technologies. According to the Regional Bank Lending Survey carried out by the Bank of Italy, in 2018 almost all banks offered their customers the possibility of remote access to payment instruments; 60 per cent of banks offered savings management services through digital channels and 70 per cent provided the possibility to carry out micro-payments and peer-to-peer electronically money transfers; finally, more than 30 per cent of banks allowed households to use internet to request financing quotes, make credit applications or sign loan agreements. The process that led to this diffusion began in the early 2000s for digital payment and asset management services, which have spread more gradually over time; the diffusion of micropayments and online household financing services came later but was faster (Figure a.2).

Finally, a greater preference for cash could be associated with high levels of tax evasion (Immordino and Russo, 2018), while it is difficult to establish a priori the relationship between crime and cash demand. On the one hand, the traceability of non-cash transactions could increase the use of cash for laundering funds of illegal origin; on the other hand, large-scale crime that involves huge sums of money often prefers cashless means of payment (Mai, 2016).

## 4. Empirical analysis

### 4.1 Econometric set-up

Following the discussion in Section 3, we analyse the differences in retail payments in Italian provinces as a function of households' socio-economic characteristics, the banks' supply of digital payment services, the diffusion of ATMs and POS, the degree of criminality and the shadow economy. Households' socio-economic characteristics are estimated by per capita income, access to a bank account, level of scholarship and digital skills.

We examine elements that can influence both the choice to use non-cash payment instruments (and, in particular, transactions with payment cards) and the demand for cash, approximated by the cash-card ratio discussed in Section 3.

We estimate these specifications:

$$Y_{p,t} = f\big(GDP_{p,t-1}, BANK_{p,t-1}, MOBILE_{p,t-1}, POS_{p,t-1}, ATM_{p,t-1},$$
$$EDUCATION_{p,t-1}, INTERNET_{p,t-1}, CRIME_{p,t-1}, EVAS_{p,t-1}\big) \qquad [1]$$

where the dependent variable *Y* is alternatively:

- *NPAGELECT*, which is the number of per capita transactions made with means other than cash, cheques and bank receipts;
- *NPAGCARD*, which is the number of transactions with payment cards per inhabitant;
- *CASH_CARD_RATIO*, which is our measure of demand for cash (cash-card ratio) as defined in Section 2.

Among the regressors, *GDP* and *BANK* are respectively the value of per capita GDP and the number of bank current accounts normalized by GDP, and describe the level of economic and financial development; *MOBILE* is a proxy of financial innovation at provincial level and is defined as the share of banks offering, in the province, services that consent mobile micropayments; *POS* and *ATM* are respectively the number of ATMs and POS normalized by GDP; *EDUCATION* is the share of the population between 25 and 64 years with no education or with only a primary school diploma; *INTERNET* is the share of population using internet at least once a week (a proxy for digital skills); *CRIME* is the number of reported crimes normalized by GDP; finally, *EVAS* is a proxy of tax evasion: given that no official data on tax evasion at provincial level are available, we consider the share of agriculture in employment as a proxy for fiscal evasion because agriculture was the sector with the highest employment irregularity rate in Italian each geographical area in 2017 (latest data available).[8]

To avoid simultaneity issues, the regressors are lagged by one year, while to tackle multicollinearity issues, we introduce variables that are highly correlated in alternative specifications (Table a2 shows the correlation coefficients among the variables).

In order to take into account the provincial idiosyncratic component of the error term, we estimate equation [1] using a panel data model. We perform a Hausman test to choose between fixed or random effects, rejecting the consistence of the latter. Based on this evidence, we estimate equation [1] using a panel model with fixed effects; however in the Appendix we also report the estimates obtained by running the pooled model and the model with random effects. The estimates are robust to heteroscedasticity and the estimation results are given in terms of elasticities (i.e. d(lny)/d(lnx)).

