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Digital payments and tax revenues in Greece

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The judgments on policy issues and the proposals contained in this study express the opinions of the researchers and do not necessarily reflect the opinion of the members or the management of IOBE.

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EXECUTIVE SUMMARY

The aim of the study is to investigate the role of digital payments in curbing the shadow economy and boosting tax revenues in Greece. The study also attempts to quantify the impact on tax revenues from adopting incentives for the use of digital payments.

Introduction

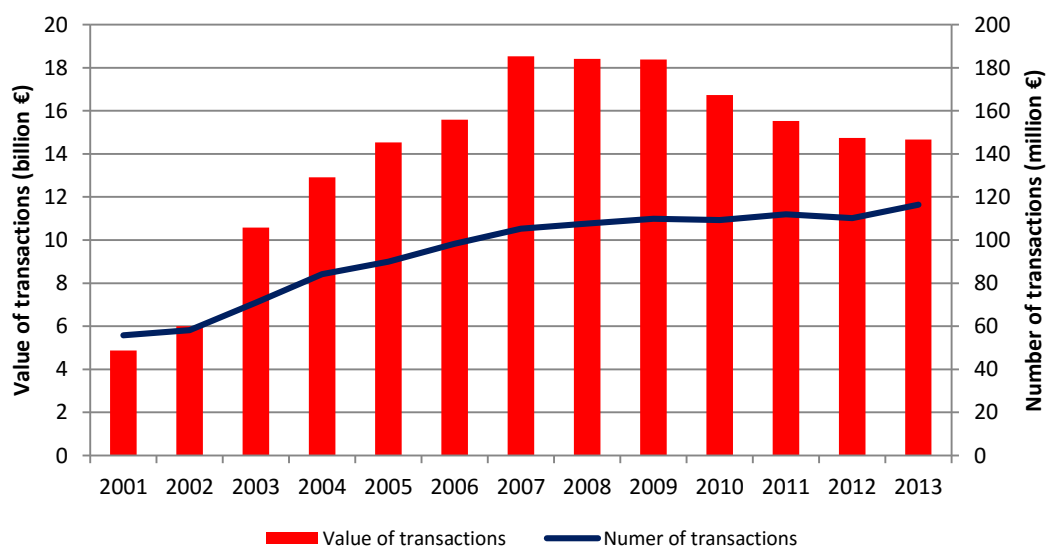
The objective to increase tax revenues by curbing tax evasion and by reducing the size of the shadow economy plays a key role in the effort to rationalise public finances and to bring the Greek economy back on a growth path. The shadow economy thrives on the underreporting of sales and undeclared labour.

One of the available instruments for limiting the shadow economy is the use of electronic means for carrying out payments. The use of Electronic Means of Payment (EMP) in a transaction implies that the transaction is recorded in the information systems of the banks, facilitating the tax audit of both transactions and incomes. Therefore, a wider use of these payments could contribute substantially to the reduction of the shadow economy, the growth of tax revenues and ultimately to the genuine and sustainable recovery of the Greek economy.

The EMP use in Greece

The level of EMP use in Greece today is significantly higher than in 2000. Nevertheless, the negative impact of the crisis on the diffusion of EMP is notable. In particular, if we examine the course of EMP use without taking into account credit transfers, which also include business-to-business transactions and transfers that are not necessarily related to the purchase of goods and services, the impact of the economic crisis transpires both in a slowdown of the growth rate of the number of transactions and in a reduction of their value.

Figure 1: Number and value of digital payments in Greece (2001-2013)



Note: Credit transfers are not included.

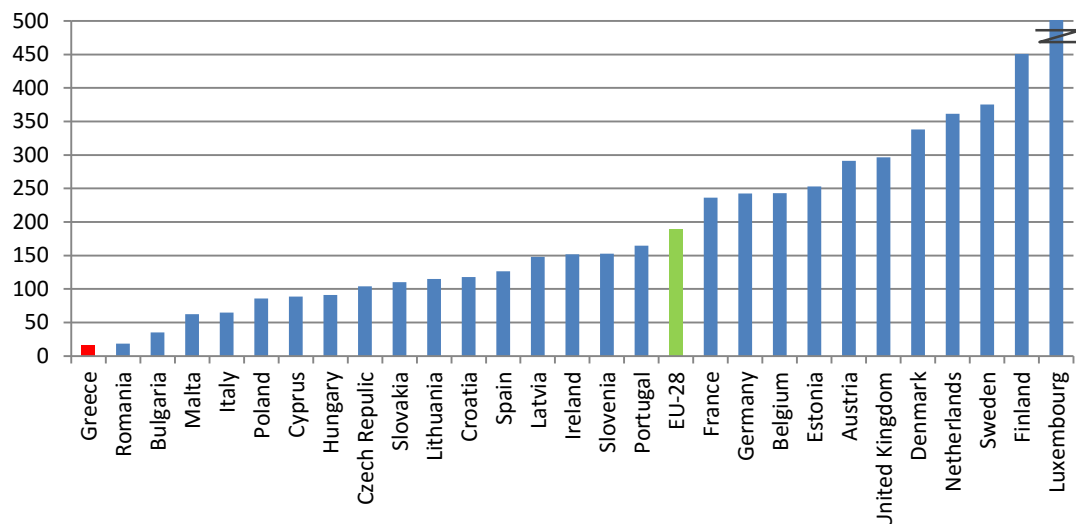
Source: European Central Bank

In particular, the number of transactions increased annually by only 1.6% on average between 2008 and 2013, with the largest growth rate recorded in 2013 (+5.5%). During the same period, the value of transactions fell notably, reaching towards the end of this period its 2005 level (Figure 1). Note that before the crisis, the value of digital payments (except credit transfers) was growing at fast pace, almost doubling in 2007, compared with 2001.

The use of EMP in Greece lags considerably behind the rest of the EU. Despite the growth recorded since 2001, Greece continues to occupy very low positions in the relevant rankings. Based on the value of transactions with EMP per inhabitant in 2013, Greece ranked higher only compared to Croatia and Bulgaria, while in terms of the number of transactions per inhabitant Greece occupied the last position in the ranking (Figure 2).

In addition, the preferred types of digital payments seem to differ significantly in Greece and in the rest of the Euro area countries. Even though credit transfers are the prevalent means in both regions, cheques remain a popular means of payment in Greece, while in contrast direct debits have a substantially higher share in the Euro area.

Figure 2: Number of digital payments per inhabitant (2013)

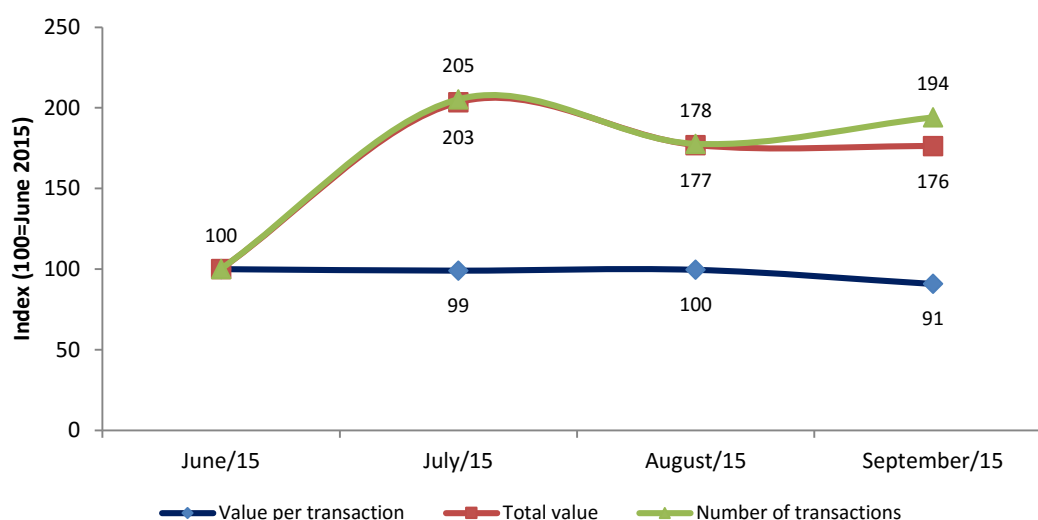


Source: European Central Bank, **Data processing:** IOBE

Regarding the payment cards, the use of debit cards has increased significantly over the past few years in Greece, remaining however at significantly lower diffusion rates compared with the EU average. Meanwhile, the use of credit cards, in the aftermath of their rapid growth in the preceding decade, contracted during the crisis, due both to the fall of private consumption and to the reduction of the credit limits by the financial institutions.

During the summer, the bank holiday, the compulsory acceptance of payment cards and the daily limit on ATM withdrawals gave a significant boost to the diffusion of digital payments. In July, the use of payment cards for purchases through POS terminals more than doubled, compared with June. As the branches of the banks finally opened towards the end of July, the use of cards declined, remaining however much higher compared with the period before the imposition of capital controls (Figure 3).

Figure 3: Domestic transactions with payment cards over the summer of 2015



Source: Banks members of the HBA. Data processing: IOBE

Despite the formidable percentage growth in digital payments over the summer, their use in Greece remains significantly behind the other EU member states. The doubling of the EMP use in the best of cases leads to a gain of one place for Greece in the ranking based on the number of EMP transactions per inhabitant. In order to reach the EU average for this ranking, the number of EMP transactions per inhabitant in Greece should increase by about 11 times from their 2013 level, thus the potential for further growth is significant.

Obstacles to further EMP diffusion

In order to boost the use of EMP, we should first examine the main reasons why Greece lags behind. The current regulatory framework does not seem to raise particular obstacles to the use of EMP, as counter-incentives introduced in the past are no longer in force (e.g. the expenditure made with cards, but not with cash, was taken into account in the calculation of the imputed income of individuals for taxation purposes). In contrast, the public administration is trying to develop mechanisms for the digitalisation of its transactions with private individuals and enterprises. Nevertheless, there is room for a further boost of the role of the state as a catalyst for the diffusion of digital payments.

On the consumer side, a significant number of individuals do not trust the safety of the transactions and of the electronic systems in general. This distrust is not supported by objective observations, as the number of fraud cases with payment cards in Greece is quite low compared with the EU average. The low diffusion of new technologies and the internet in the Greek households also acts as a deterrent. Meanwhile, the economic crisis has also had a negative impact, as it has led to a significant reduction of the disposable income of many households in the country and has created insecurity regarding the robustness of the Greek banking system.

Correspondingly, a fairly large number of enterprises support digital payments, as reflected in the relatively high number of POS terminals per inhabitant in Greece, compared with other EU countries. However, the significant number of self-employed in the country and the

high share of very small enterprises in retail trade contribute to the low diffusion of digital payments, given the stronger propensity to make unrecorded transactions and the higher incidence of tax evasion in these categories of professionals and businesses.

While the above factors contribute to the limited EMP use, none of them seems strong enough to fully and convincingly explain on its own the observed lag. Nevertheless, the combined effect of these obstacles prevents the accumulation of a sufficient mass of transactions that could unleash the positive impact of the network effects, characteristic for goods such as EMP. When the EMP use is limited and when paying with EMP is not a daily habit of the consumers, the utility of the digital payments is low both for the consumers and the smaller enterprises. In addition, when the EMP diffusion is limited, the fixed costs of installing, maintaining and operating the relevant infrastructure is spread over fewer transactions, increasing thus the cost of EMP use per transaction.

Incentives for the use of EMP

Recognising the significance of EMP for curbing the shadow economy and the need for intervention due to network effects, particularly in the early stages of EMP penetration, a number of countries have adopted incentives and/or administrative measures to strengthen the use of EMP. The incentives include partial refunds when a transaction is carried out with EMP, income tax discounts when households, as well as enterprises, achieve targets for EMP use in their transactions, and lotteries for EMP transactions. The incentives are often accompanied by administrative measures, such as an obligation of accepting EMP and a prohibition of cash use for higher value transactions.

Implementing a series of such measures in South Korea led to an increase in the share of card transactions in private consumption to over 65% in 2010, from 14.7% in 1999. In the same period, the total receipts deriving from income tax in the country were growing by 13.6% annually, significantly surpassing the pace of GDP growth (6.5% on average from 2000 to 2009).

Apart from the state, the use of EMP has also been incentivised by financial institutions. In Greece, the banks implement loyalty programmes that provide rewards for the use of credit and debit cards. The programmes usually entail the collection of reward points for each transaction and exchange of the points for discounts in participating stores. Few of the existing programmes entail the return of cash at the end of an administrative period (e.g. a month). The main programmes encountered in Greece can be grouped in the following categories:

- Cash refund programmes, either at a bank account of the consumer or against purchases at participating stores.
- Programmes of collecting reward point. The points correspond to gifts, gift cheques or discounts at participating stores.
- Programmes of collecting air miles, which can be exchanged for tickets, seat upgrades, hotel discounts and other offers to travellers by airline alliances.
- Coupon programmes, where the consumers receive discount coupons for purchases in participating stores. The discount rate is higher when the payment is made with a card of the bank that administers the programme.

We examined the effectiveness of the incentives that the Greek banks offer, using transaction data for a random anonymised sample of 40,000 consumers, covering the period from 2010 to 2014. The econometric analysis revealed a positive relationship between the incentives offered by the domestic banking institutions and the use of payment cards, both in terms of frequency of use and value per transaction. In addition, it seems that the number and the value of transactions are higher among younger consumers, men, the employed and university graduates. Therefore, the provision of incentives in the form of discounts or cash refunds seems to be an effective method for boosting digital payments in Greece.

Digital payments, shadow economy and economic growth

A starting point for the implementation of the suitable policy measures in the direction of expanding the use of electronic payment instruments is to highlight its impact on the informal or shadow economy and tax evasion. A wider use of EMP and the reduction of the use of cash in payments could act as a policy measure against tax evasion and the shadow economy, particularly in areas where the conditions favour the intense presence of these phenomena.

In addition, the electronic transactions have a direct link with economic growth. According to recent studies, the large-scale adoption of digital payments lowers the cost of intermediation services, promotes the creation of new markets, improves the efficiency of the trade system, intensifies the competition in the markets for products and services and ultimately boosts consumption and economic activity. It is estimated about 0.2 percentage of the growth rate of the world GDP each year can be attributed to the diffusion of card payments (Zandi και Singh, 2010, 2013).

The positive impact of the EMP diffusion on tax revenues is also revealed by an empirical analysis with data on the Greek economy. In particular, using annual time series for the value of transactions with payment cards, tax revenues and GDP for the last 15 years, we estimated that the tax revenues increase by 0.24 percentage points for every percentage point growth of the use of payment cards.

Policy suggestions

The implementation of appropriate measure for strengthening the EMP use, taking into account the current obstacles to their further diffusion, would offer the chance to limit the shadow economy and significantly increase the state tax revenues. Both economic theory and the international experience show that the effectiveness of the measures differs significantly depending on their implementation scope. Meanwhile, the incentives come at a cost in terms of public expenditure. Therefore, the measures should be appropriately targeted in order to be efficient.

The study attempts to quantify the fiscal impact from a set of complementary policy measures for boosting the EMP use. The scope of the proposed incentives and administrative measures differs depending on the tax evasion risk grade of each transaction (low, medium, high – Table 1). For transactions with a limited tax evasion risk, we examine a discount of 1% in the value of transactions (through periodic cash refunds to the consumers). Additional measures in this risk category include further diffusion of digital

payments in the wider public sector, e.g. by installing POS terminals in all utility services with the state as a major shareholder.

The general scope measures, however, have a limited strength with regard to creating incentives for the use of EMP in transactions with an intermediate tax evasion risk (category B, based on Table 1). In the transactions where the gain from tax evasion is collected exclusively by the merchants, as is the case for example in tourist enterprises or small stores that do not reduce the final price paid by the consumers when a receipt is not issued, the discount that could incentivise the consumers to insist on paying with EMP should be deeper (e.g. 5%). Further measures that could be adopted in this risk category are compulsory installation of POS terminals, the imposition of fines in case that a digital payment is refused, incentives to the consumers that have justifiably reported a digital payment refusal and incentives to very small enterprises, such as a subsidy for the installation of POS terminals with a corresponding reduction of the bank fees and the possibility to participate in a lottery.

Table 1: Policy measures per transaction type

Policy measures	A: Low risk of tax evasion	B: Intermediate risk of tax evasion	C: High risk of tax evasion
Incentives	1% refund on the transaction value	5% refund on the transaction value	<ul style="list-style-type: none"> • 10% refund on the transaction value • EMP lottery
Administrative measures	Digital payments in all public services (such as tax office, electricity and water utilities)	Mandatory POS terminal installation	Mandatory EMP use for payments of more than €30

Source: IOBE

Lastly, even a discount of 5% might not be sufficient to incentivise the use of EMP in transactions where the merchants can reduce the final price of the service paid by the consumers in cash without a receipt (e.g. in construction, repair and health services). In this case, the discount that we examine stands at 10% of the transaction value. However, as the gain for the consumers in these cases could reach the total of the VAT, evading the tax might be the preferred option for the consumer, even with quite a large discount on the transaction value. In these cases, a lottery could be adopted, where the value of the first prize exceeds significantly the benefit that a consumer can gain from not paying VAT. In this case, it is preferable that the lottery concerns digital payments only, in order to contribute to the overcoming of the network effects, but also to reduce the administrative cost to the consumers and the state from tasks such as collection of receipts, communication of receipt codes and check of the legitimacy of the codes.

In addition, the technological infrastructure has developed sufficiently to allow for digital payments even in transactions that are done in the premises of the consumer. Mobile point of sale (mPOS) terminals, which can be used in these cases, are already in operation. Thus, the mandatory use of the POS network, with a ban of the use of cash for transaction values above a reasonable threshold (e.g. €30), can be supported technically in these transactions.

The study concludes with the following policy suggestions:

- A refund by 1% of the transaction value for digital payments through POS terminals (payment cards and e-money) for the purchase of goods and services by individuals from sectors with low risk of tax evasion
- A refund by 5% of the transaction value for digital payments through POS terminals for the purchase of goods and services by individuals from sectors with intermediate risk of tax evasion
- A refund by 10% of the transaction value for digital payments through POS terminals for the purchase of goods and services by individuals from sectors with high risk of tax evasion
- Lottery for consumers that use digital payments in sectors with high risk of tax evasion
- Placement of POS terminals in all public utility branches
- Mandatory acceptance of digital payments, with a subsidy for the installation of POS terminals in enterprises with an annual turnover of less than €150,000 operating in sectors with intermediate or high risk of tax evasion
- Mandatory use of digital payments for transaction with a value above €30 in sectors with a high risk of tax evasion

We also propose that the likely fiscal and social impact of the following measures should be examined in depth:

- Replacement of the mandatory collection of paper receipts with the obligation to make digital payments to the same amount
- Mandatory use of digital payments equal to 10% of the income for households that receive a tax reduction due to low income (a measure that relatively recently replaced the universal tax allowance)
- Reduction of the corporate income tax for companies that achieve EMP diffusion targets in their transactions with final consumers
- Participation in the lottery of companies that accept digital payments
- Boost of the catalytic role of the state in the diffusion of EMP
 - Mandatory use of credit transfers in the customs (ICISnet)
 - Universal use of EMP in the tax offices
 - Completion of the electronic invoice system
- Information and education actions, along the lines of the Banks in Action programme of the Hellenic Banking Association, which teaches finance in secondary education classes

It is estimated that the adoption of the examined measures will have a significant positive impact on the state tax revenues, provided that feasible targets for EMP transaction growth are met. The net fiscal benefit in the central scenario of the simulations is estimated to approach €700 million in the first year of implementation (Table 2). Subsequently, as the EMP diffusion targets are met and the use of digital payments consolidates as part of the consumer habits, the incentives can be gradually withdrawn, resulting in a reduction of their gross fiscal cost and a corresponding increase in their net fiscal benefit.

The additional tax revenues grow much faster than the fiscal cost of the measures, with the growth of EMP use. On the other hand, an ineffective implementation of the measures that leads to a small increase of the value of EMP transactions might result in a net negative outcome for the state. This result highlights the importance of an appropriate design and communication of the measures to the consumers and the enterprises, and stresses the need for mobilisation of the tax audit authorities in the utilisation of the increased transparency provided by the wider EMP diffusion. A further prerequisite to achieve the targets for tax revenue growth by boosting EMP use is to restore the trust of the Greek public in the domestic banking system.

Table 2: Anticipated net fiscal outcome (€ million) per scenario and policy measure

Policy measure	Break-even*	Pessimistic	Central	Optimistic
1% refund	25%	47	248	610
5% refund	105%	-1	79	182
10% refund	165%	-10	90	183
Lottery	1%	6	72	153
POS in utilities	0,1%	0	2	5
POS in small stores	1%	-14	124	297
Mandatory use of EMP	0%	16	82	163
Total	-	46	696	1594

Source: IOBE

Note: *The lowest rate of growth of EMP transactions through POS terminals in the corresponding tax evasion risk category that can lead to a net positive fiscal impact, based on the assumptions of the central scenario.