## 4.2 Data

In order to estimate equation [1] we built a dataset merging information on payment instruments, bank services and the socio-economic characteristics of the population.

The main data source is the reports of banks and financial intermediaries to the Bank of Italy (henceforth Supervisory Reports). Using these reports, we were able to build a rich dataset on payment transactions at provincial level from 2013 to 2018 including indicators about the demand for non-cash payment instruments, approximated by *NPAGELECT* and *NPAGCARD* and the demand for cash, estimated by *CASH_CARD_RATIO*.

From the Supervisory Reports we also drew the number of bank current accounts per inhabitant. We studied the period 2013-2018 because we also included information on financial intermediaries beginning to report homogenous data on payments at provincial level since 2013, while 2018 is the last year for which we observed this information.[9]

We merged these data with the results of the Regional Bank Lending Survey (RBLS), a special survey carried out by the Bank of Italy on about 300 Italian banks, representing almost 90 per cent of deposits and 80 per cent of loans to households in Italy. We used the wave conducted in March 2019 that included questions on services offered

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[8] As in Ardizzi and Iachini (2017), we weight the proxy of tax evasion by a GPD concentration index.
[9] Ardizzi and Iachini (2017) analysed payment habits until 2012, including data at provincial level reported by banks and Poste Italiane SpA but excluding information reported by financial intermediaries.

through digital channels in different banking activities, such as payment services and services that enable mobile micropayments.

The territorial dataset on payment transactions and bank supply has been enriched with socio-economic data on population, income, education, ICT skills and crimes and the shadow economy. These data are reported by the Italian National Institute of Statistics (ISTAT). Table a1 in the Appendix reports the definition and the main descriptive statistics of each variable while Table a2 shows the matrix correlation.

## 4.3 Results

The estimates of equation [1] obtained using a panel model with provincial fixed effects are shown in Table 1. The demand for electronic payments (*NPAGELECT*; columns (I) – (IV)) is positively correlated with the degree of financial development, while there is no significant correlation with economic development. The last result is due to the high degree of persistence over time of GDP per capita that becomes statistically insignificant when we introduce fixed effects into the estimates.[10]

Banks' supply factors are able to influence the economic agents' possibility to pay with instruments other than cash. In particular, banks' supply of mobile micropayments is positively associated with the number of electronic transactions, as well as a greater diffusion of POS, while there is no significant correlation with the diffusion of ATMs.

Tax evasion is negatively associated with customers' preference for electronic payment instruments, while the relationship with criminality is not clear: it is only negative and significant in model III, where we do not include banks' supply of mobile micropayments among the regressors.

Among the other households' socio-economic conditions, better digital skills are associated with a greater use of electronic payment instruments, while there is no significant relationship with the level of education.

Estimates of the specification for the use of payment cards (columns (V) - (VIII); Table 1) are quite similar to those of the specification of the demand for electronic payments, with the exception that the coefficients associated with the level of financial development (*BANK*) and our proxy of tax evasion (*EVAS*) are not statistically significant.

The results of the model of demand for cash (columns (IX) – (XII)) mirror those of equations for non-cash payment instruments. The demand for cash is negatively correlated to the level of financial development, the banks' supply of digital and innovative payment instruments, the diffusion of POS and the population's digital skills and education levels, while we find a positive correlation with the degree of criminality and tax evasion. Unlike the previous models, the relationship between the demand for cash and the diffusion of ATMs (making it easier for customers to withdraw cash) is positive and significant. Again, in the specification with provincial fixed effects, the coefficient associated with GDP per capita is not statistically significant given the high degree of persistence that characterizes this regressor. The magnitude of the coefficients associated with tax evasion and criminality is lower respect to those associated with the variables of banks' supply of innovative payment instruments and the population's digital skills and education levels.

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[10] There is instead a positive correlation between GDP per capita and the demand for electronic payments in the pooled specification and in the model with random effects shown in Tables a3 and a4.