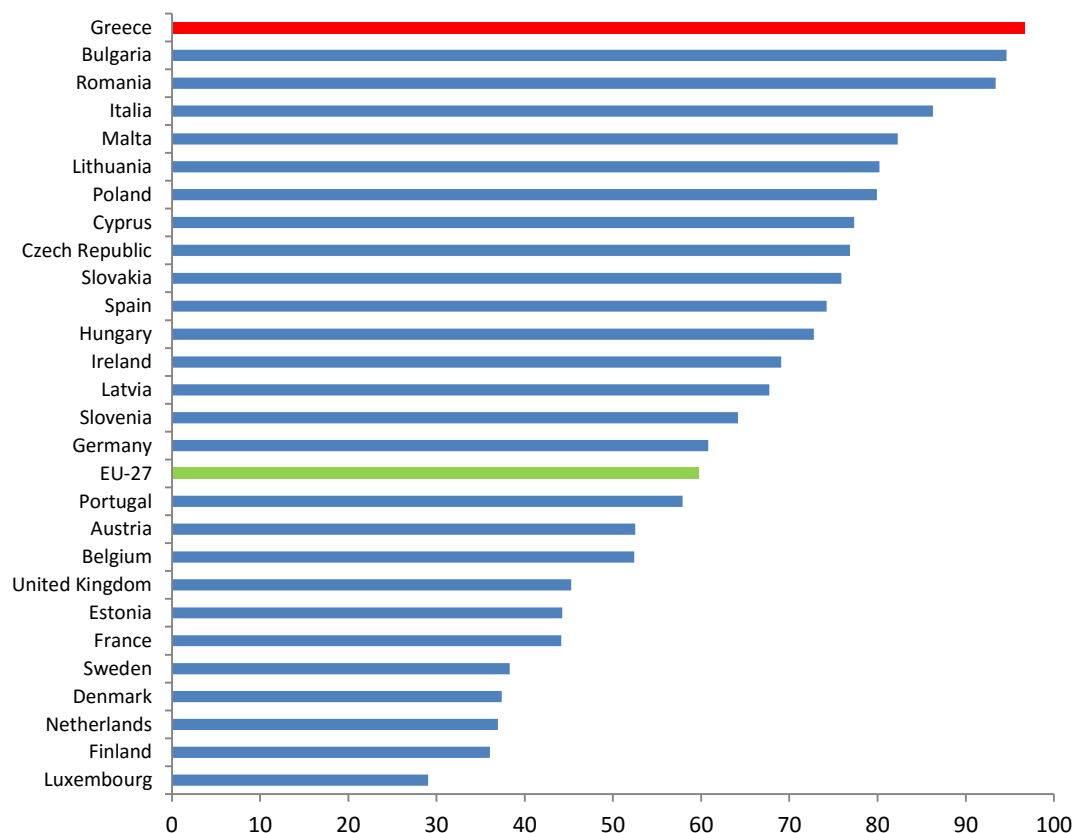
1. INTRODUCTION

The strengthening of the tax revenues by reducing tax evasion and the shadow economy plays a key role in the efforts to achieve fiscal consolidation and to put the Greek economy back on a path of recovery. The shadow economy, in turn, is fuelled by underreporting sales and undeclared work.

Cash payments allow the merchants to avoid issuing tax receipts and paying Value Added Tax (VAT) to the State. In competitive markets with low possibility of punishment, this practice offers a competitive advantage to the tax-evading merchants, who can offer their products at a lower price, at the expense of merchants that pay VAT. Moreover, the VAT evasion results in a lack of proper records in the transactions with suppliers as well. Finally, the lack of transaction records facilitates false income statements by firms and professionals and leads to additional tax revenue losses.

One of the available means to reduce the shadow economy is the use of Electronic Means of Payment (EMP) in transactions. The use of EMP implies that the transactions are recorded in the information systems of the banks, which in turn facilitates the tax audit of transactions and incomes. Thus, the wide use of EMP contributes substantially to the decline of the shadow economy, strengthens tax revenues and, finally, contributes to the effective and sustainable growth of the Greek economy.

Figure 1.1: Percentage of cash use in payments with respect to the volume of transactions in 2010



Source: ECB (2012)

Cash is still the most used payment instrument in Greece. It is estimated that in 2010 about 97% of the transactions were performed with cash (Figure 1.1). In the respective ranking, Greece is ranked first among all countries of the European Union (EU), followed by Bulgaria with 95% and Romania with 93%. The last country in this ranking is Luxembourg, below the Scandinavian countries and the Netherlands, where the cash use does not exceed 40% of the transactions. Evidently, the use of EMP in Greece is extremely limited, thereby facilitating tax evasion.

The aim of this study is to investigate the role of EMP in curbing the shadow economy and in strengthening tax income in Greece. The study also attempts to quantify the impact on tax revenues from the adoption of incentives to use EMP. Chapter 2 presents the main categories of EMP and analyses data for their use in Greece, comparing them with data for EU countries. Chapter 3 presents the main reasons for the limited use of payment cards in Greece, while Chapter 4 records the incentives that are implemented abroad and in Greece, from financial institutions, to increase the use of payment cards. The impact of shadow economy decline on tax revenue and economic growth is presented in Chapter 5. This chapter also presents estimation results for the impact of EMP on tax revenues. Chapter 6 contains policy proposals with estimations for the range of fiscal effects from the proposed measures. The study concludes with a brief summary of the main findings.

2. USE OF ELECTRONIC MEANS OF PAYMENT IN GREECE

The purpose of this section is to present and analyse data on the use of electronic means of payment (EMP) in Greece. These data are then compared with the corresponding data for EMP in the EU, in order to assess the progress of Greece in EMP use.

We use data for the number and the value of digital payments in EU member countries, derived from ECB's Statistical Data Warehouse, which cover – in most cases – the period from 2000 to 2013. Demographic data for the profile of users of payment cards in Greece, provided from domestic banks, are also presented. Finally, the study reports the impact on the penetration of EMP from the imposition of a bank holiday and capital controls since the summer.

2.1 *Electronic means of payment*

The basic categories of cashless payment instruments according to ECB's Statistical Data Warehouse are the following:

- **Credit transfer:** The payer issues an order, which instructs her bank to transfer funds to the account of a beneficiary. The payment order and the funds described therein move from the bank of the payer to the bank of the beneficiary, possibly via several other credit institutions as intermediaries. The credit transfers that can be considered an electronic means of payment executed outside a bank's branch include transactions through electronic banking performed directly by a payer using a computer or a mobile device.
- **Card with a credit function:** A card enabling its holder to make purchases and in some cases also to withdraw cash up to a pre-arranged limit. The credit granted can be settled in full by the end of a specified period or may be settled in part, with the balance taken as an extended credit on which interest is usually charged. The holder is sometimes charged other fees, such as an annual fee, as well. The distinguishing feature of a card with a credit function, in contrast to a card with a debit function or a delayed debit function, is the contractual agreement granting the cardholder a credit line allowing for extended credit (irrespective of whether the cardholder actually makes use of this feature or chooses to settle the full amount of the debt incurred at the end of a specified period).
- **Card with a debit function:** A card enabling its holder to have their purchases directly and immediately charged to her accounts. A card with a debit function may be linked to an account offering overdraft facilities as an additional feature. The distinguishing feature of a card with a debit function, in contrast to a card with a credit function or a delayed debit function, is the contractual agreement to charge purchases directly to funds on the cardholder's current account.
- **Card with a delayed debit function:** A card enabling cardholders to have their purchases charged to an account with the card issuer, up to an authorised limit. The balance in this account is settled in full at the end of a predefined period. The holder is usually charged an annual fee. The distinguishing feature of a card with a delayed debit function, in contrast to a card with a credit function or a debit function, is the contractual agreement granting a credit line but with an obligation to settle the debt

incurred at the end of a pre-defined period. This type of card is commonly referred to as a "charge card".

- **Direct debit:** A payment service for debiting a payer's payment account, potentially on a recurrent basis, where a payment transaction is initiated by the beneficiary on the basis of the payer's prior consent.
- **E-money purchase transaction:** A transaction whereby the holder of e-money makes a transfer from her account to the account of the beneficiary either with an e-money card or with other means of e-money storage. According to Directive 2009/110/EC "electronic money means electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of funds for the purpose of making payment transactions as defined in point 5 of Article 4 of Directive 2007/64/EC, and which is accepted by a natural or legal person other than the electronic money issuer". Examples of electronic money are amounts stored on pre-paid payment cards and mobile phones, as well as accounts in Internet Payment Systems such as Paypal, especially for retail payments.
- **Cheque:** A written order from one party, i.e. the drawer, to another, i.e. the drawee, which is normally a credit institution, requiring the drawee to pay a specified sum on demand to the drawer or to a third party specified by the drawer. While the cheques are cashless payments, executed through the banking system, they are not classified as electronic means of payment.
- **Other means of payment:** Includes payment instruments that are not included in the above categories, such as bills of exchange. With a bill of exchange, the drawer requires the drawee to pay a specified amount on demand or on a specified date to the drawer or a third party specified by the drawer. As in the case of cheques, these instruments are not classified as electronic means of payment.

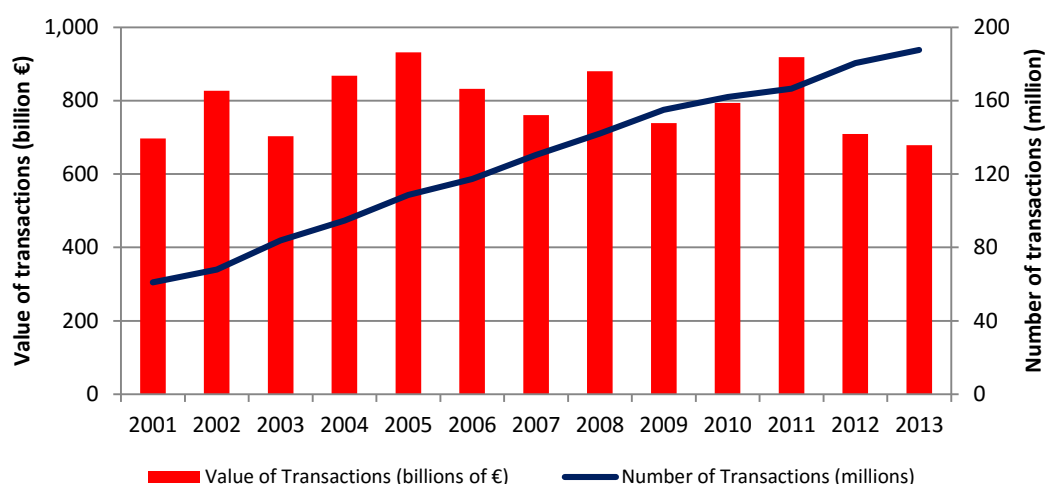
2.2 Digital payment trends

The number and the value of all transactions carried out in Greece with EMP between 2001 and 2013 are presented in Figure 2.1. The number of transactions more than tripled (+208%), from €61 million in 2001 to €188 million in 2013,¹ however, their growth has weakened since 2008. In particular, while between 2001 and 2008 the corresponding compounded annual growth rate (CAGR) totalled 12.8%, between 2009 and 2013 it fell to 4.9%. The corresponding value of transactions varied around €795 billion from 2001 through 2013, peaking in 2005 (€932 billion). However, the value of transactions has followed a downward trend since 2008, which at least partly is explained with the economic crisis that led to a significant reduction in the value per transaction.

If we exclude the credit transfers from the above figure, we obtain a clearer picture for the trends in EMP use by the consumers, as the credit transfers are primarily related to transactions among firms and to a lesser extent among consumers and firms. In this case, the consequences of the economic crisis are more evident, both in terms of a slowdown in the number of transactions and a drop in the value of transactions.

¹ Transactions among banks are not included in the figures presented in the study.

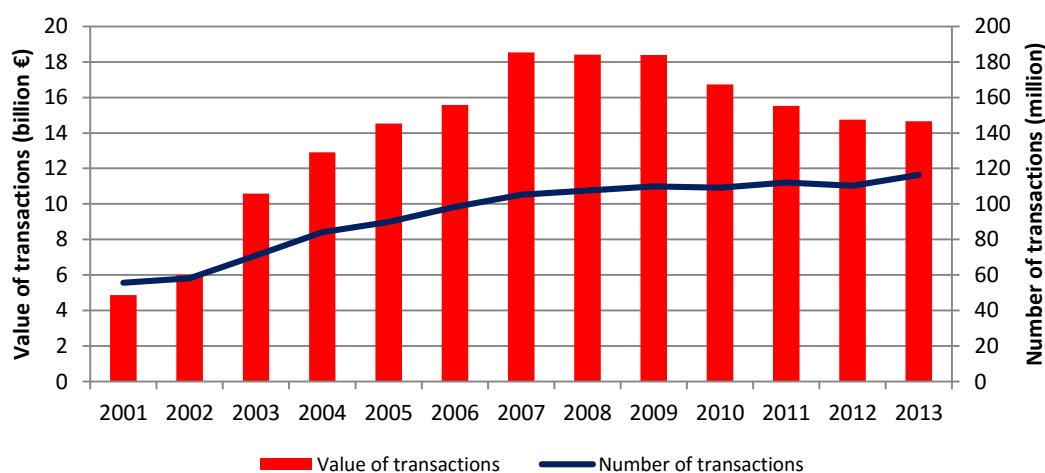
Figure 2.1: Number and value of transactions with EMP in Greece (2001-2013)



Source: European Central Bank

In particular, the number of transactions increased by only 1.6% on average between 2008 and 2013, with the highest annual growth observed in 2013 (+5.5%). Their value significantly dropped during the same period (Figure 2.2), shrinking to their 2005 level in 2012 and 2013. It is noteworthy that before the outbreak of the economic crisis, the value of electronic transactions (except credit transfers) was rapidly growing, with their 2007 value almost four times higher than in 2001.

Figure 2.2: Number and value of retail digital payments in Greece (2001-2013)



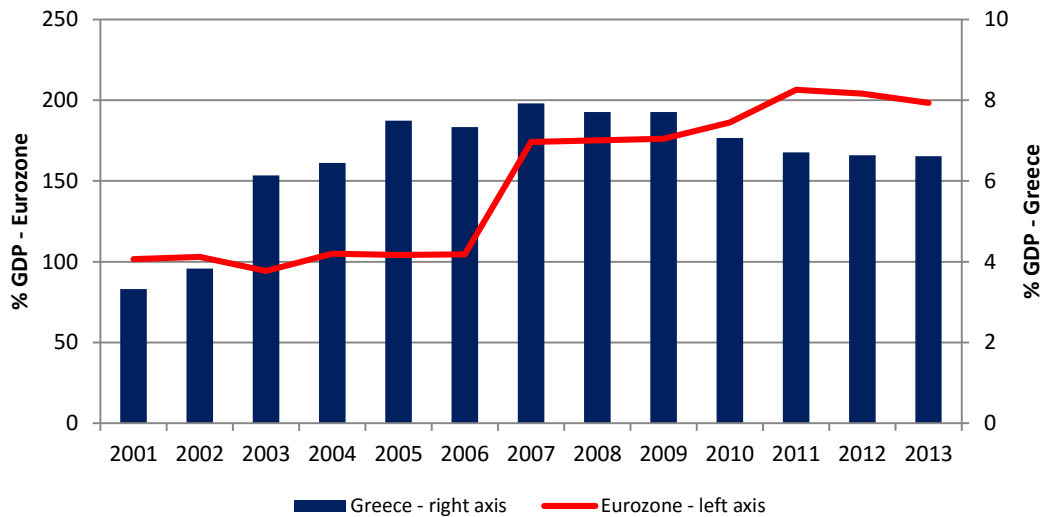
Note: Credit transfers are not included

Source: European Central Bank

Compared with the Eurozone, the use of electronic means of payment in Greece (without taking into account credit transfers) is much less frequent. The value of transactions as a percentage of GDP initially seemed to be converging. However, the difference significantly widened between 2007 and 2013 (Figure 2.3). Indeed, the value of electronic retail payments was estimated at only 6.6% of Greek GDP in 2013, compared to 198.4% of Eurozone's GDP (30 times higher). In addition, the majority of electronic transactions in the Eurozone is performed with direct debit, totalling on average 122.1% of GDP. In Greece,

most digital retail transactions are performed either with cards (3.2% of GDP, on average, from 2001 to 2013) or direct debit (3.1% of GDP, on average, 2001-2013).

Figure 2.3: Retail digital payments as percentage of GDP in Greece and the Eurozone (2001-2013)

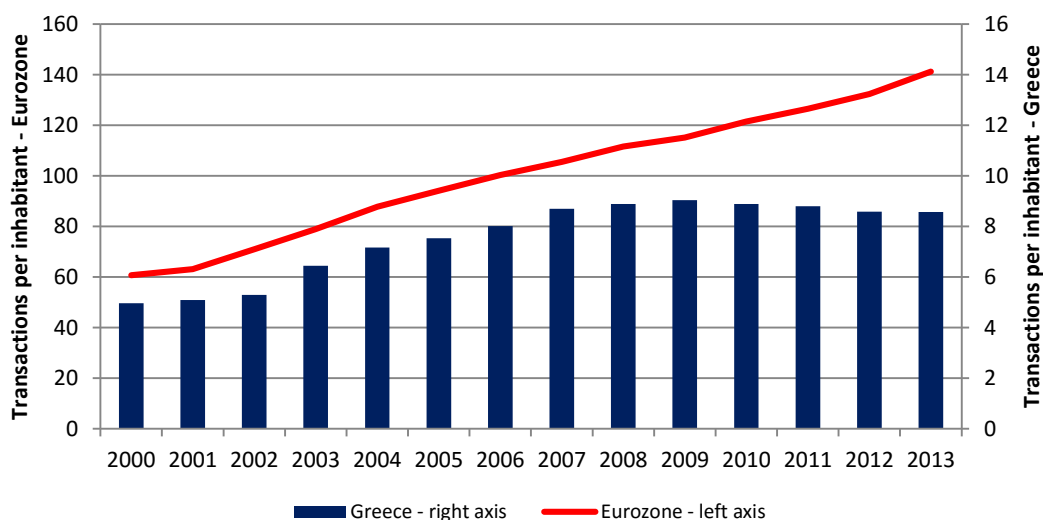


Note: Credit transfers and cheques are not included

Source: European Central Bank

If we consider the number of transactions per inhabitant, the difference in EMP use between Greece and the Eurozone is less intense (about 16 times less in Greece), even though it also increased between 2009 and 2013 (Figure 2.4). Note that in 2013, there were 141 transactions per inhabitant in the Eurozone, compared with only 8.6 transactions in Greece.

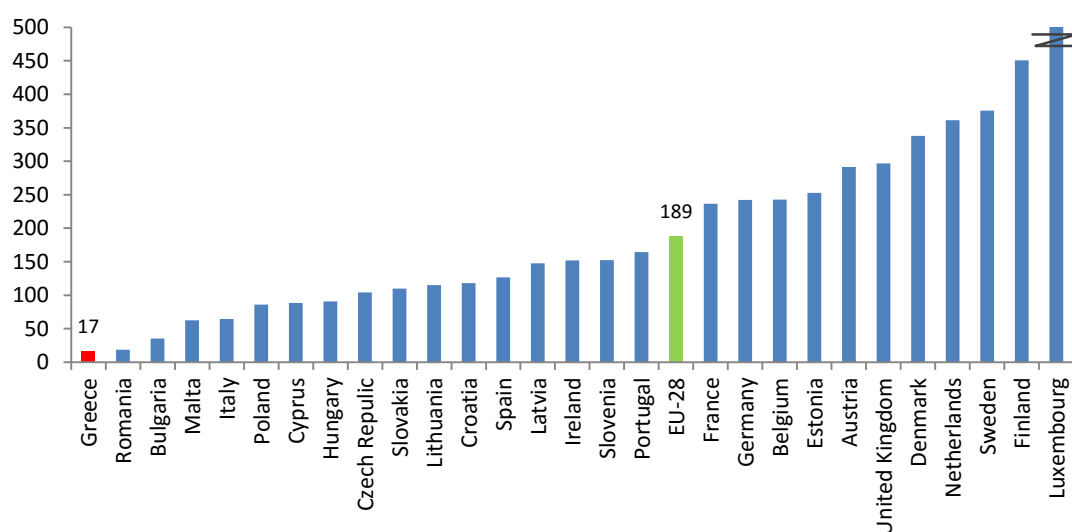
Figure 2.4: Digital payments per inhabitant Greece-Eurozone (2000-2013)



Note: Credit transfers and cheques are not included

Source: European Central Bank

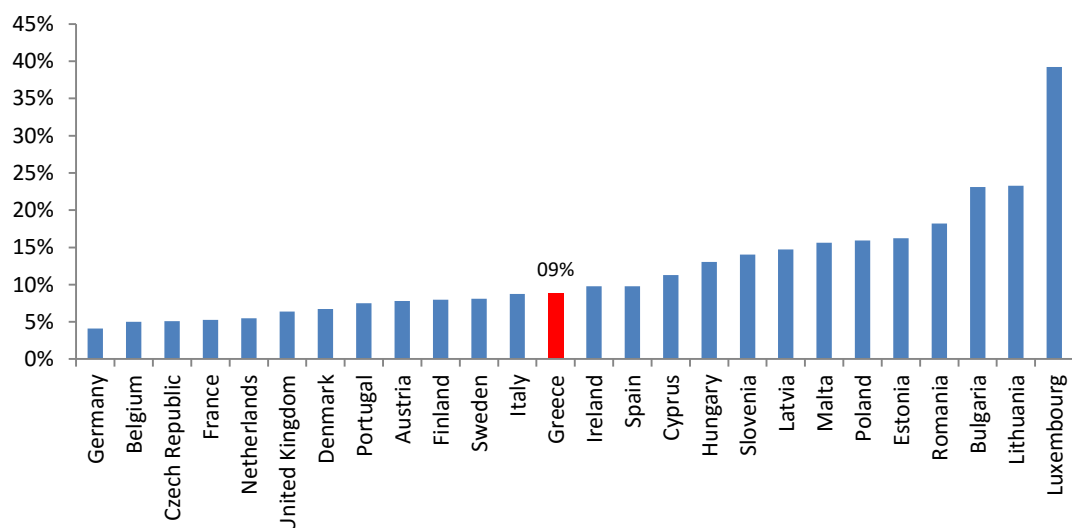
Figure 2.5: Number of digital transactions per inhabitant (2013)



Source: European Central Bank, Data processing: FEIR

Taking into account credit transfers as well, Greece ranks last among the EU countries in 2013 with respect to the number of transactions per inhabitant. In particular, 17 transactions were executed per inhabitant in Greece, whereas in Luxembourg the corresponding number is 2,596 (Figure 2.5). In the countries of Central and Northern Europe, the use of EMP is more widespread, whereas in the countries of Southern and Eastern Europe the penetration rate of EMP – in terms of a number of transactions – is limited.