**Table 1 – Fixed effects estimates** (1)

| | Dependent variable: number of electronic payments per inhabitant | | | | Dependent variable: number of transactions with payment cards per inhabitant | | | | Dependent variable: cash-card ratio | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) | (V) | (VI) | (VII) | (VIII) | (IX) | (X) | (XI) | (XII) |
| GDP | 0.950 | | | | 1.303 | | | | -0.005 | | | |
| | (0.658) | | | | (0.908) | | | | (0.251) | | | |
| BANK | 0.940* | 1.019*** | 0.184 | 0.344 | 0.917 | 0.445 | 0.228 | 0.150 | -0.202 | -0.433*** | -0.150 | -0.112 |
| | (0.524) | (0.316) | (0.340) | (0.273) | (0.814) | (0.548) | (0.514) | (0.461) | (0.192) | (0.157) | (0.120) | (0.114) |
| MOBILE | 0.458*** | 0.769*** | | 0.457*** | 0.554*** | 0.843*** | | 0.642*** | -0.204*** | -0.243*** | | -0.051 |
| | (0.118) | (0.074) | | (0.083) | (0.143) | (0.092) | | (0.111) | (0.060) | (0.040) | | (0.037) |
| POS | 0.339*** | | 0.281*** | 0.308*** | 0.242*** | | 0.227** | 0.228** | -0.067** | | -0.039 | -0.017 |
| | (0.054) | | (0.065) | (0.067) | (0.091) | | (0.098) | (0.110) | (0.029) | | (0.031) | (0.029) |
| ATM | -0.080 | -0.020 | -0.097 | -0.060 | -0.040 | -0.021 | -0.075 | -0.045 | 0.125*** | 0.101** | 0.125*** | 0.071 |
| | (0.103) | (0.118) | (0.092) | (0.123) | (0.158) | (0.163) | (0.140) | (0.171) | (0.046) | (0.046) | (0.044) | (0.048) |
| CRIME | 0.057 | -0.068 | -0.277*** | 0.025 | 0.082 | -0.021 | -0.468*** | 0.018 | -0.018 | 0.009 | 0.104*** | -0.052 |
| | (0.087) | (0.107) | (0.102) | (0.093) | (0.159) | (0.187) | (0.171) | (0.165) | (0.058) | (0.055) | (0.037) | (0.057) |
| EVAS | | -0.012* | | | | 0.000 | | | | 0.008** | | |
| | | (0.007) | | | | (0.011) | | | | (0.003) | | |
| INTERNET | | | 1.017*** | | | | 0.934*** | | | | -0.350*** | |
| | | | (0.150) | | | | (0.198) | | | | (0.073) | |
| EDUCATION | | | | -0.137 | | | | -0.055 | | | | 0.226*** |
| | | | | (0.101) | | | | (0.120) | | | | (0.042) |
| CONSTANT | -5.636 | 0.615 | 6.538*** | 5.376*** | -10.468 | 1.902 | 5.512** | 4.993** | 0.003 | 1.233** | -0.185 | 0.554 |
| | (8.394) | (1.044) | (1.393) | (1.433) | (12.082) | (1.677) | (2.171) | (2.316) | (3.113) | (0.525) | (0.583) | (0.608) |
| Obs. | 570 | 570 | 636 | 570 | 570 | 570 | 636 | 570 | 570 | 570 | 636 | 570 |
| R-squared | 0.707 | 0.681 | 0.718 | 0.706 | 0.593 | 0.578 | 0.582 | 0.588 | 0.427 | 0.427 | 0.441 | 0.472 |

(1) All coefficients are calculated in the form of d(lny)/d(lnx). Robust standard errors are reported in parentheses. Symbols: *** significant at 1%; ** significant at 5%; * significant at 10%.

## 5. Conclusions

App-based payments, contactless transactions, e-money wallets and payment initiation services: the payment ecosystem is changing rapidly. While innovations are spreading far and wide, divergences in the use of cash or electronic instruments at POS persist among European countries.