Figure 2.6: Compounded annual growth rate of the number of transactions with EMP (2000-2013)



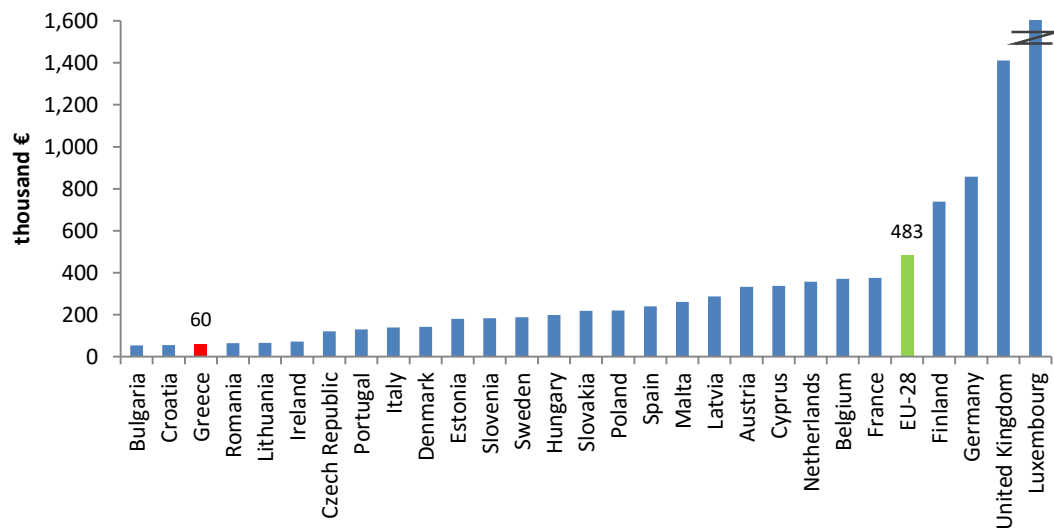
Source: European Central Bank, Data processing: FEIR

In addition, the growth in the number of transactions in Greece during the last decade was inadequate. According to ECB data for the period 2000-2013, the number of transactions with EMP in Greece grew by 8.8% on average, when in countries such as Lithuania, Bulgaria, Romania and Estonia the corresponding growth rate totalled 23.3%, 23.1%, 18.2% and

16.2%, respectively (Figure 2.6). Meanwhile, the rate in countries where the use of EMP is widespread, such as Germany (4.1%), Belgium (5%) and France (5.3%), is lower.

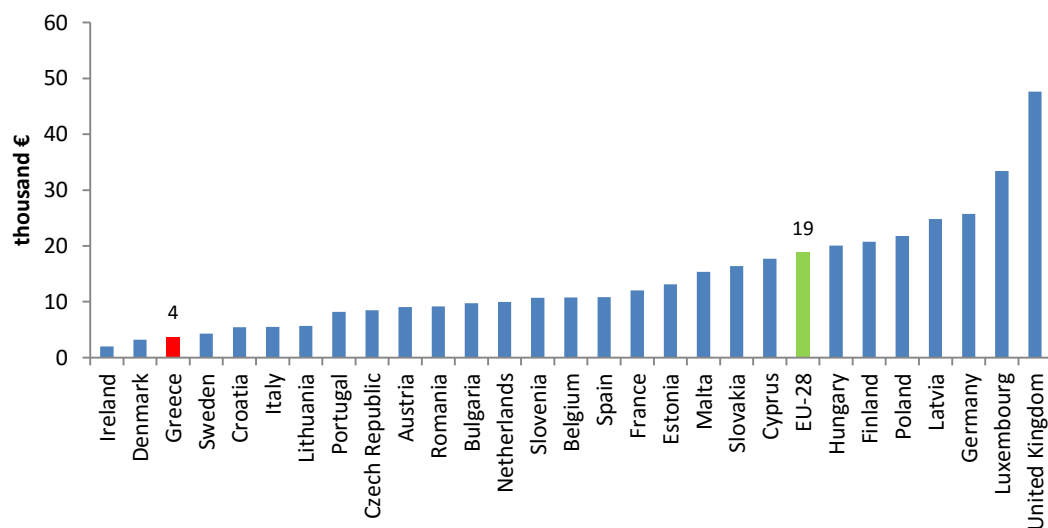
Similar conclusions can be reached if we analyse the value of transactions per inhabitant (Figure 2.7). Greece is ranked 26th with about €60,000 per inhabitant when the corresponding value in the EU is €483,000 while in Luxembourg it reaches €2.8 million. The Northern European countries perform better in transaction value terms, compared with their Southern and Eastern European peers, which can be partly explained from the higher disposable income and the purchasing power of their inhabitants.

Figure 2.7: Value of transactions with EMP per inhabitant (2013)



Source: European Central Banks

Figure 2.8: Value of transactions with EMP as percentage of GDP (2013)



Source: European Central Bank

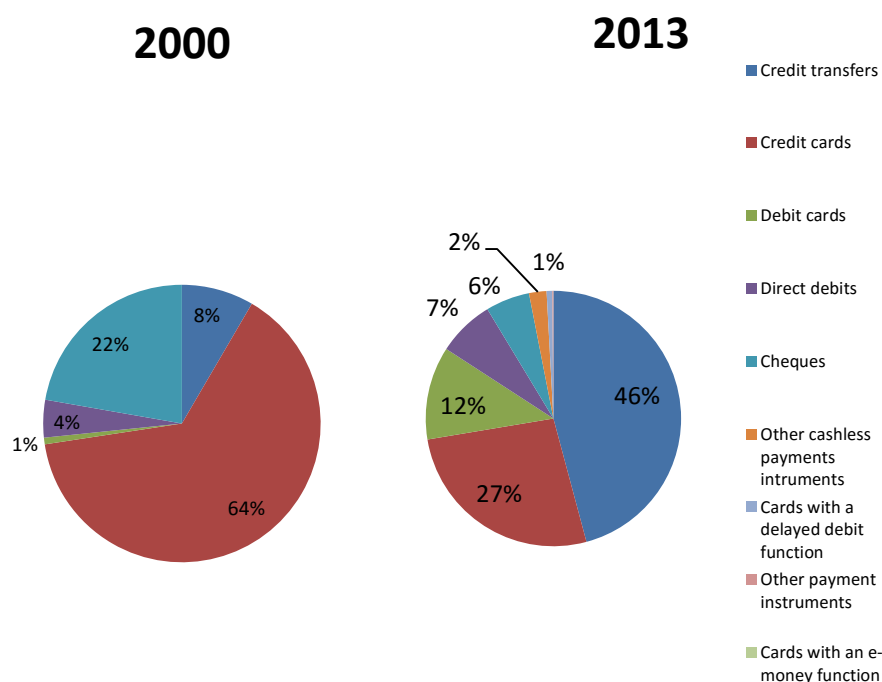
Finally, if we isolate the effect of income disparities, the value of transactions with EMP over GDP in Greece is once more among the lowest in the EU, amounting to 3.7, while the corresponding ratio for the EU totals 18.8 (Figure 2.8). Near the top of this category,

alongside Northern and Western European countries (e.g. the UK, Luxembourg and Germany), we can also find countries such as Latvia, Poland and Hungary.

2.3 Composition of transactions per payment instrument

Regarding the composition of the transactions per payment instrument in Greece in 2013, based on the number of transactions (Figure 2.9), about 50% of the transactions in the banking system were carried out with credit transfers² (45.8% in 2013 against 8.4% in 2000). It is estimated that the development of e-banking contributed significantly to the increase of the share of this instrument to the total number of transactions.

Figure 2.9: Percentage of transactions per mean of transaction with respect to the number of transactions, in Greece



Source: European Central Bank, Data processing: IOBE

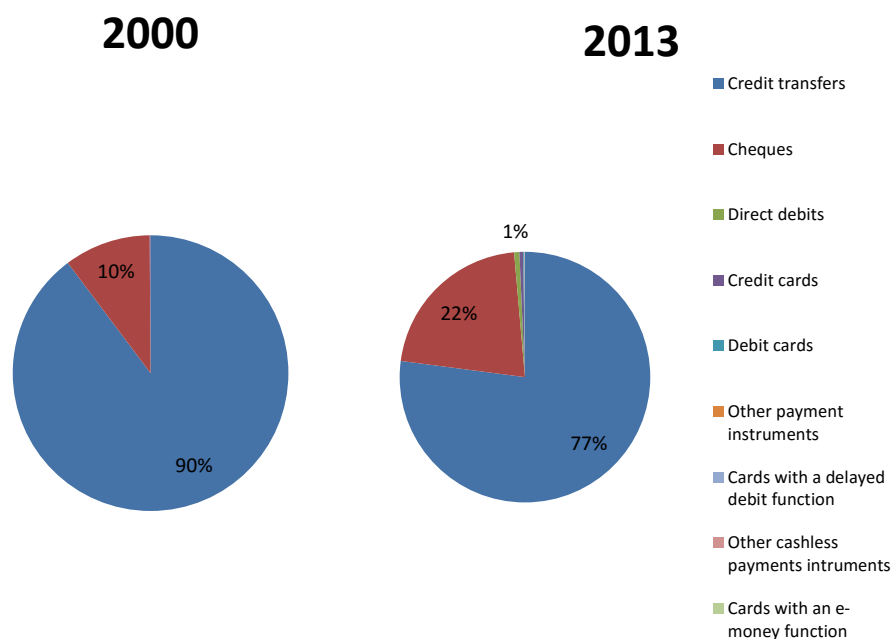
The transactions with credit cards come second with 26.5% in 2013 from 64.2% in 2000. This decline may be attributed to the credit crunch since 2009, but also due to the introduction of other means of payment, such as debit cards, which represented 11.8% of the transactions performed in 2013 (from only 0.8% in 2000). The transactions with direct debit come next with 7.2% in 2013 (against 4.4% in 2000), followed by e-money purchase transactions (2.2%). Meanwhile, the share of cheques has significantly declined (5.6% in 2013 from 22.3% in 2000).

² Transactions with cash are not included, because are not carried out through banking system and therefore are not recorded from the databases of commercial banks.

In other words, the data reveal that the use of cheques and credit cards has fallen, whereas the use of credit transfers and debit cards has increased. However, the composition is different if we take into account the value of transactions.

Almost 80% of the value of cashless transactions is carried out with credit transfers (from 89.7% in 2000 – Figure 2.10), followed by transactions with cheques (21.5% in 2013 from 10.1% in 2000). The importance of cheques as a transaction instrument can be attributed to the fact that post-dated cheques can be used as collateral for bank lending, especially by small and medium enterprises (SMEs). The other means of payment have a much smaller share in the total value of transactions, as they mostly concern low-value transactions between final consumers and retail trade firms.

Figure 2.10: Percentage of transactions per mean of transaction with respect to the value of transactions, in Greece



Source: European Central Bank, **Data processing:** FEIR

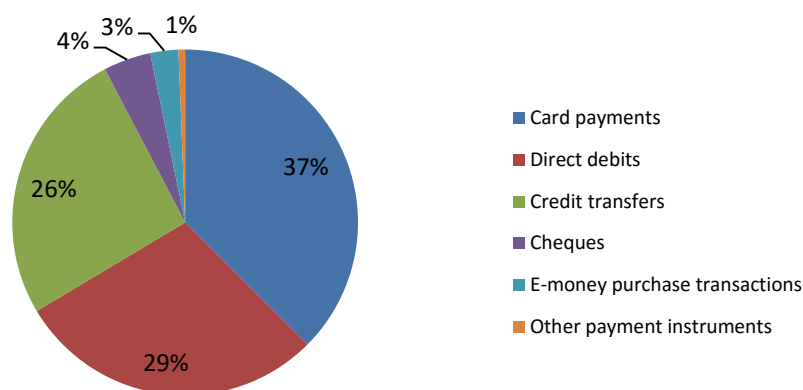
There are notable differences in the composition of the payment instruments in Greece and the Eurozone. In particular, the payment cards are the most frequently used instrument in the Eurozone, representing 37.5% of the total number of transactions (39% in Greece), followed by direct debits with 29%, (7.2% in Greece). Credit transfers, the most common payment instrument in Greece (46% in 2013) come third in the Eurozone with 25.9% (Figure 2.11). Finally, the other means of payment (cheques, e-money purchase transactions and other means of payment) have a similar share in the number of transactions in the Eurozone and in Greece.

Regarding the breakdown of card transactions, 34.2% percent of the cashless transactions in the Eurozone in 2013 were performed with debit cards, while the corresponding share for Greece was only 11.8%. The transactions with credit cards in the Eurozone reached only 1.1% of the total number of transactions, in contrast with Greece, where the corresponding

share stood at 26.5%. Finally, the shares for delayed debit cards were low both in Greece and in the Eurozone (0.7% and 2.2%, respectively).

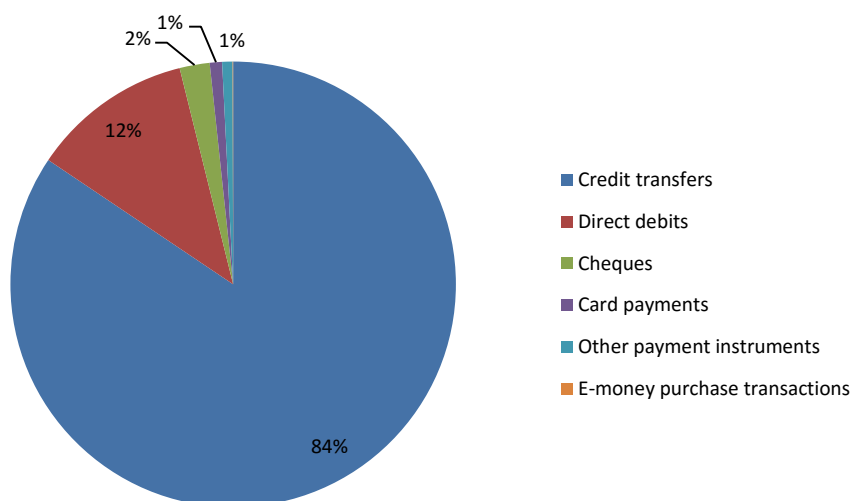
The composition varies between Greece and the Eurozone when we use as a criterion the value of transactions as well (Figure 2.12). In particular, 84.4% of the value of cashless transactions in the Eurozone was performed with credit transfers (77.1% in Greece), followed by direct debits with only 11.7%. The use of cheques, which is considerable in Greece (21.5% of the value of transactions), reached only 2.2% in the Eurozone while the other means of transactions had even lower shares.

Figure 2.11: Composition of the payment instruments in the Eurozone with respect to the number of transactions (2013)



Source: European Central Bank

Figure 2.12: Compositions of the payment instruments in the Eurozone with respect to the value of transactions (2013)



Source: European Central Bank

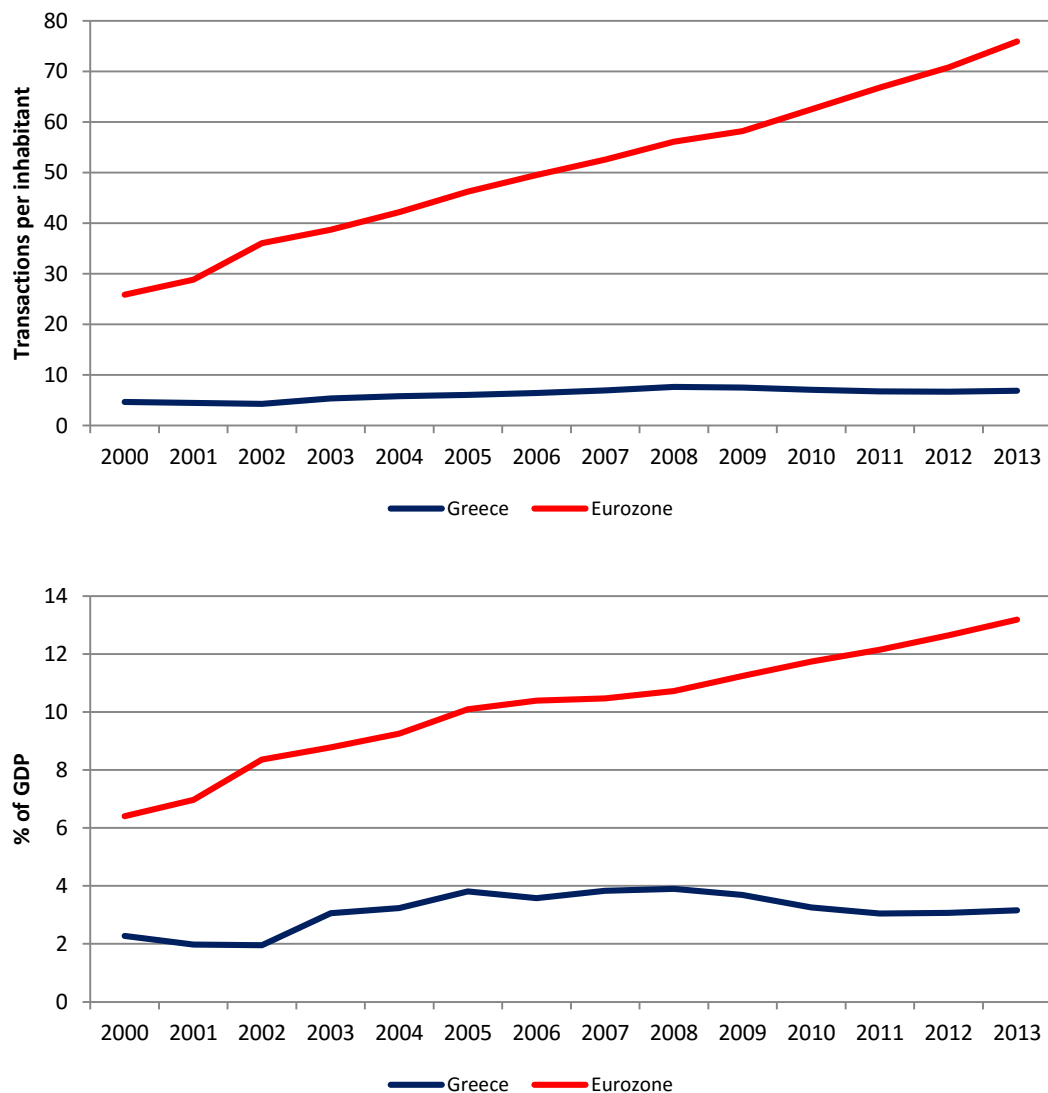
2.3.1 PAYMENT CARDS

There is a significant difference in the number of transactions per inhabitant in Greece and the Eurozone. While the number of transactions per inhabitant in Greece increased from 5 in

2000 to 8 in 2008-2009, to fall back to 7 transactions thereafter, in the Eurozone, transactions increased from 26 in 2000 to 76 in 2013 (Figure 2.13).

A similar trend is observed if we take into account the value of transactions as a percentage of GDP. The difference in the use of payment cards kept growing – with the exceptions of the years 2003 and 2007 – and as a result, the value of card transactions in Greece in 2013 was only 2.3% of GDP, compared with 13.2% in the Eurozone.

Figure 2.13: Number and value of transactions with payment cards in Greece and Eurozone (2000-2013)

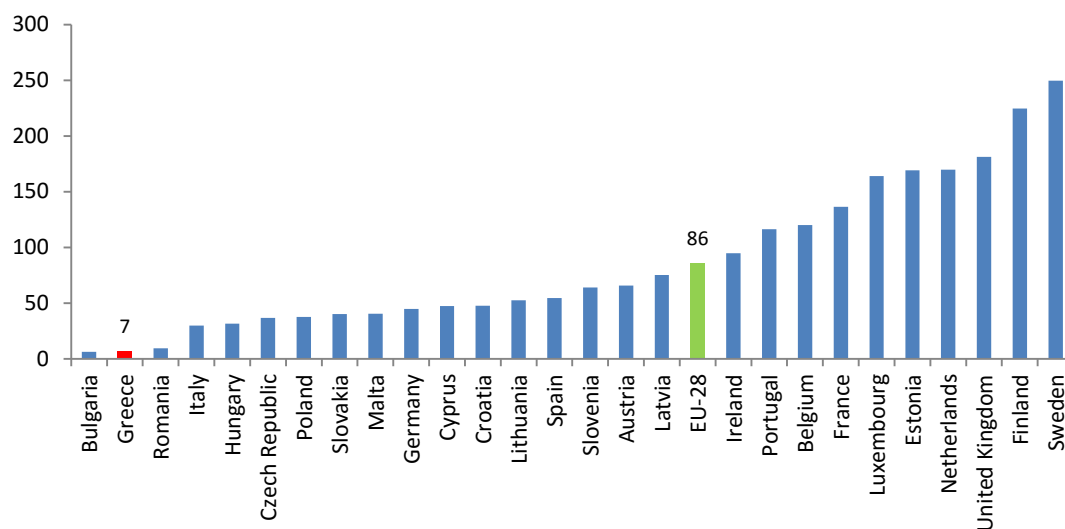


Source: European Central Bank

Furthermore, if we compare the use of cards in 2013 between Greece and other Eurozone countries, the results are not encouraging. Regarding the number of transactions with cards per inhabitant (except cards with an e-money function), Greece is ranked 27th (Figure 2.14). The country with the highest number of transactions per inhabitant is Sweden with 250,

followed by Finland (225) and the United Kingdom (181). At the bottom of the ranking, along with Greece, are Bulgaria (6 transactions) and Romania (9 transactions).

Figure 2.14: Number of card transactions per inhabitant in the EU countries (2013)

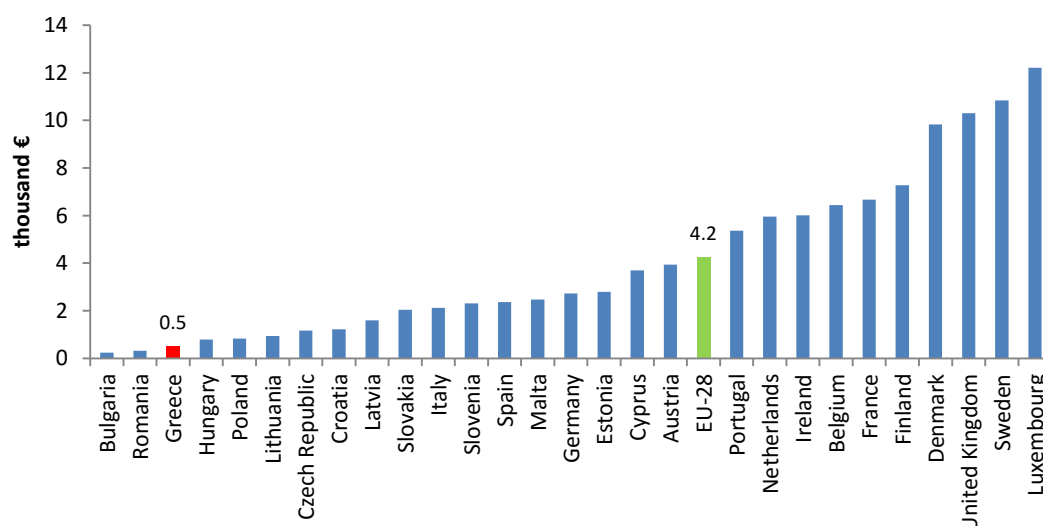


Note: Cards with e-money function are not included

Source: European Central Bank

The limited use of cards as a payment instrument is also evident in the value of transactions per inhabitant. Their value in Greece in 2013 did not exceed €510 (higher only compared with Bulgaria and Romania), while the corresponding amount for EU was €4,200, reaching €12,200 in Luxembourg (Figure 2.15).

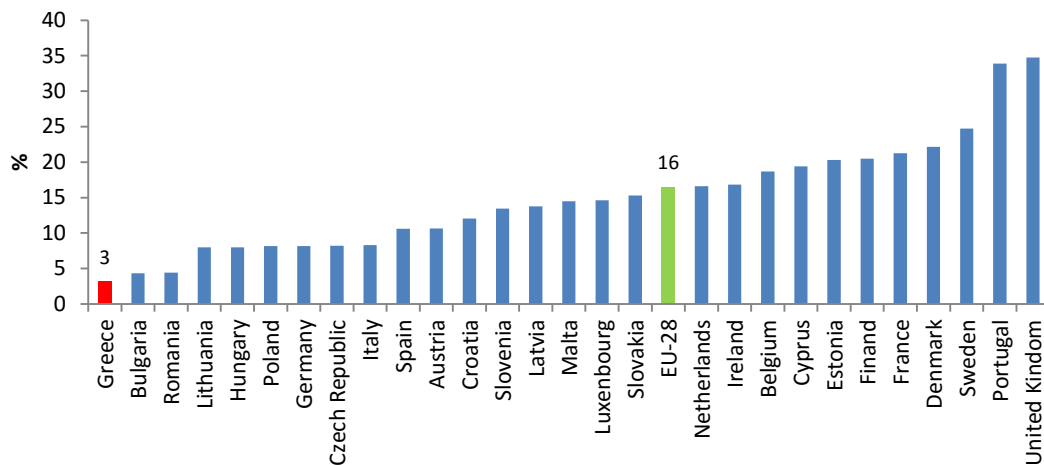
Figure 2.15: Value of card transactions per inhabitant in the EU countries (2013)



Note: Cards with e-money function are not included

Source: European Central Banks

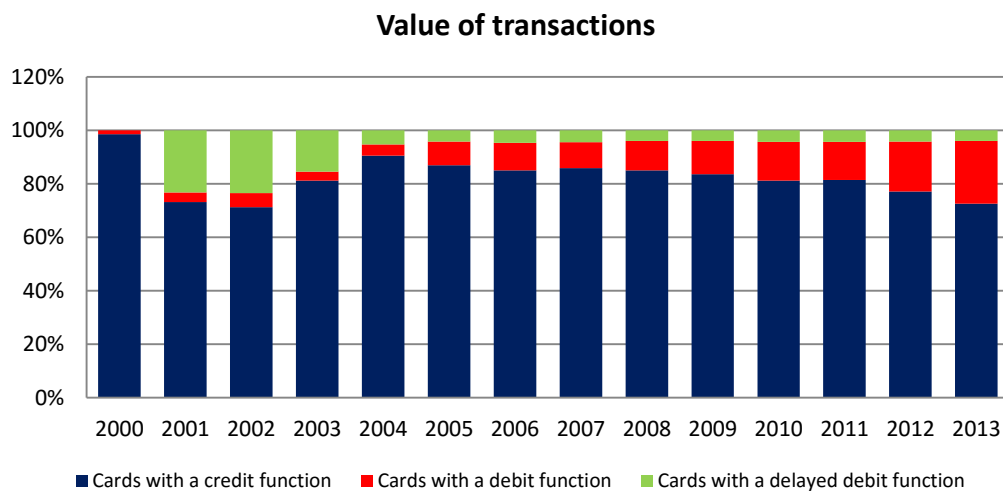
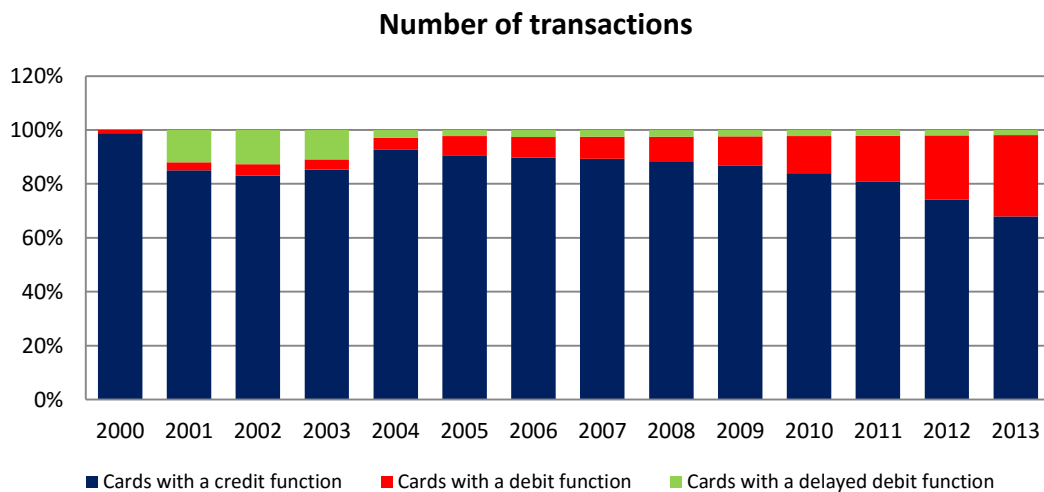
Figure 2.16: Value of cards transactions as percentage of GDP in the EU countries (2013)



Note: Cards with e-money function are not included

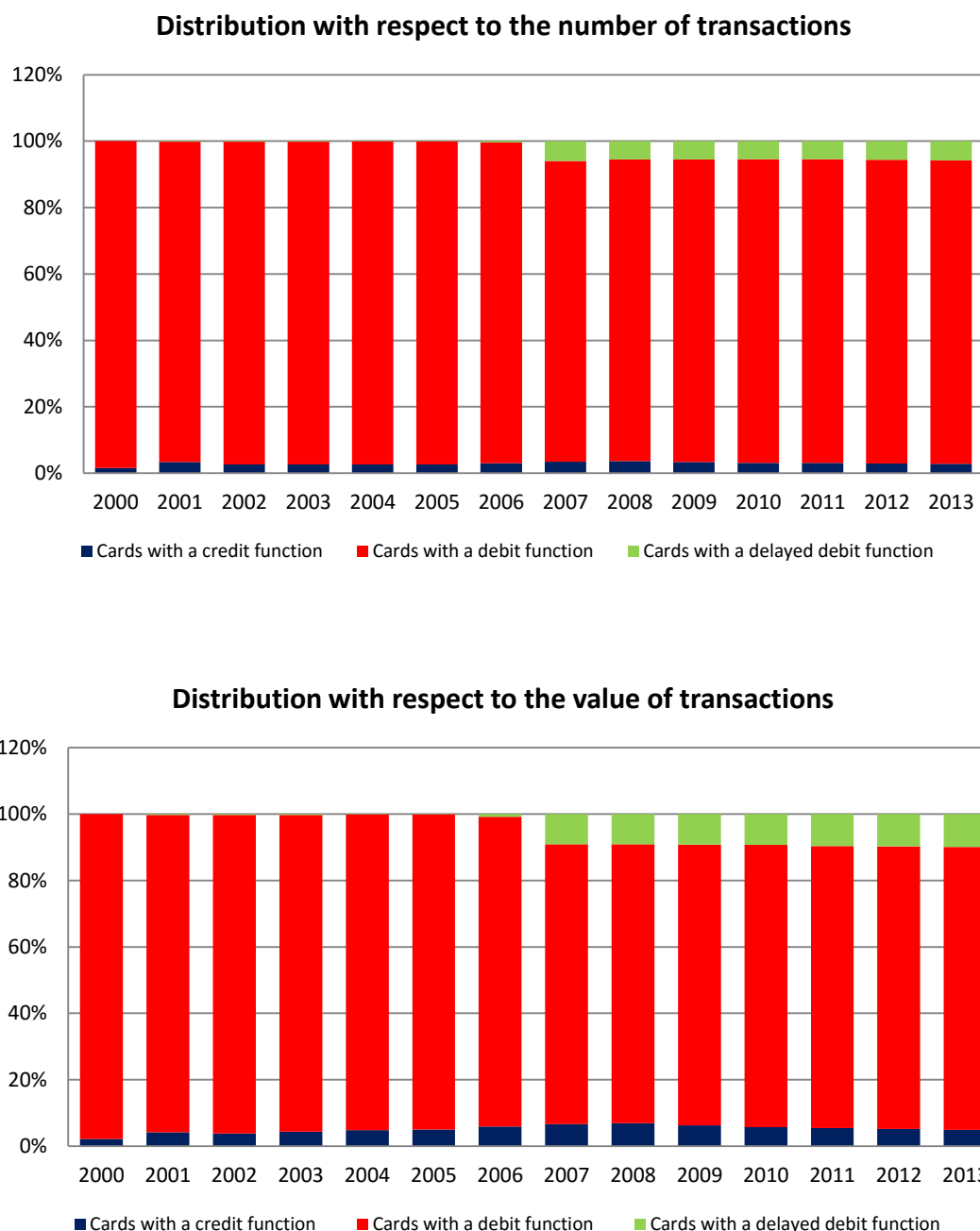
Source: European Central Bank

Figure 2.17: Distribution of the number and the value of card transactions in Greece (2000-2013)



Source: European Central Bank

Figure 2.18: Distribution of the number and the value of card transactions in the Eurozone (2000-2013)



Source: European Central Bank

Moreover, the value of card transactions over GDP in Greece was the lowest in the EU, amounting only to 3.2%, when the corresponding share reached 16.5% in the EU on average and 34.8% in the United Kingdom, which came first in this ranking (Figure 2.16). In general, cards are used with greater intensity in Central and Northern European countries and considerably less in the South-East and Eastern Europe.

In addition, credit cards have a dominant role in Greece, whereas in the Eurozone most card transactions concern transactions with debit cards. Although credit cards dominate in Greece, since 2008 both the number and the value of credit card transactions have declined.

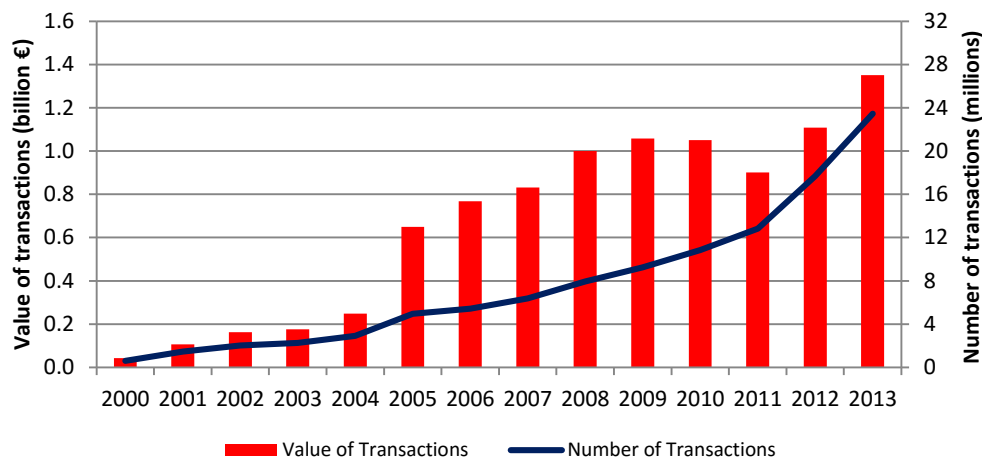
At the same time, the use of debit cards has grown, while the role of cards with a delayed debit function has declined.

However, the vast majority of transactions are performed with debit cards in the Eurozone, while the share of transactions with credit cards is very small and – both in terms of the number of transactions and their value – declining since 2008 (Figure 2.18). Unlike Greece, the use of delayed debit cards in the Eurozone has increased since 2006, although their use is still very limited. However, the cards with a delayed debit function have a higher value of transactions than credit cards over time.

Transactions with debit cards

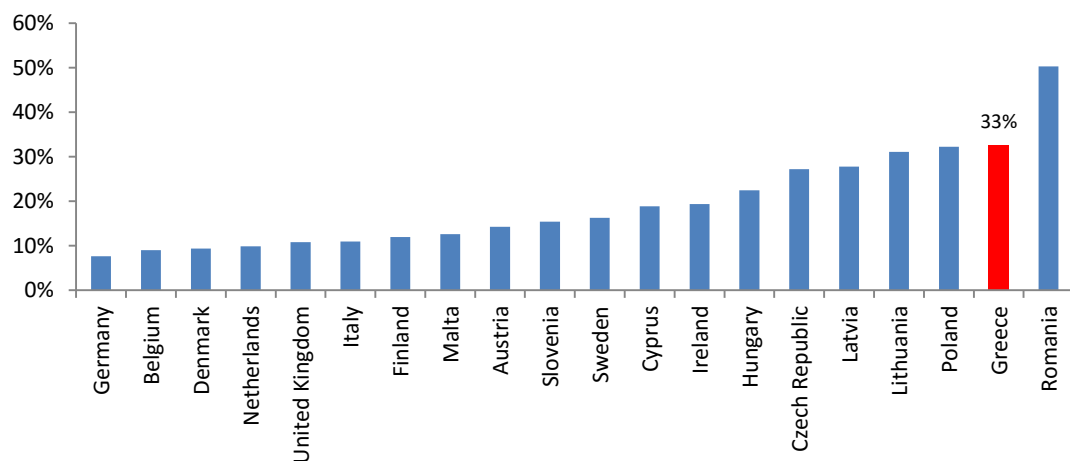
Both the number and the value of transactions with debit cards increased significantly between 2000 and 2013 (Figure 2.19). Despite the slowdown and then drop in the first years of the recession (2009-2011), the value of transactions returned to growth in 2012 and 2013. As a result, the value of transactions increased from €4.2 million in 2000 to €1.35 billion in 2013, and their number from 602,000 in 2000 to 23.5 million in 2013.

Figure 2.19: Number and value of transactions with debit cards in Greece (2000-2013)



Source: European Central Bank

Figure 2.20: Number of transactions with debit cards, CAGR 2000-2013



Source: European Central Bank, Data processing: FEIR

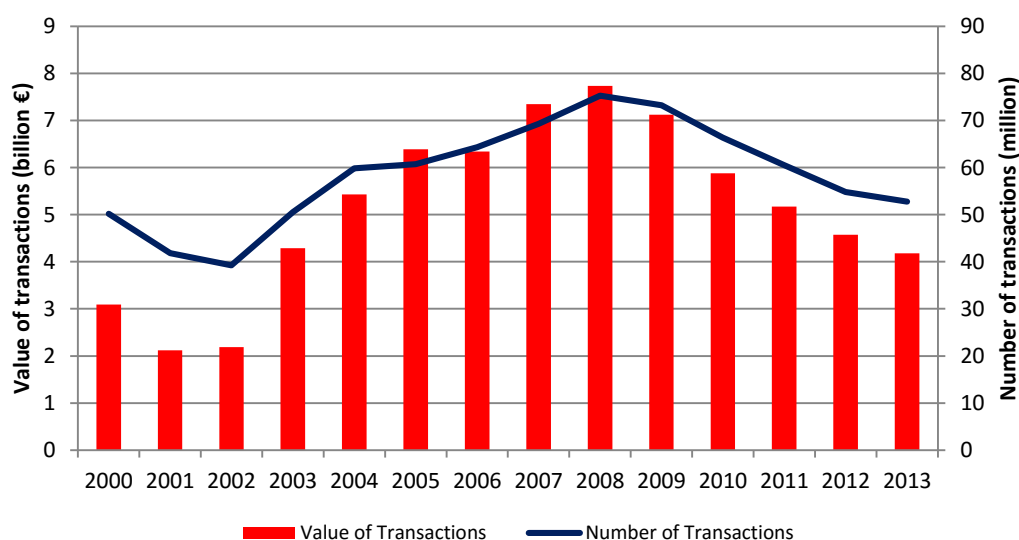
It is worth noting that the rate of increase of the number of transactions with debit cards in Greece is among the highest in EU (at least for the countries with data for the period 2000-2013), reaching 33% per year on average (Figure 2.20).

Credit cards

Both the number and the value of transactions increased between 2002 and 2008, but they declined notably during the economic crisis (2009-2013 - Figure 2.21). This trend may be attributed to the decrease in private consumption during this period (-0.7% in 2009, -6.9% in 2010, -10.7% in 2011, -7.9% in 2012 and -2.15% in 2013), as well as to the reduction of credit card limits by the banks in order to limit their credit risk.

In greater detail, the number of transactions with credit cards reached 75.3 million in 2008, decreasing to 52.8 million in 2013. Their value also reached its peak in 2008 (€7.7 billion) and then decreased to €4.2 billion in 2013. We should note, however, that despite the reduction during the recession, the number and value of transactions remained higher in 2013 than in 2000, by 5.1% and 35.2%, respectively.

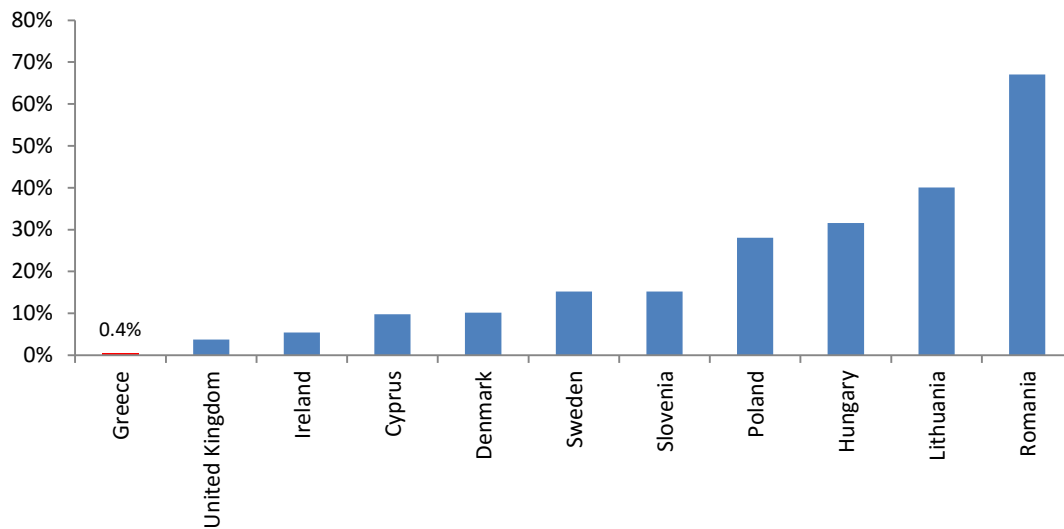
Figure 2.21: Number and value of transactions with credit cards in Greece (2000-2013)



Source: European Central Bank

During the same period, the CAGR of transactions with credit cards in Greece stood at only 0.4%, while in countries such as Romania, Lithuania, Hungary and Poland it reached 67%, 40%, 32% and 28%, respectively (Figure 2.22). This difference is probably also due to the fact that the credit card use in Greece is at a more “mature” level, compared with these countries.