The model of demand for cash and electronic instruments that we estimated for Italy at provincial level from 2013 to 2018 shows that the main factors that can reduce the demand for cash and increase the use of electronic payment methods to substitute cash are innovation in terms of the diffusion of digital points of interaction (i.e. points of sale, internet, app mobile for micro-payments and so on) and the degree of financial literacy; criminality and tax evasion are also significantly and positively correlated to the use of cash but their correlations with the observed discontinuity among Italian provinces are not predominant.

Although Italy remains a cash-based country, promising developments have emerged recently. According to our evidence, cash usage has been reducing over the last few years in Italy, both in terms of the cash-card ratio and in terms of a higher growth rate for total electronic transactions in every Italian geographical area, pushed by electronic card payments that remain the most widely used instrument in Italy, experiencing a double-digit growth in the last few years. However, Italy continues to be characterized by a significant North/South dichotomy: in the South and Islands the lower use of non-cash payment instruments is associated with a more intensive use of debt and prepaid cards to withdraw cash from ATMs instead of paying via POS.

The increase of non-cash transactions was spurred by technological innovation and the new legal framework supporting security, efficiency and transparency in digital payments. Payment card schemes (i.e. Bancomat, Visa, Mastercard and so on) are launching tokenized debit and credit cards to be used to pay via a smartphone; the same app will allow transfers between individuals, whose accounts will immediately be debited/credited. We expect a further increase both in the volume of proximity payments at the physical points of sale (especially for contactless applications, including wallet and app mobile solutions) and through e-commerce POS, also through the use of POS instant payments, even if they are still in a start-up phase and need to adopt more appropriate business models (service costs are currently an issue) and implement additional value added services (i.e. payment guarantee mechanisms in the event of error and fraud). Finally, innovation in security is a key driver for all new developments. Confidence in digital money is crucial for replacing POS cash payments.

More recently, the health emergency and the measures to contain COVID-19 have intensified these trends. The share of online purchases using payment cards has grown throughout the country; in physical stores, the share of transactions with contact-less cards and mobile apps is growing and the use of cash seems to be decreasing. Digital payment services have therefore proved to be a fundamental resource for both firms and consumers, modifying traditional exchange processes and allowing greater continuity in their daily activities; we believe that once the emergency is over, this process will continue.

# Appendix

## Tables

### Table a1 – Descriptive statistics

| Variable | Description | 2013 | | | | 2018 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | p25 | p50 | p75 | Mean | p25 | p50 | p75 |
| NPAGELECT | Per capita number of payments with instruments other than cash, cheques, receipts | 50.4 | 30.2 | 48.9 | 59.2 | 81.8 | 52.6 | 81.8 | 99.0 |
| NPAGCARD | Per capita number of payments with cards | 33.9 | 19.5 | 30.9 | 39.4 | 51.8 | 31.1 | 48.3 | 62.3 |
| CASH-CARD_RATIO | Value of withdrawals from ATMs/(value of withdrawals from ATMs+value of payments via POS) | 0.7 | 0.6 | 0.7 | 0.7 | 0.6 | 0.5 | 0.6 | 0.6 |
| GDP | Per capita GDP (euros) | 24,734 | 18,744 | 24,900 | 29,388 | 25,804 | 18,783 | 25,362 | 30,824 |
| BANK | Number of bank current accounts/GDP | | | | | | | | |
| CRIME | Number of reported crimes/GDP | 0.002 | 0.001 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.002 |
| MOBILE | Share of banks allowing customers to make mobile micropayments | 0.002 | 0.000 | 0.000 | 0.000 | 0.512 | 0.475 | 0.500 | 0.557 |
| POS | Number of Point of Sales/GDP | 0.00005 | 0.00001 | 0.00004 | 0.00006 | 0.00008 | 0.00004 | 0.00006 | 0.00011 |
| ATM | Automated teller machines/GDP | 0.02898 | 0.02457 | 0.02870 | 0.03341 | 0.02676 | 0.02285 | 0.02680 | 0.02987 |
| EVAS | Share of agriculture in employment weighted by GDP concentration index | 18.0 | 3.2 | 7.1 | 17.7 | 15.1 | 2.9 | 6.8 | 16.6 |
| EDUCATION | Share of population between 25 and 64 years with no educational qualifications or only having a primary school diploma | 0.10 | 0.07 | 0.08 | 0.11 | 0.06 | 0.04 | 0.04 | 0.07 |
| INTERNET | Share of population using internet at least once a week | 0.53 | 0.46 | 0.55 | 0.58 | 0.69 | 0.66 | 0.72 | 0.73 |