Figure 2.22: Number of transactions with credit cards, CAGR 2000-2013

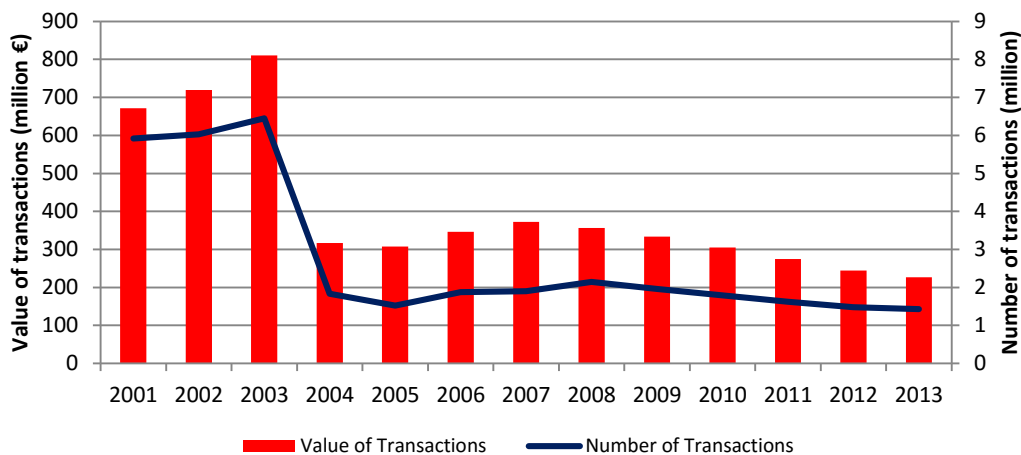


Source: European Central Bank, Data processing: FEIR

Cards with a delayed debit function

Unlike the previous means of payment, both the number and the value of transactions with delayed debit cards has shrunk since 2003 (Figure 2.23), except from the period from 2005 to 2008 that showed a slight increase. Overall, the number and the value of transactions have declined since 2001 by 75.9% and 66.2%, respectively. To a large extent, the use of delayed debit cards fell with the growth initially of credit and then debit cards.

Figure 2.23: Number and value of transactions with cards with a delayed debit function in Greece (2001-2013)



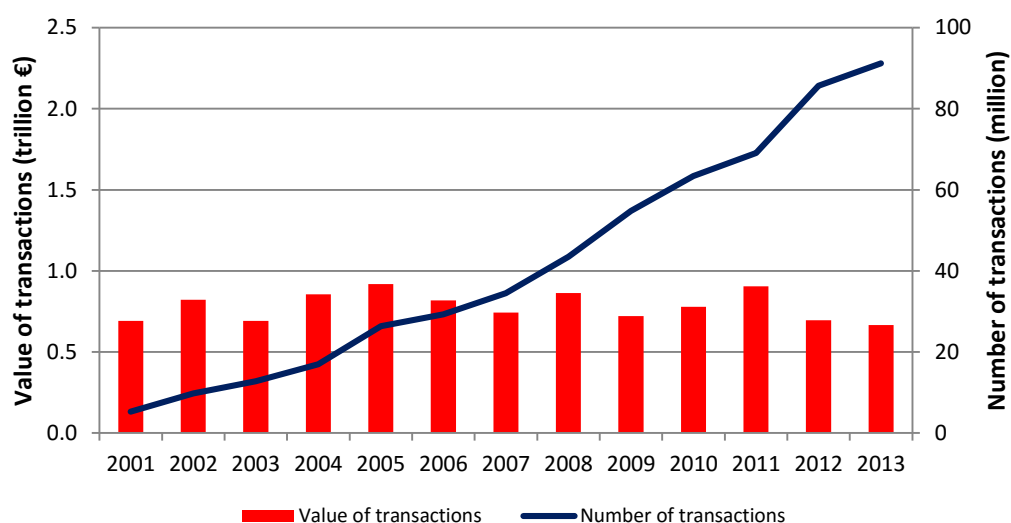
Source: European Central Bank

2.3.2 CREDIT TRANSFERS

While the number of credit transfers increased by 17 times, from 5.3 million in 2001 to 91.2 million in 2013, their value at the same period decreased by 3.6%, from €692 billion in 2001 to €667 billion in 2013 (Figure 2.24). The diverging trend in the value and the number of transactions demonstrates the continuous decline in the average value of transactions,

which may be attributed to the increased use of e-banking for retail payments between households and firms.

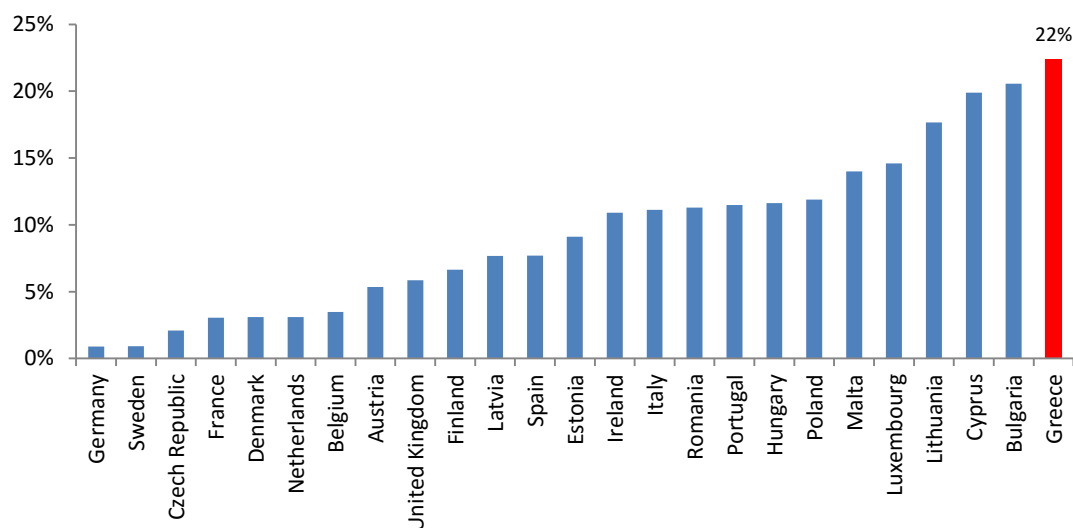
Figure 2.24: Number and value of transactions with credit transfers in Greece (2000-2013)



Source: European Central Bank

The rapid increase in the number of transactions with credit transfers in Greece is also highlighted by the fact that their growth in Greece was the highest among 25 EU countries between 2000 and 2013, reaching 22% (Figure 2.25). Bulgaria (21%) and Cyprus (19%) came next, while, the growth rate did not exceed 1% in countries such as Germany and Sweden. More generally, in countries where the use of credit transfers is widespread (Sweden, the Netherlands, Belgium, Austria, Finland), the rate of growth is lower, compared with countries where the use of credit transfers is limited (Greece, Bulgaria, Cyprus, Malta).

Figure 2.25: Number of transactions with credit transfers, CAGR 2000-2013



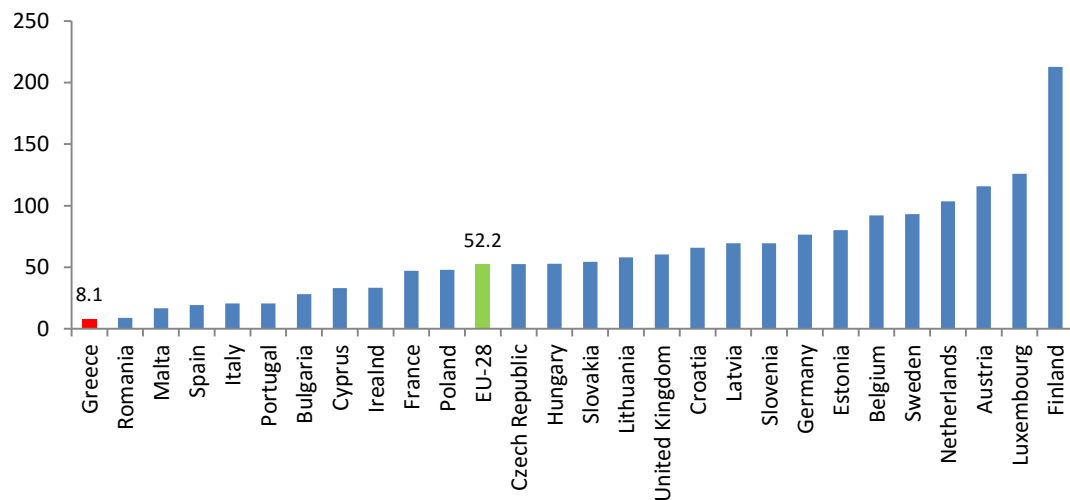
Source: European Central Bank, **Data processing:** FEIR

However, despite the significant increase in the number of transactions with credit transfers between 2000 and 2013, the comparison with the EU is not favourable, since Greece is

ranked last among the EU countries with respect to the number of transactions per inhabitant, with only 8 transactions (Figure 2.26). The country with the highest number of transactions per inhabitant is Finland (213), followed by Luxembourg (126), Austria (116), the Netherlands (104) and Sweden (93). Apart from Greece, only Romania has less than 10 credit transfer transactions per inhabitant.

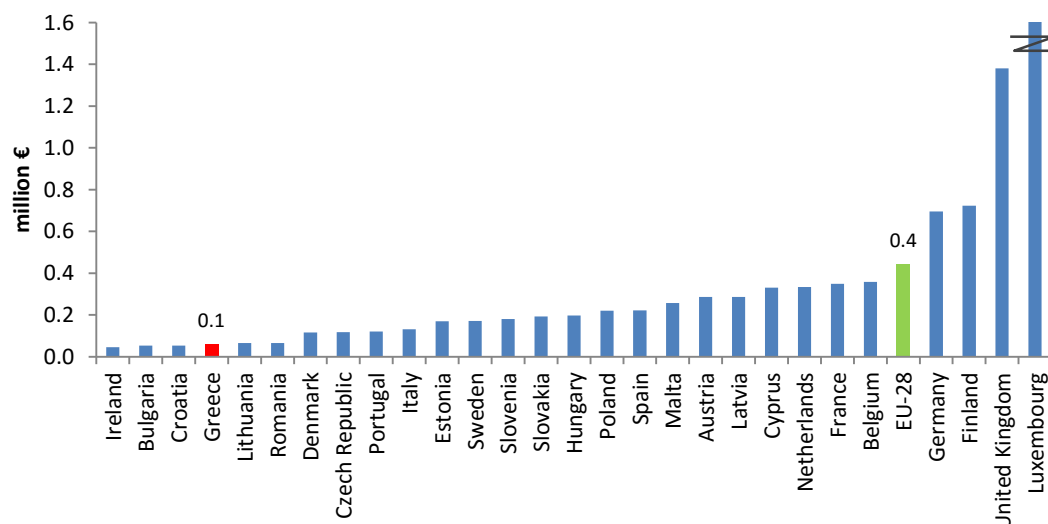
The value of transactions per inhabitant in Greece, at €59,100, is quite low, compared with the EU (€442,600 on average). The value of transactions per inhabitant is well above the EU average in countries with developed financial sectors, such as Luxembourg with €2.7 million per inhabitant and the United Kingdom with €1.4 million per inhabitant (Figure 2.27).

Figure 2.26: Number of transactions per inhabitant with credit transfers (2013)



Source: European Central Bank

Figure 2.27: Value of transactions per inhabitant with credit transfers (2013)

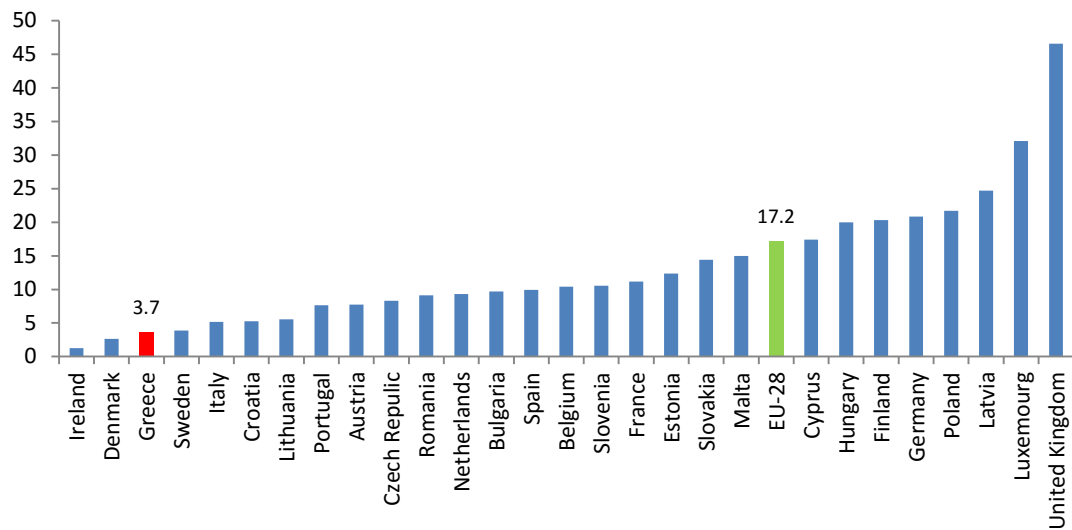


Source: European Central Bank

The same differences are observed in the case of the value of transactions over GDP, with Greece ranked 26th among the 28 EU countries, with the transaction value 3.7 times higher

than its GDP. The corresponding ratio for EU on average equaled 17.2, while for the United Kingdom – an economy largely reliant on the financial sector – it totalled 46.6 (Figure 2.28).

Figure 2.28: Value of transactions with credit transfers, as percentage of GDP (2013)

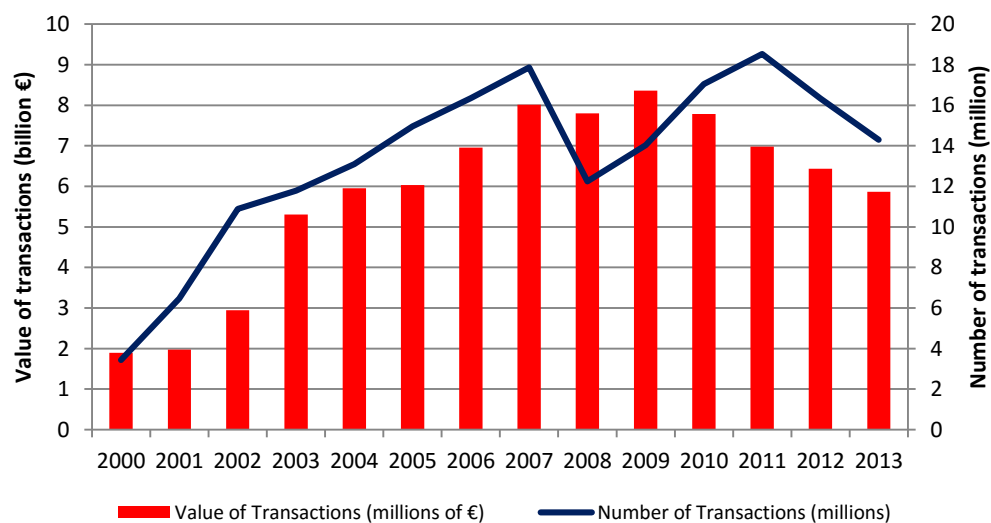


Source: European Central Bank

2.3.3 DIRECT DEBITS

Both the number and the value of direct debits increased continuously up to 2007 and then – after some fluctuations, especially in the number of transactions – followed a downward trend (Figure 2.29). The fall during the recession may be attributed to the need for a more flexible cash management by the households during a period of uncertainty and limited liquidity. Despite the decline during the recession, the number of transactions has increased compared with 2000, by approximately four times (from 3.4 million to 14.3 million in 2013), while the corresponding value of transactions has increased by approximately three times (from €1.9 billion to €5.9 billion in 2013).

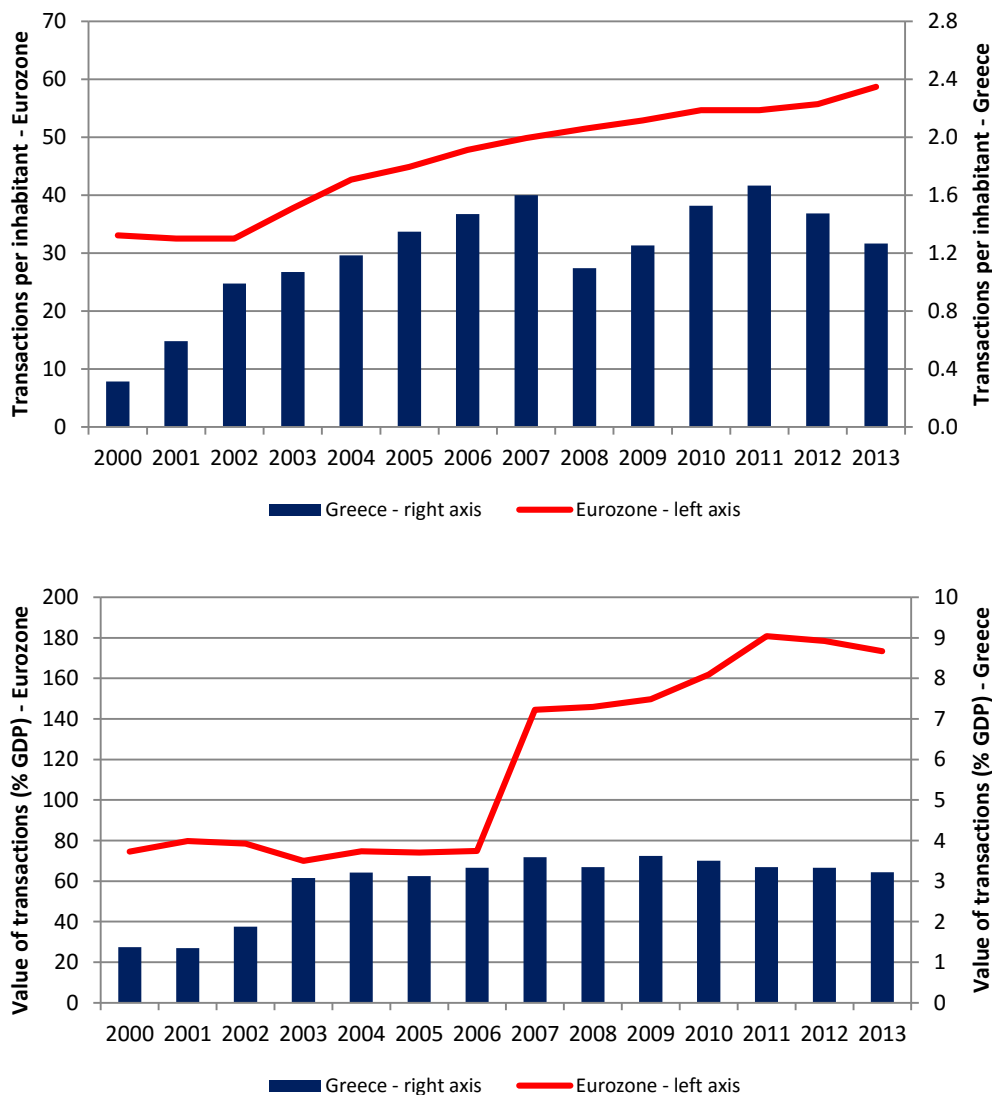
Figure 2.29: Number and value of transactions with direct debits in Greece (2000-2013)



Source: European Central Bank

Compared with the other EU countries, Greece lags behind in terms of both the number and the value of transactions with direct debit, with the gap in the value of transactions widening since 2006 (Figure 2.30). In particular, the number of transactions with direct debit per inhabitant was extremely low in 2013 (only 1.3 transactions per inhabitant on average), exceeding only that of Romania (0.4), Poland (0.6) and Bulgaria (0.8 - Figure 2.31). The country with the highest number of transactions per inhabitant was Germany (121) while the EU average stood at 47.1.

Figure 2.30: Number and value of transactions with direct debits Greece-Eurozone (2000-2013)



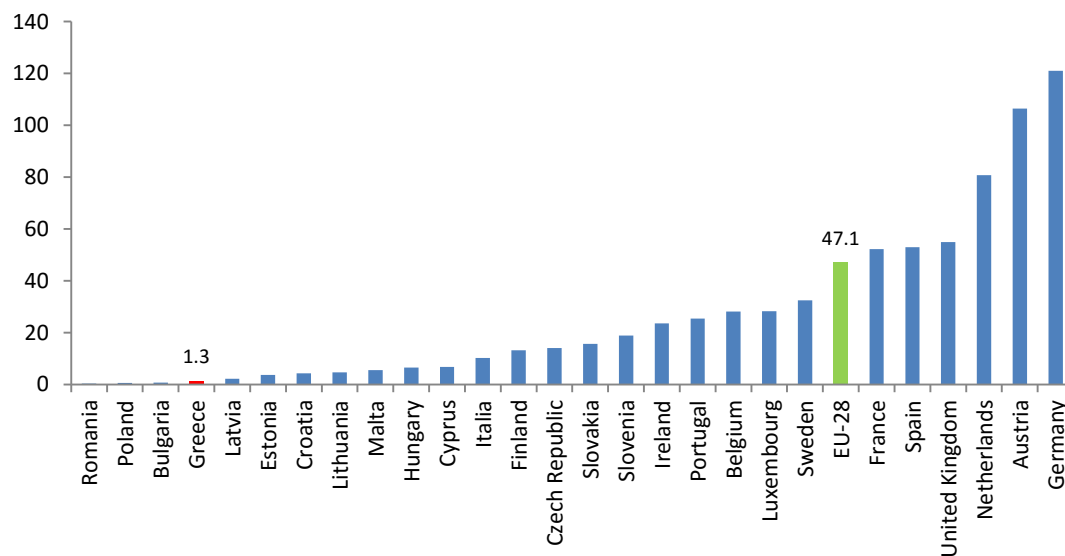
Source: European Central Bank

The value of transactions as a percentage of GDP in Greece in 2013 did not exceed 3.2% while the corresponding rate in the EU was 138.7%. The country with the highest rate was Germany with 478.1% (Figure 2.32). Similar differences are observed in the value of transactions per inhabitant, which stood at only €519 in Greece, compared with €37,500 in the EU on average. In about one-third of the EU countries – including Greece – the annual value of direct debit transactions per inhabitant did not exceed €1,000, in another one-third

it ranged between €1,000 and €9,999, and in the rest, it exceeded €10,000. The first country in the corresponding ranking was Germany, where the value of transactions per inhabitant approached €160,000.

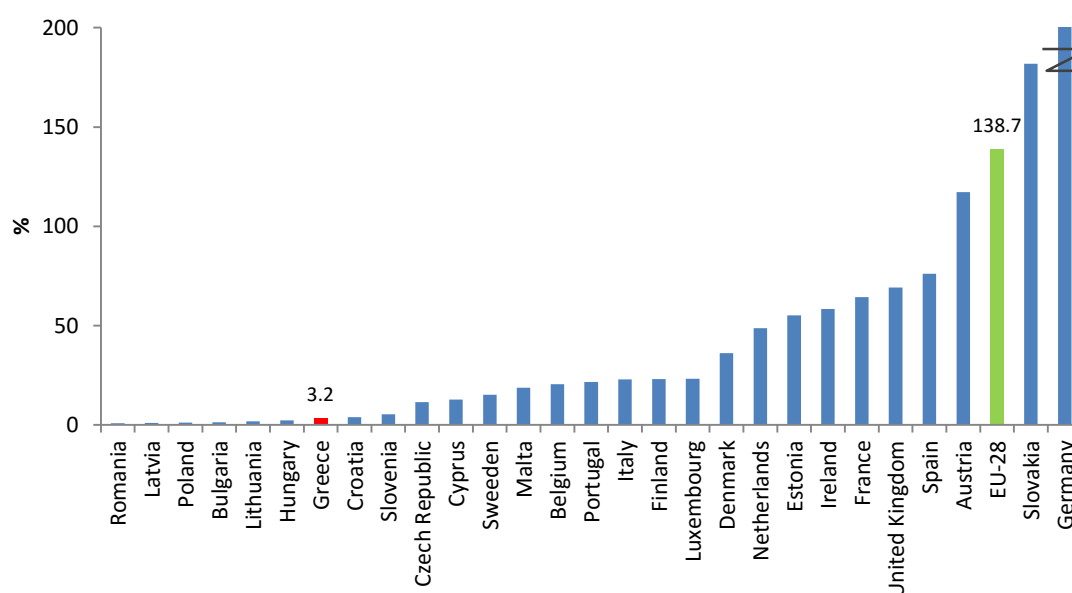
On the other hand, Greece had one of the highest growth rates of the number of transactions with direct debits between 2000 and 2013 in Europe, reaching 12% (sixth highest rate). However, Greece is far behind other countries such as Latvia (51.5%), Poland (41.5%) and Lithuania (24.2% - Figure 2.34).

Figure 2.31: Number of transactions per inhabitant with direct debits (2013)



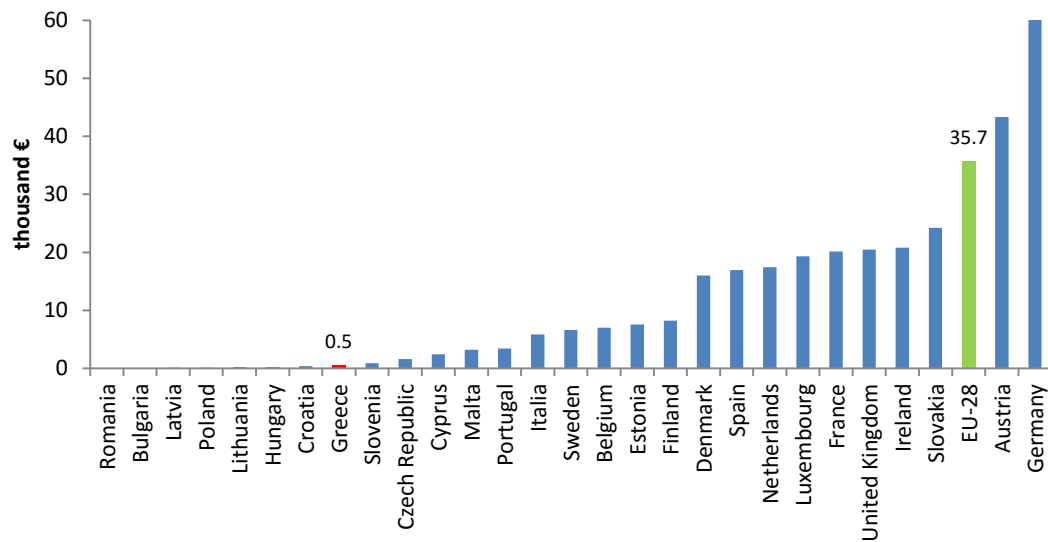
Source: European Central Bank

Figure 2.32: Value of transactions with direct debits, as percentage of GDP (2013)



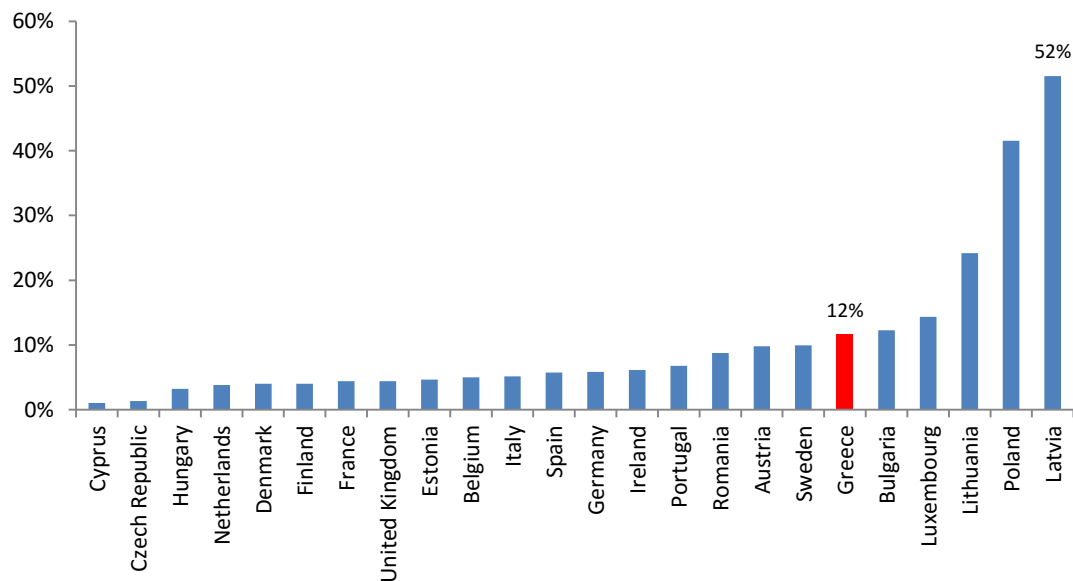
Source: European Central Bank

Figure 2.33: Value of transactions per inhabitant with direct debits (2013)



Source: European Central Bank

Figure 2.34: Average Annual Rate of Change (AARC) of direct debits transactions (2000-2013)



Source: European Central Bank, Data processing: FEIR

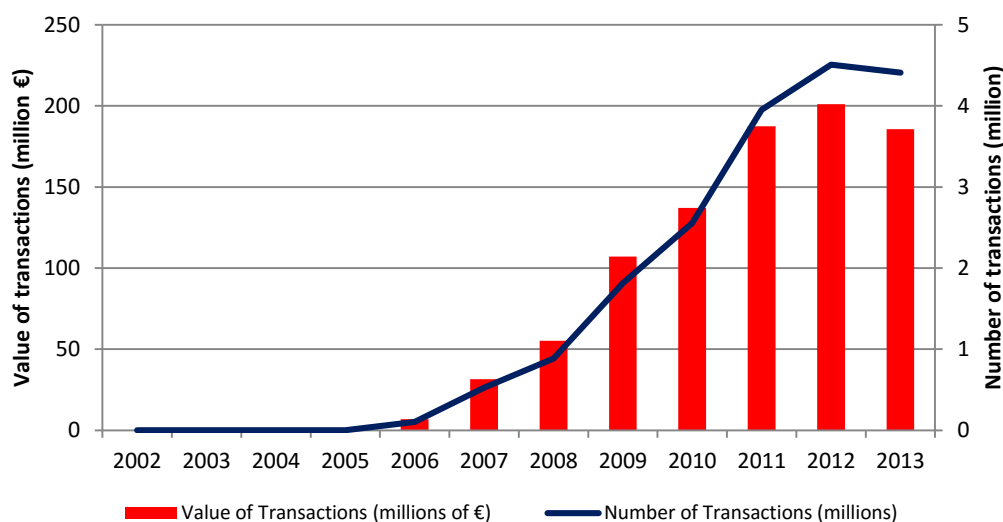
2.3.4 E-MONEY PURCHASE TRANSACTIONS

Both the number and the value of e-money transactions increased significantly between 2006 and 2012 (there is no data on e-money purchase transactions between 2002 and 2005), followed by a small decline in 2013 (Figure 2.35). From 2006 till 2013, the number of transactions increased by a factor of 44 (from 101,000 in 2006 to 4.4 million in 2013), while

the corresponding value of transactions increased 28 times (from €6.8 million in 2006 to €185.7 million in 2013).

Compared with other EU countries, the number and the value of transactions per inhabitant in Greece have remained very low. Indeed, the gap between Greece and the Eurozone tends to increase over time (Figure 2.36). Perhaps, this is a result of low familiarity (e.g. lack of knowledge or experience in the use of specialised software for electronic transactions from mobile phones or computers) and trust (e.g. fear of interception of passwords or personal data) of the Greek consumers in innovative payment instruments.

Figure 2.35: Number and value of e-money transactions (2002-2013)

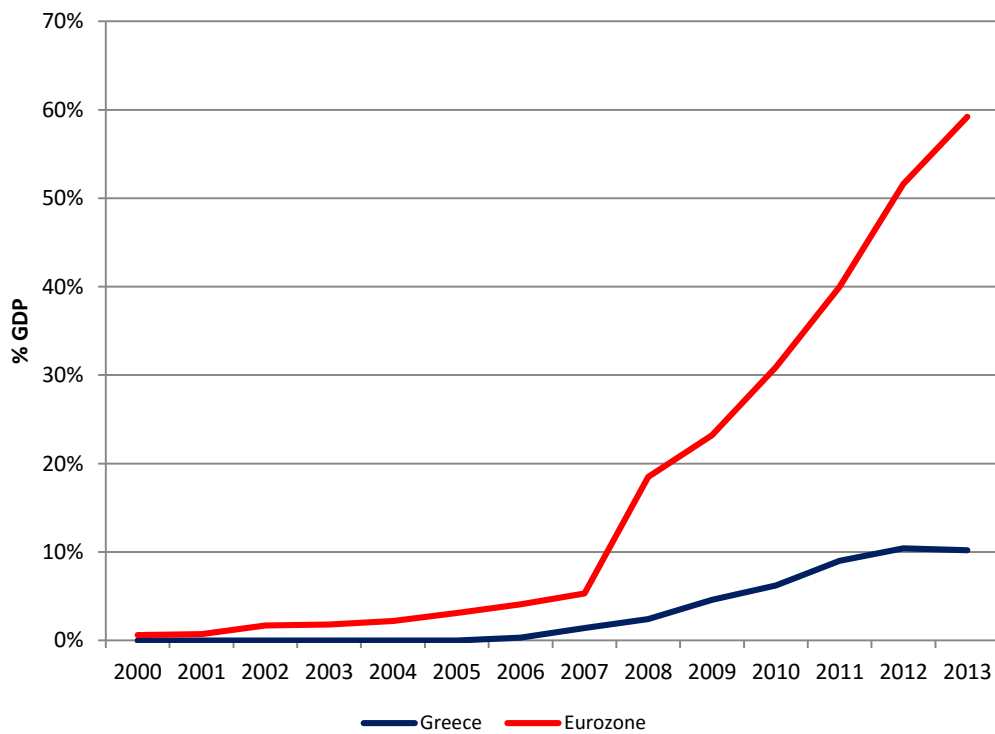
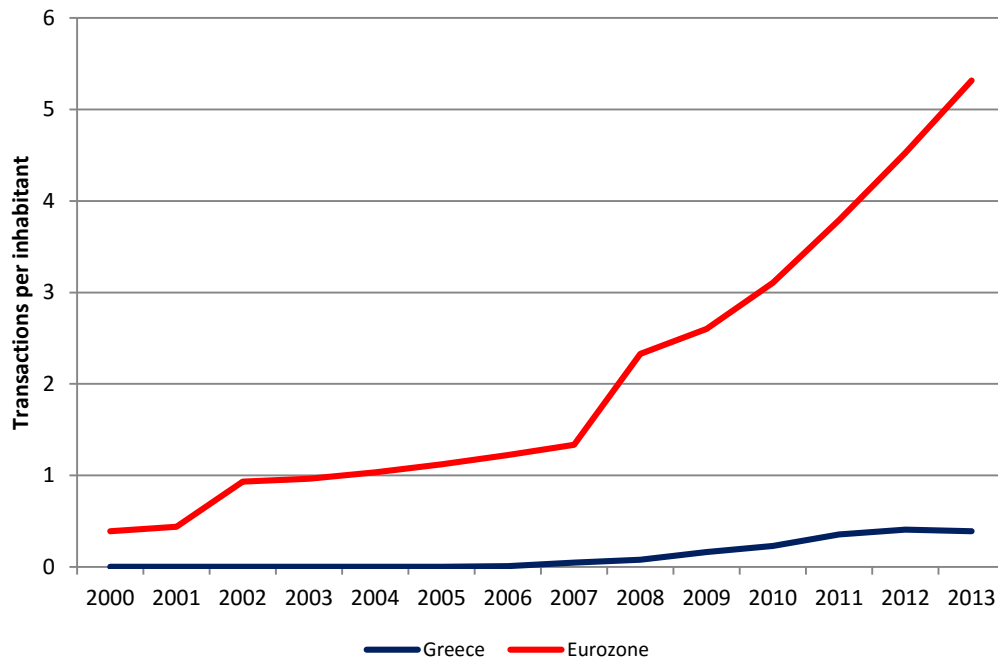


Source: European Central Bank

A comparison with the other EU countries reveals that the number of transactions with e-money in Greece is quite low (0.4 transactions per inhabitant), according to available data for 16 EU countries (3.52 transactions per inhabitant on average). However, with the exception of Luxembourg (with 2,277 transactions per inhabitant), the use of e-money transactions is limited in other EU countries as well. In nine of the countries for which data were available, the average number of transactions per inhabitant was lower than one, in five countries it ranged from 1 to 4, whereas in the Netherlands it amounted to 7 transactions (Figure 2.37).

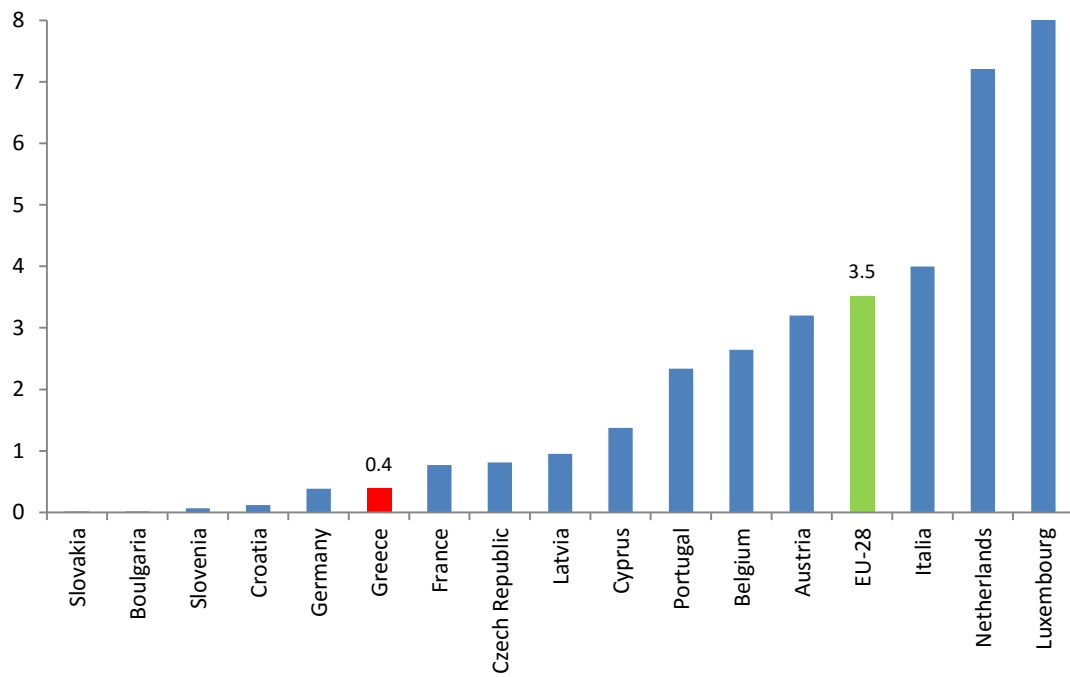
In terms of value per inhabitant, however, Greece ranks relatively high. In particular, the value of e-money transactions per inhabitant in Greece in 2013 reached €16.4, at similar levels with the Netherlands (€16.3), Latvia (€17.6) and Austria (€18.9 - Figure 2.38). The highest value per inhabitant was recorded in Portugal (€46.8), Cyprus (€73.6) and Italy (€192.5), while the corresponding amount was exceptionally high in Luxembourg, where the European headquarters of Paypal are located (€79.659). Finally, as a percentage of GDP, the value of e-money purchase transactions both in Greece (0.10%) and in other EU countries – except for Luxembourg – is very low, not exceeding 1% (Figure 2.39).

Figure 2.36: Number and value of e-money transactions, Greece and the Eurozone (2002-2013)



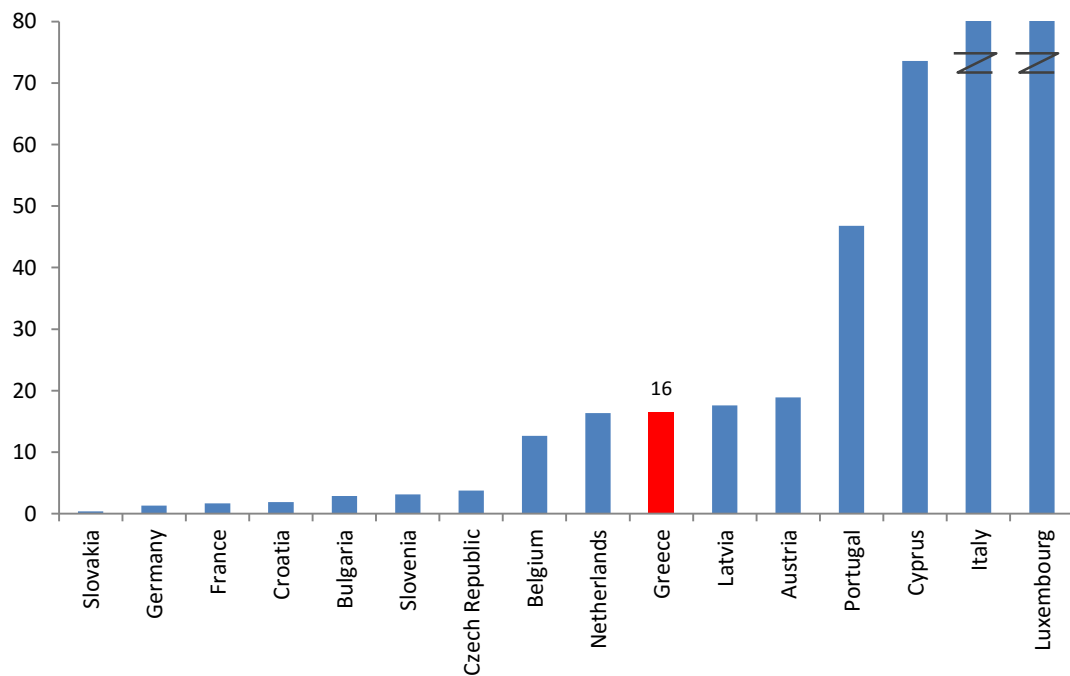
Source: European Central Bank

Figure 2.37: Number of e-money transactions per inhabitant (2013)



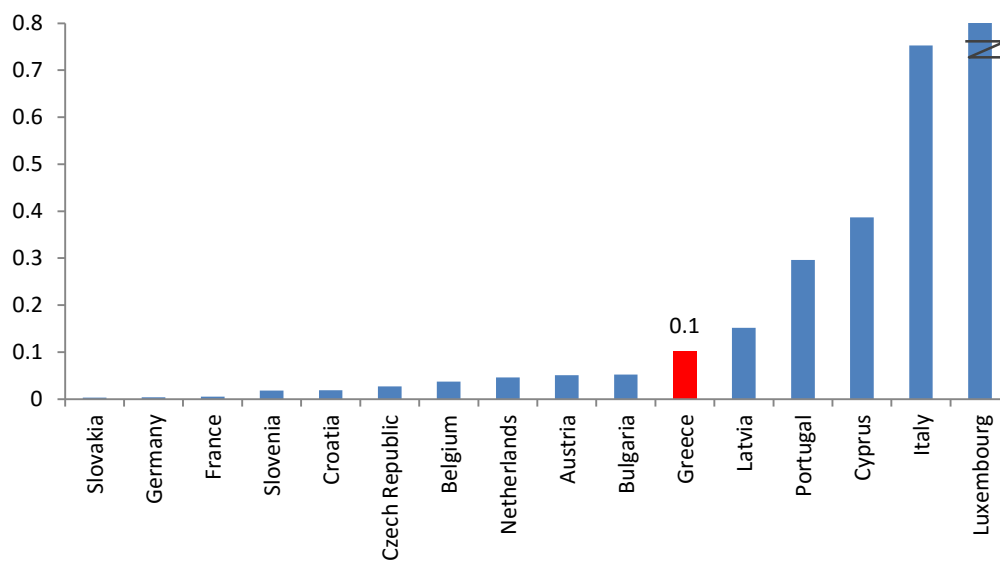
Source: European Central Bank

Figure 2.38: Value of e-money transactions per inhabitant (2013)



Source: European Central Bank

Figure 2.39: Value of transactions with e-money, as percentage of GDP (2013)

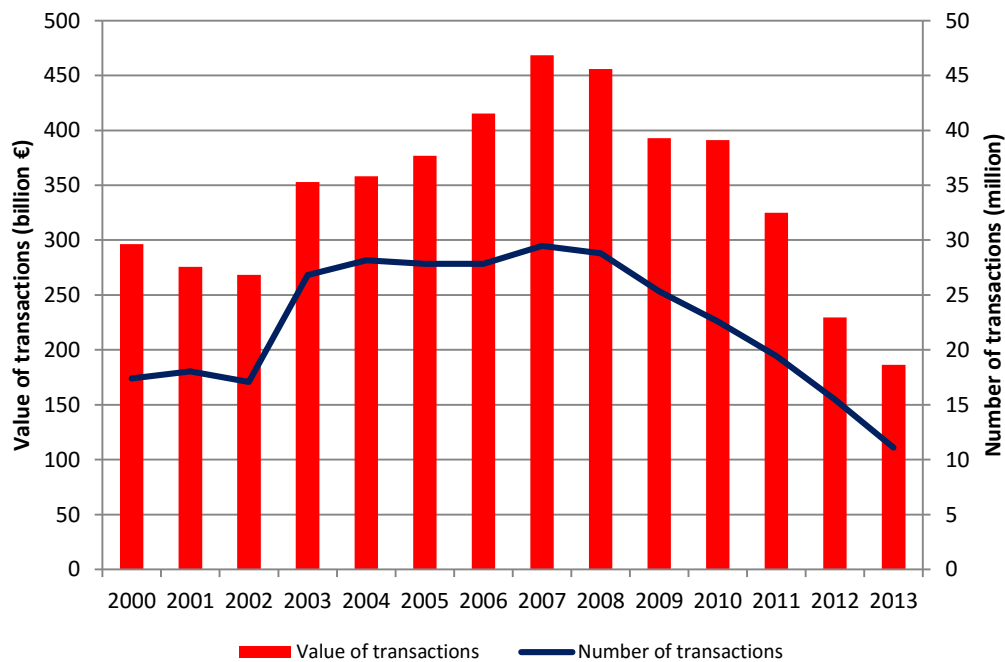


Source: European Central Bank

2.3.5 CHEQUES

Both the value and the number of transactions with cheques has fallen significantly in Greece since 2008 (Figure 2.40). During the period of economic crisis (2008-2013), the acceptance of cheques as a transaction instrument both between firms and between firms and commercial banks declined, due to the increased number of bounced cheques during the first year of crisis.