**Table a2 – Correlation matrix**

| | GDP | BANK | MOBILE | POS | ATM | CRIME | EVAS | EDUCATION | INTERNET |
|---|---|---|---|---|---|---|---|---|---|
| GDP | 1 | | | | | | | | |
| BANK | -0.30 | 1 | | | | | | | |
| MOBILE | 0.07 | 0.12 | 1 | | | | | | |
| POS | -0.36 | 0.49 | 0.19 | 1 | | | | | |
| ATM | 0.10 | 0.23 | -0.11 | 0.45 | 1 | | | | |
| CRIME | -0.53 | 0.12 | -0.29 | -0.11 | -0.19 | 1 | | | |
| EVAS | -0.63 | 0.31 | 0.02 | 0.53 | 0.06 | 0.19 | 1 | | |
| EDUCATION | -0.70 | 0.04 | -0.47 | -0.06 | -0.20 | 0.59 | 0.39 | 1 | |
| INTERNET | 0.64 | 0.02 | 0.63 | 0.07 | 0.14 | -0.53 | -0.37 | -0.88 | 1 |

**Table a3 – Pooled OLS estimates** (1)

| | Dependent variable: number of electronic payments per inhabitant | | | | Dependent variable: number of transactions with payment cards per inhabitant | | | | Dependent variable: cash-card ratio | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) | (V) | (VI) | (VII) | (VIII) | (IX) | (X) | (XI) | (XII) |
| GDP | 1.707*** | | | | 1.793*** | | | | -0.483*** | | | |
| | (0.053) | | | | (0.069) | | | | (0.029) | | | |
| BANK | 0.550*** | 0.247 | 0.140 | 0.363* | 0.415*** | 0.116 | 0.023 | 0.219 | -0.024 | 0.071 | 0.085 | 0.029 |
| | (0.112) | (0.172) | (0.185) | (0.195) | (0.153) | (0.202) | (0.221) | (0.234) | (0.067) | (0.073) | (0.076) | (0.080) |
| MOBILE | 0.794*** | 0.773*** | | 0.308*** | 0.889*** | 0.875*** | | 0.387*** | -0.257*** | -0.250*** | | -0.106*** |
| | (0.059) | (0.086) | | (0.085) | (0.076) | (0.102) | | (0.101) | (0.032) | (0.036) | | (0.035) |
| POS | 0.036* | | -0.164*** | -0.169*** | 0.050** | | -0.156*** | -0.166*** | -0.009 | | 0.044*** | 0.047*** |
| | (0.018) | | (0.021) | (0.028) | (0.023) | | (0.026) | (0.032) | (0.011) | | (0.007) | (0.010) |
| ATM | 0.394*** | 0.600*** | 0.551*** | 0.581*** | 0.566*** | 0.801*** | 0.686*** | 0.768*** | -0.167*** | -0.223*** | -0.194*** | -0.212*** |
| | (0.051) | (0.092) | (0.062) | (0.074) | (0.073) | (0.110) | (0.082) | (0.094) | (0.029) | (0.031) | (0.025) | (0.029) |
| CRIME | 0.253*** | -0.377*** | -0.075 | -0.084 | 0.378*** | -0.289*** | 0.018 | 0.017 | -0.031 | 0.149*** | 0.059** | 0.054* |
| | (0.041) | (0.055) | (0.046) | (0.061) | (0.049) | (0.062) | (0.054) | (0.067) | (0.026) | (0.026) | (0.024) | (0.030) |
| EVAS | -0.018*** | -0.018*** | | | | -0.018*** | | | | 0.005*** | | |
| | (0.001) | (0.001) | | | | (0.002) | | | | (0.000) | | |
| INTERNET | | | 2.467*** | | | | 2.537*** | | | | -0.721*** | |
| | | | (0.087) | | | | (0.106) | | | | (0.040) | |
| EDUCATION | | | | -0.723*** | | | | -0.748*** | | | | 0.221*** |
| | | | | (0.044) | | | | (0.051) | | | | (0.019) |
| CONSTANT | -13.552*** | 5.593*** | 5.172*** | 1.277 | -13.739*** | 6.227*** | 5.664*** | 1.870 | 3.821*** | -1.630*** | -1.450*** | -0.317 |
| | (0.674) | (0.759) | (0.842) | (0.944) | (0.909) | (0.894) | (1.021) | (1.146) | (0.332) | (0.289) | (0.329) | (0.360) |
| Obs. | 570 | 570 | 636 | 570 | 570 | 570 | 636 | 570 | 570 | 570 | 636 | 570 |
| R-squared | 0.778 | 0.474 | 0.651 | 0.557 | 0.688 | 0.415 | 0.557 | 0.486 | 0.505 | 0.335 | 0.467 | 0.404 |