Figure 2.40: Number and value of transactions with cheques in Greece (2000-2013)

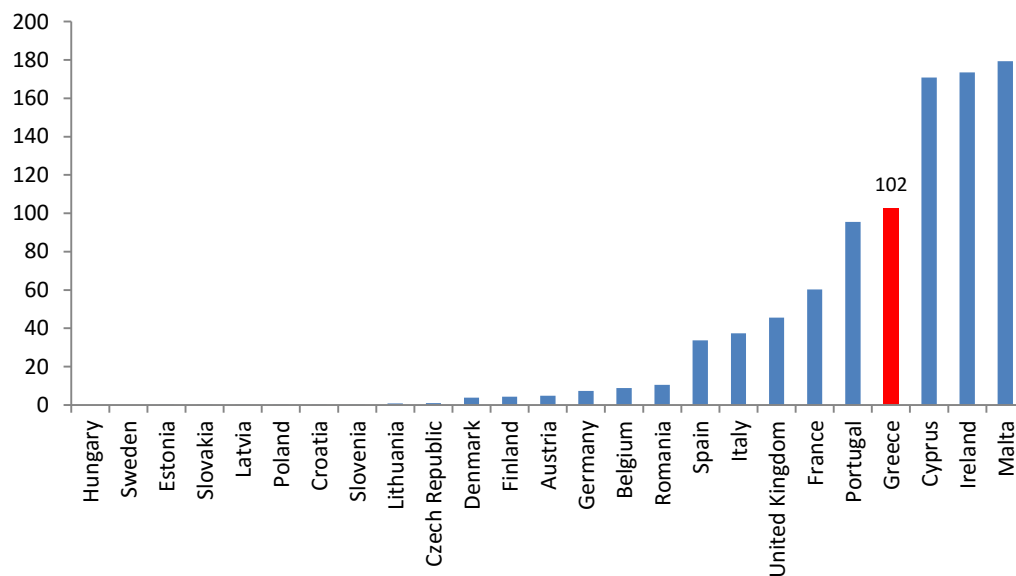


Source: European Central Bank

Despite the reduction, the use of cheques in Greece is still among the highest in the EU, with their value reaching 102% of GDP in 2013, which is the fourth highest share among 25 EU countries (Figure 2.41). Ahead of Greece in this ranking are Malta (179%), Ireland (174%) and Cyprus (171%).

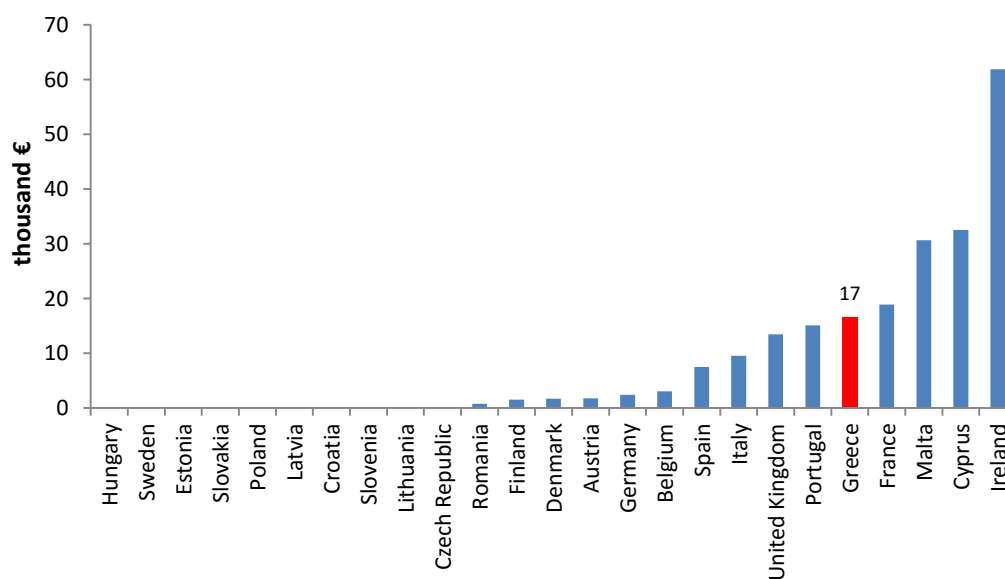
A similar result is observed in terms of the value of transactions with cheques per inhabitant. Greece is ranked 5th in this ranking with €16,500 per inhabitant, behind Ireland (€61,900), Cyprus (€32,500) and Malta (€30,700 - Figure 2.42).

Figure 2.41: Value of transactions with cheques, as percentage of GDP (2013)



Source: European Central Bank

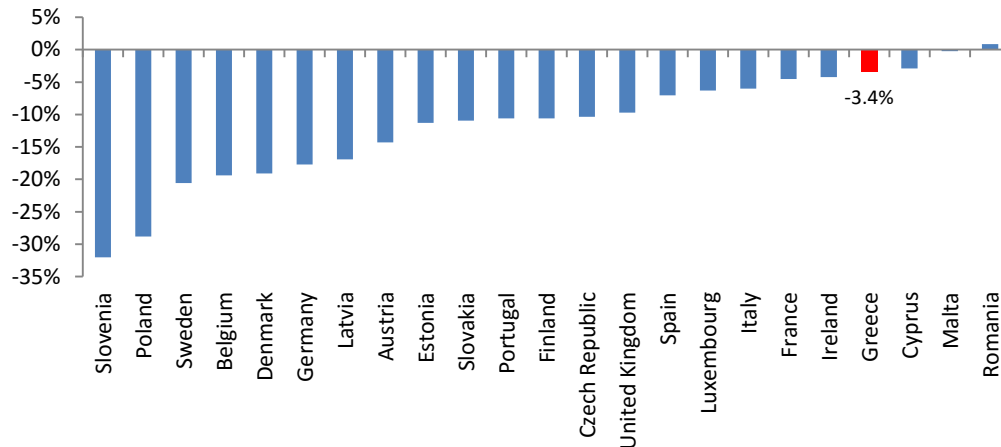
Figure 2.42: Value of transactions with cheques per inhabitant (2013)



Source: European Central Bank

The importance of cheques as a transaction instrument can also be seen from the growth rate of the number of transactions. In Greece, the average rate of change between 2000-2013 was limited to -3.4%, whereas the corresponding reduction in other countries such as Slovenia, Poland, Sweden, Belgium and Denmark reached 32%, 28.8%, 20.6%, 19.4% and 19.1%, respectively (Figure 2.43).

Figure 2.43: Transactions with cheques, CAGR 2000-2013

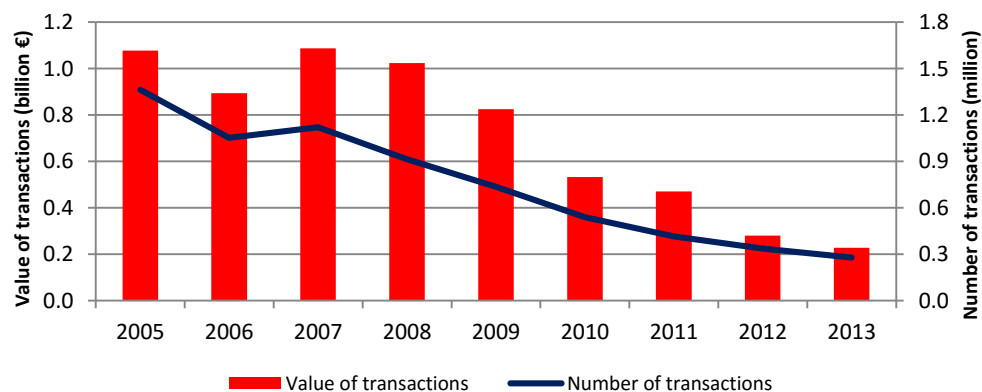


Source: European Central Bank

2.3.6 OTHER PAYMENT INSTRUMENTS

The value and the number of transactions with other payment instruments (except cash) have steadily declined since 2007 (Figure 2.44). In particular, between 2005 and 2013 the value of transactions fell by 78.9% (from €1.1 billion to €227,5 million) while the number of transactions decreased by 79.6% (from 1.4 million to 278 million).

Figure 2.44: Number and value of transactions with other cashless payment instruments in Greece (2005-2013)



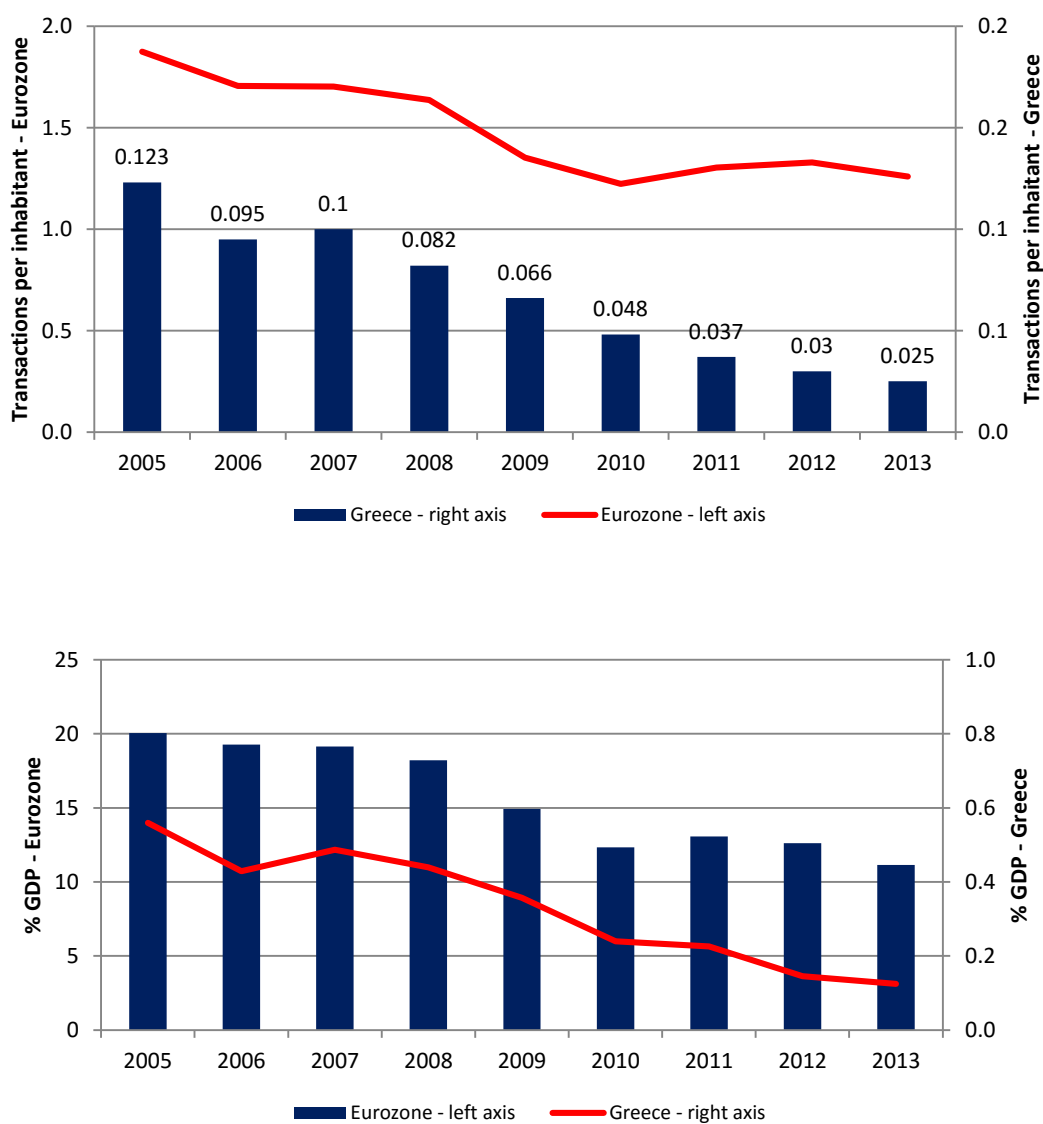
Source: European Central Bank

There is a considerable difference in the use of other means of payment between Greece and the Eurozone, both in terms of the number and the value of transactions. The difference widened after 2010 (Figure 2.45), due to the continuous decline of transactions with other means of payment in Greece.

The comparison of Greece with the other EU countries suffers from a lack of available data, as there are data on other cashless payment instruments only for half of the EU countries. That said, the use of other means of payment is practically negligible for most countries and in the EU overall, with Italy being the country with the highest number of transactions per inhabitant (4.8 transactions - Figure 2.46).

The above figures also give an idea about the trends in the value of transactions per inhabitant, which in the case of Greece does not exceed €20, when it amounted to €2,128 in the EU and to €10,647 in Italy (ranked first in the corresponding ranking - Figure 2.47). The value of these transactions as a percentage of GDP is also very low in Greece, as it does not exceed 0.13%. In the EU, these transactions amount to 8.3% of GDP, whereas in Italy their share is rather high (41.7% - Figure 2.48).

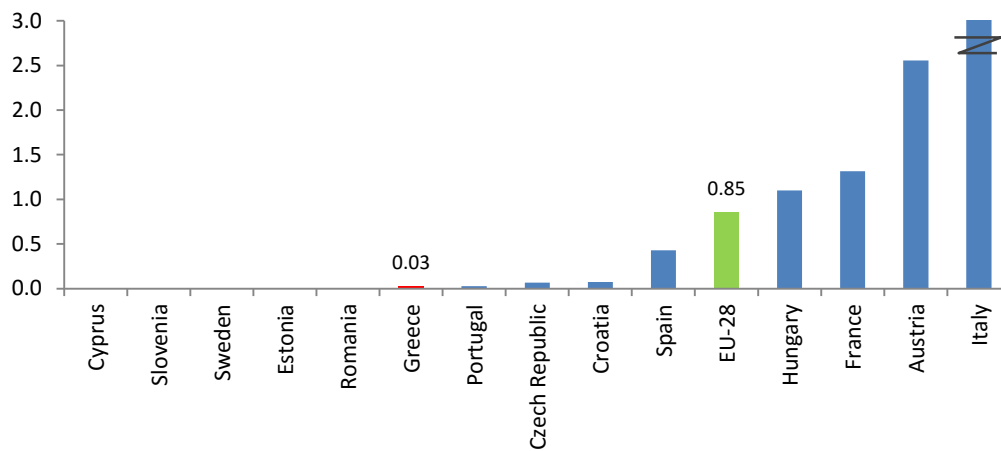
Figure 2.45: Number and value of transactions with other cashless payment instruments, Greece and the Eurozone (2005-2013)



Note: Credit transfers and cheques are not included

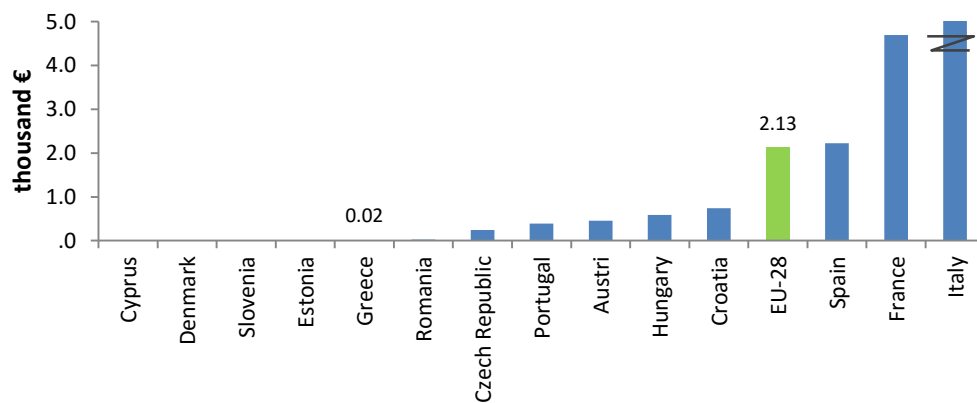
Source: European Central Bank

Figure 2.46: Number of transactions per inhabitant with other cashless payment instruments (2013)



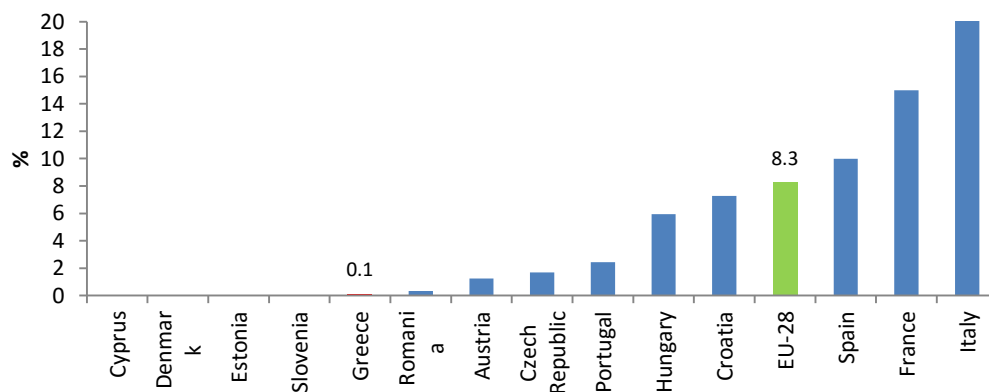
Source: European Central Bank

Figure 2.47: Value of transactions per inhabitant with other cashless payment instruments (2013)



Source: European Central Bank

Figure 2.48: Value of transactions with other cashless payment instruments as percentage of GDP (2013)



Source: European Central Bank

2.4 Demographic characteristics of the card use in Greece

In cooperation with the Hellenic Bank Association (HBA) and HBA member banks (National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank), we collected a sample of 4.5 million records. These records concern credit and debit card transactions between 2010 and 2014, representing 40 thousand people who made use of their cards during this period.

2.4.1 USE OF PAYMENT CARDS

The share of active credit card holders, meaning those that do not only possess a credit card but also make use of it, ranged between 65-75% from 2010 to 2014. In contrast, the percentage of debit card holders who use it shows a noticeable increase over the examined period, from 15% to 35%. Although the rate of use of debit cards that offer reward points seems to be higher, it does not approach the credit card usage levels. The data sample that is analysed below concerns the card holders who have made at least one card transaction between 2010 and 2014.

The total value of transactions in the sample stood at €437 million and the average transaction value at €99 (Table 2.1). The average transaction does not differ substantially between credit and debit card holders (€94 and €90 respectively) while it is higher in the case of bank customers who have both credit and debit cards (€114), and also among prepaid card users (€ 176 per transaction).