(1) All coefficients are calculated in the form of d(lny)/d(lnx). Robust standard errors are reported in parentheses. Symbols: *** significant at 1%; ** significant at 5%; * significant at 10%.

**Table a4 – Random effects estimates** (1)

| | Dependent variable: number of electronic payments per inhabitant | | | | Dependent variable: number of transactions with payment cards per inhabitant | | | | Dependent variable: cash-card ratio | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) | (V) | (VI) | (VII) | (VIII) | (IX) | (X) | (XI) | (XII) |
| GDP | 1.771*** | | | | 1.842*** | | | | -0.512*** | | | |
| | (0.133) | | | | (0.167) | | | | (0.064) | | | |
| BANK | 0.980*** | 0.957*** | 0.064 | 0.325 | 0.805*** | 0.633** | 0.039 | 0.129 | -0.259** | -0.246** | -0.018 | -0.054 |
| | (0.203) | (0.208) | (0.314) | (0.237) | (0.289) | (0.313) | (0.413) | (0.360) | (0.116) | (0.100) | (0.106) | (0.098) |
| MOBILE | 0.639*** | 0.712*** | | 0.380*** | 0.707*** | 0.773*** | | 0.485*** | -0.196*** | -0.215*** | | -0.028 |
| | (0.074) | (0.067) | | (0.066) | (0.091) | (0.076) | | (0.077) | (0.035) | (0.033) | | (0.030) |
| POS | 0.111*** | | -0.048 | 0.004 | 0.115** | | -0.064 | -0.031 | -0.032* | | 0.029** | 0.018 |
| | (0.031) | | (0.041) | (0.047) | (0.045) | | (0.051) | (0.059) | (0.019) | | (0.013) | (0.017) |
| ATM | 0.055 | 0.097 | 0.062 | 0.124 | 0.111 | 0.156 | 0.106 | 0.193 | 0.037 | 0.020 | 0.025 | 0.004 |
| | (0.092) | (0.109) | (0.079) | (0.113) | (0.133) | (0.137) | (0.113) | (0.139) | (0.036) | (0.031) | (0.028) | (0.034) |
| CRIME | 0.193*** | -0.260*** | -0.306*** | -0.130 | 0.254*** | -0.254** | -0.385*** | -0.142 | -0.021 | 0.118*** | 0.121*** | 0.016 |
| | (0.068) | (0.084) | (0.077) | (0.094) | (0.090) | (0.108) | (0.108) | (0.111) | (0.044) | (0.046) | (0.032) | (0.047) |
| EVAS | | -0.018*** | | | | -0.017*** | | | | 0.006*** | | |
| | | (0.003) | | | | (0.004) | | | | (0.001) | | |
| INTERNET | | | 1.639*** | | | | 1.598*** | | | | -0.512*** | |
| | | | (0.117) | | | | (0.131) | | | | (0.046) | |
| EDUCATION | | | | -0.419*** | | | | -0.388*** | | | | 0.260*** |
| | | | | (0.068) | | | | (0.074) | | | | (0.031) |
| CONSTANT | -16.011*** | 1.406* | 4.527*** | 2.347** | -16.405*** | 2.200** | 4.162** | 2.497 | 5.375*** | 0.287 | -0.390 | 0.533 |
| | (1.716) | (0.730) | (1.284) | (1.173) | (2.202) | (1.103) | (1.731) | (1.637) | (0.861) | (0.328) | (0.428) | (0.441) |
| Obs. | 570 | 570 | 636 | 570 | 570 | 570 | 636 | 570 | 570 | 570 | 636 | 570 |

(1) All coefficients are calculated in the form of d(lny)/d(lnx). Robust standard errors are reported in parentheses. Symbols: *** significant at 1%; ** significant at 5%; * significant at 10%.

# Figures

## Figure a1 – Number of non-cash payments by type of transaction in the main advanced countries
*(annual percentage changes)*



Legend: ■ 2005-12  ■ 2013-18

Categories: Australia, Canada, Sweden, Switzerland, United Kingdom, United States, Euro area

## Figure a2 – Supply of banking services offered through digital channels in Italy
*(share of banks providing their services through digital channels – unweighted frequencies)*



Legend: payment services — smartphone applications — mobile micropayments — lending to housholds — lending to firms — asset management
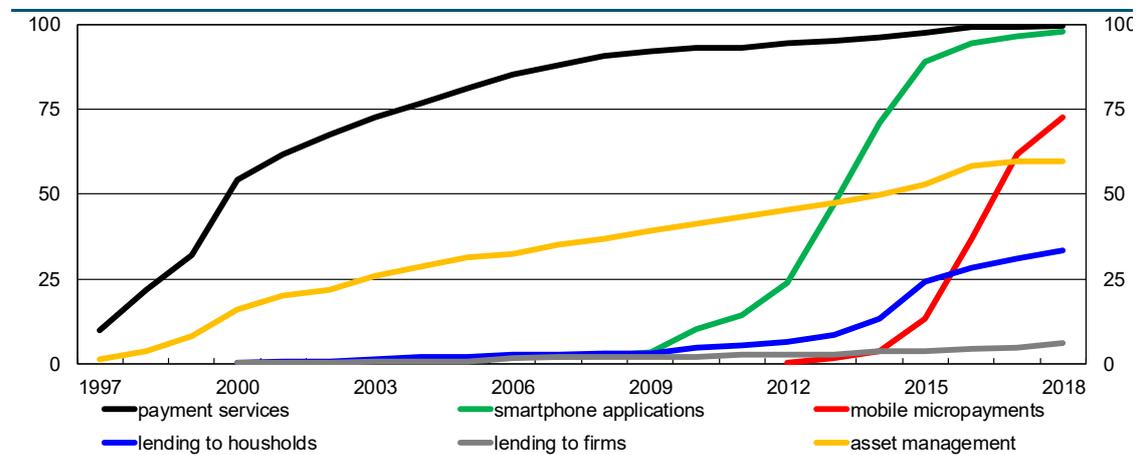
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