Table 2.1: Descriptive statistics of the data sample, 2010-2014

Type of card	Total number of transactions	Total value of transactions (€mil.)	Average value of transaction (€)	Average number of transactions	Maximum number of transactions per card
Credit card	2.133.973	200,5	93,9	100	2512
Debit card	1.085.100	97,3	89,7	104	4129
Prepaid	25.328	4,5	175,7	34	612
Debit and Credit	1.180.483	134,3	113,8	139	1619
Total	4.424.884	436,5	98,7	108	4129

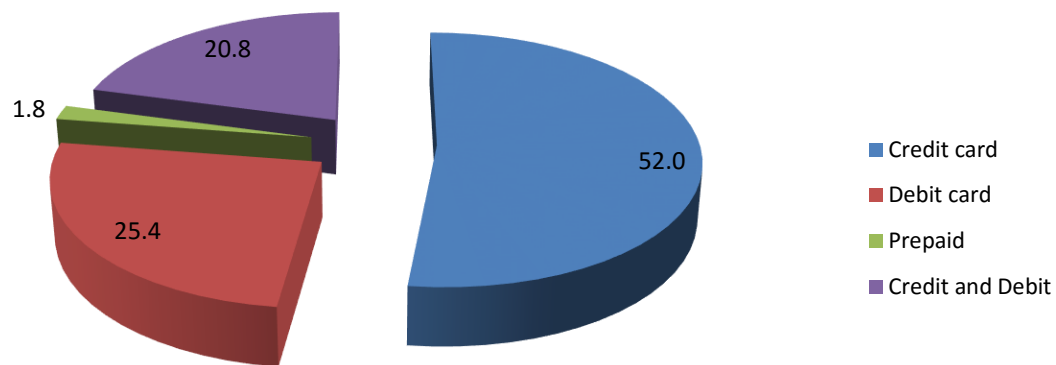
Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

The average number of transactions per card reached 108 over the examined period. The average number of transactions was higher among holders of both credit and debit cards (€139). The use of prepaid cards was less common, but they were used for higher value transactions.

Although there is a small difference in the average value and the average number of transactions between the credit and debit cards (there is weak evidence for increased use of debit cards for lower value transactions), the two types of cards differ significantly at the maximum number of transactions per card: 2,512 transactions in the case of credit cards and 4,129 transactions in the case of debit cards. This indicates that there are debit card holders

that use them regularly, even for daily transactions of lower value, whereas in the case of credit cards this use pattern is less common.

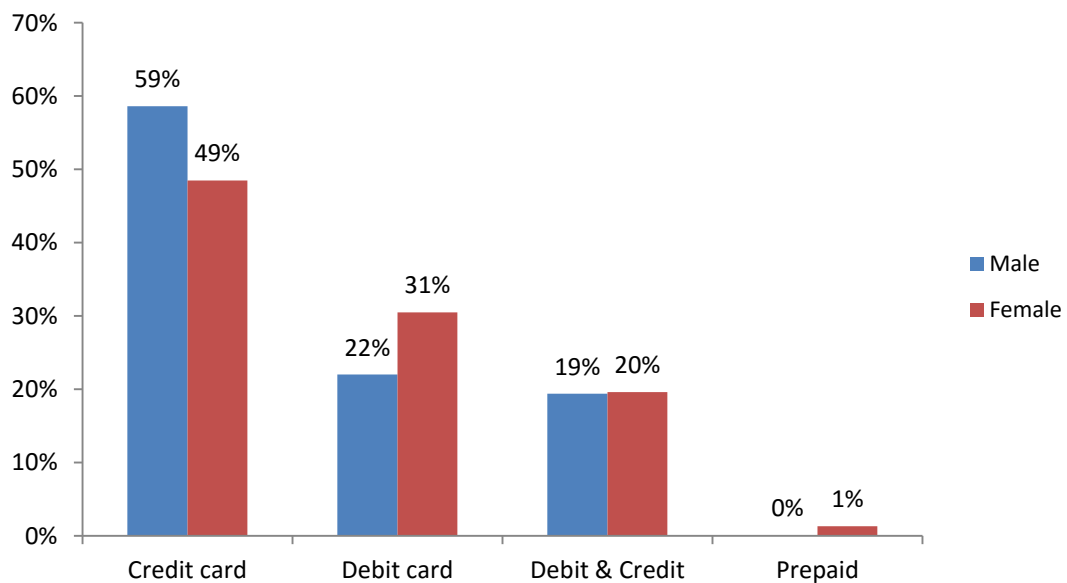
Figure 2.49: Share of users per card over the period, 2010-2014



Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

Considering the card type, the majority of the sample uses a credit card (52%), followed by debit card users (25%). On the contrary, the use of prepaid cards is not particularly widespread as their share does not exceed 1.8% (Figure 2.49).

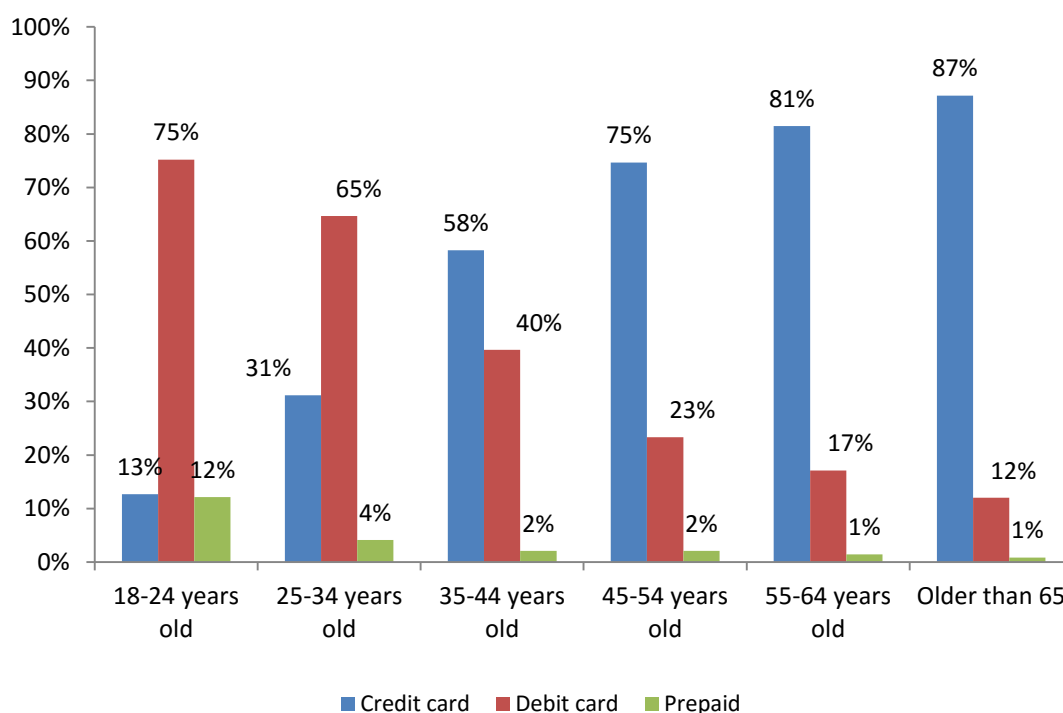
Figure 2.50: Type of cards, by gender



Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

Based on the gender, the use of credit cards is slightly higher in men (58% against 48% for women). In contrast, women appear more familiar with the use of debit cards (30% and 22% of men respectively - Figure 2.51).

Figure 2.51: Type of cards by age category



Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

The age distribution shows that credit cards prevail among older people, with the reverse holding for debit cards. The differences are most marked in the categories of 18-24 and over 65 years old. The share of holders aged 65 or more who use a credit card is at least four times higher compared to cardholders aged between 18 and 24 (87% versus 13%). The use of prepaid cards in the sample is not very different for those aged above 35 years (Figure 2.52).

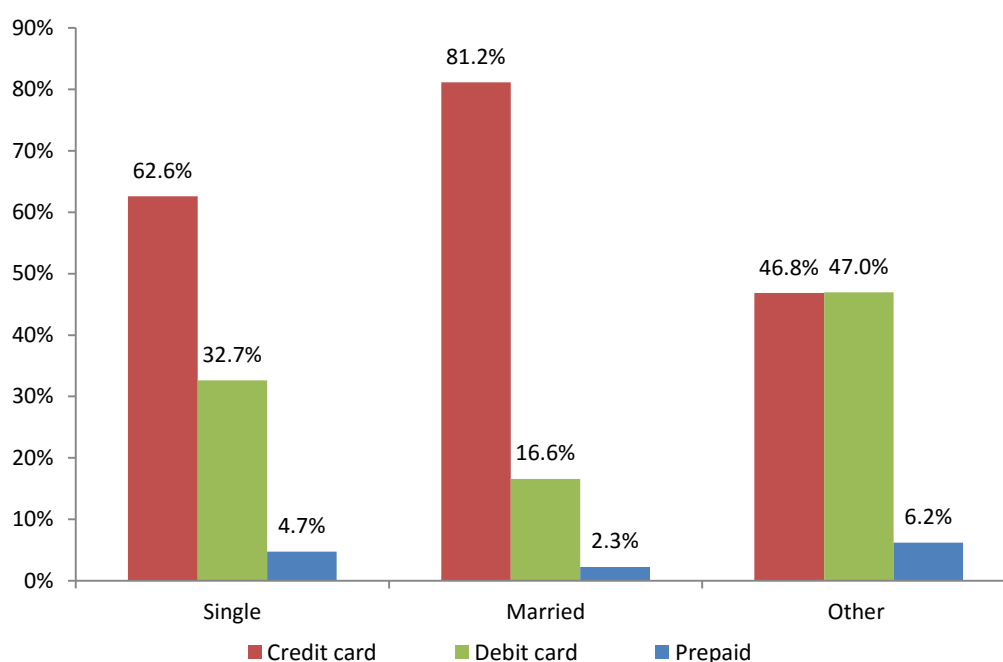
Regarding the marital status, the use of credit cards is more common among married individuals, compared with singles and other categories. This may come from a higher credit limit, due to higher income (family income) among married people, compared with singles. However, this difference might also be associated with the lack of sufficient liquidity to cover the higher family expenditure (Figure 2.52).

Also, the average value per transaction and the maximum value per transaction respectively, are higher among both married men and women, than in the case of singles, which is possibly associated with higher family expenditure (Table 2.2).

The effect of education on the consumer preferences between credit and debit cards is small. The share of credit cards ranges between 88.4% and 88.8%, depending on the level of education (Figure 2.53).³

³ As the availability of demographic data vary between the banks, the shares of card types by demographic characteristic may differ significantly from the shares in the whole sample.

Figure 2.52: Type of cards and marital status



Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

Table 2.2: Gender and marital status

Gender	Marital status	Average value per transaction
Female	Single	€127,0
	Married	€157,6
Male	Single	€148,6
	Married	€193,1

Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

The average value per transaction in the sample is higher among the users of a lower educational level. This is probably due to the fact that the use of cards by this user category is less frequent and is made for transactions of higher value (Figure 2.53). Instead, among individuals with higher education, the use of cards is more common, including also lower cost transactions. A similar trend is observed in the educational level per gender (Table 2.4).

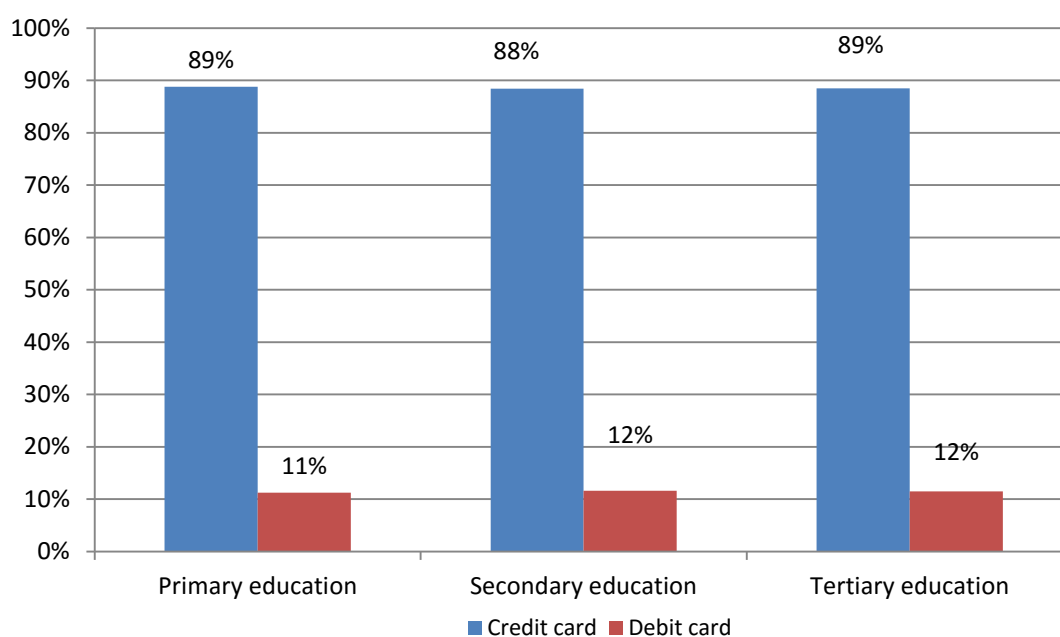
Moreover, the use of cards varies across employment status, which most probably reflects disposable income variation. Pensioners, who have increased needs that cannot be readily covered with cash, may choose to defer the payment of their purchases by using a credit card, an option that a debit card cannot offer. On the other hand, those who make less use of credit cards, mainly due to insufficient income, are unemployed and students. In the case of students, the use of prepaid cards is more common.

Table 2.3: Educational level and marital status

Educational level	Marital status	Average value per transaction
Primary education	Single	€161,4
	Married	€191,1
Secondary education	Single	€161,9
	Married	€187,0
Tertiary education	Single	€139,3
	Married	€182,0

Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

Figure 2.53: Type of cards by educational level



Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank, Data processing: IOBE/FEIR

Table 2.4: Educational level and gender

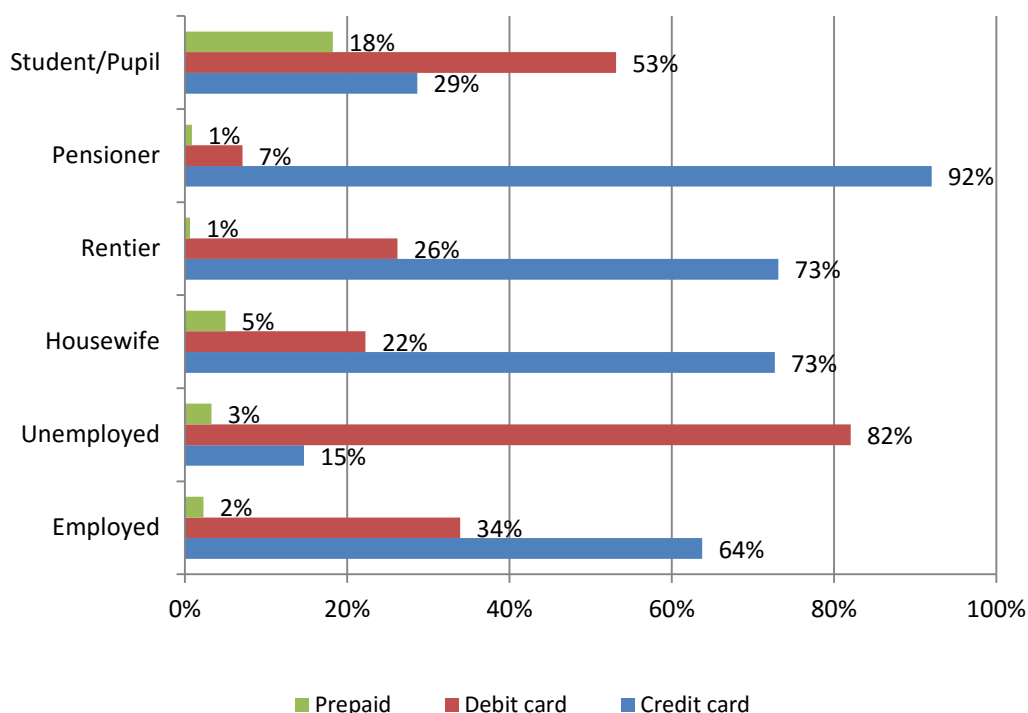
Educational level	Gender	Average value per transaction
Primary education	Female	€155,4
	Male	€215,2
Secondary education	Female	€157,7
	Male	€208,2
Tertiary education	Female	€157,6
	Male	€179,0

Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

2.4.2 REWARD FOR THE USE OF CARDS

The concepts of reward and redemption and their benefits do not seem to be widely known by the card users. In total, only 57.8% of the card users collect reward points through transactions and even fewer redeem the collected points (33%). The results are higher for credit card users, with the corresponding reward and redemption rates reaching 60% and 32% respectively (Figure 2.55). In contrast, the use of redemption and reward in debit cards is not particularly widespread (24.6% and 13.3% respectively).

Figure 2.54: Card use by professional status



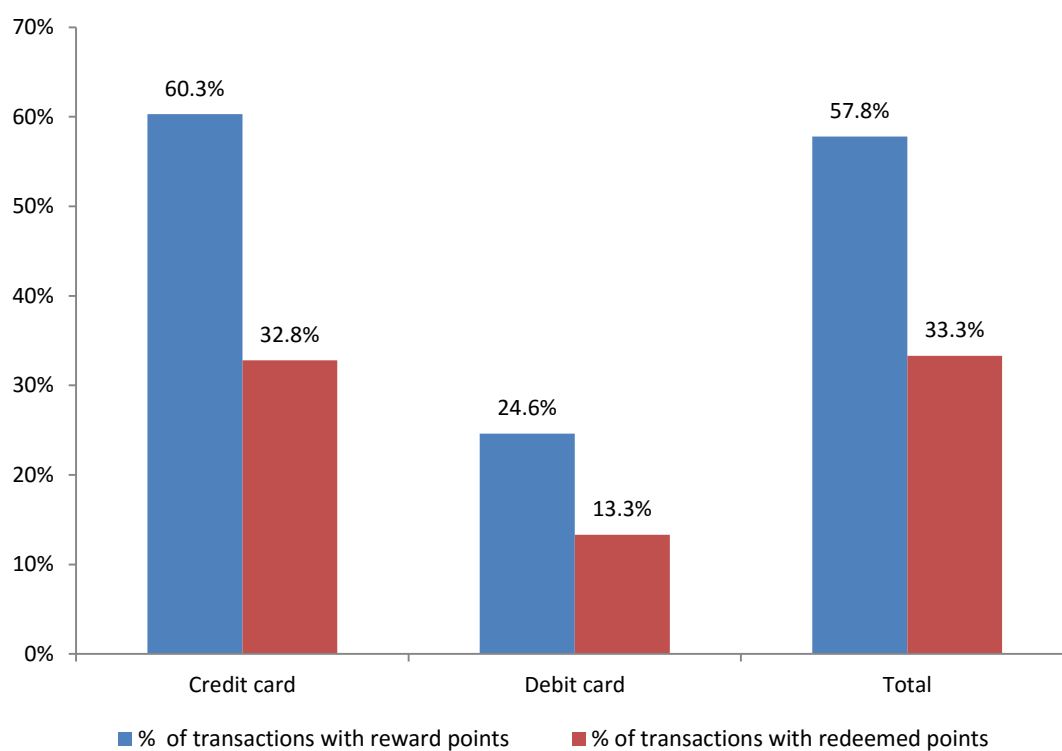
Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank, Data processing: IOBE/FEIR

The redemption of points collected from transactions was mainly done with credit cards (51% of the transactions). Only 10% of the cases that involved redeemed points concerned debit cards, while none of the transactions were redeemed through prepaid cards (Figure 2.56).

In relation to gender, the fact that women are more familiar with the use of debit cards is even more evident in the case of points redemption. Although the redemption of points with debit cards is less frequent than with credit cards, only 45% of the redemption by debit cards was carried out by men (Figure 2.57).

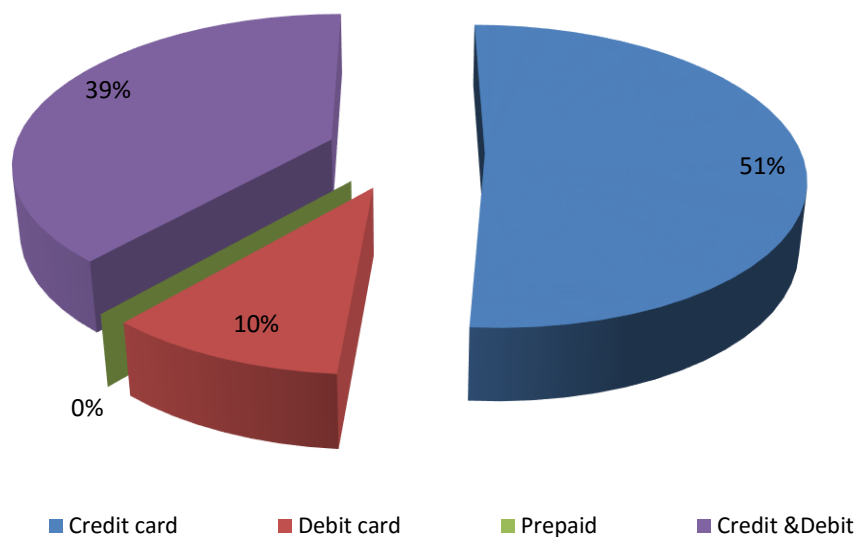
Age seems to have a positive effect on the awareness about the card benefits until the age of 35-44 and a negative effect for older people. The reward rate reached 62% of the transactions in the age of 35-44, while for individuals up to 24 years it represented only 21% of the transactions (Figure 2.58). Similarly, the percentage of transactions with a redemption of points was also highest among those aged 35-44 (36%).

Figure 2.55: Share of transactions with reward and redeem points



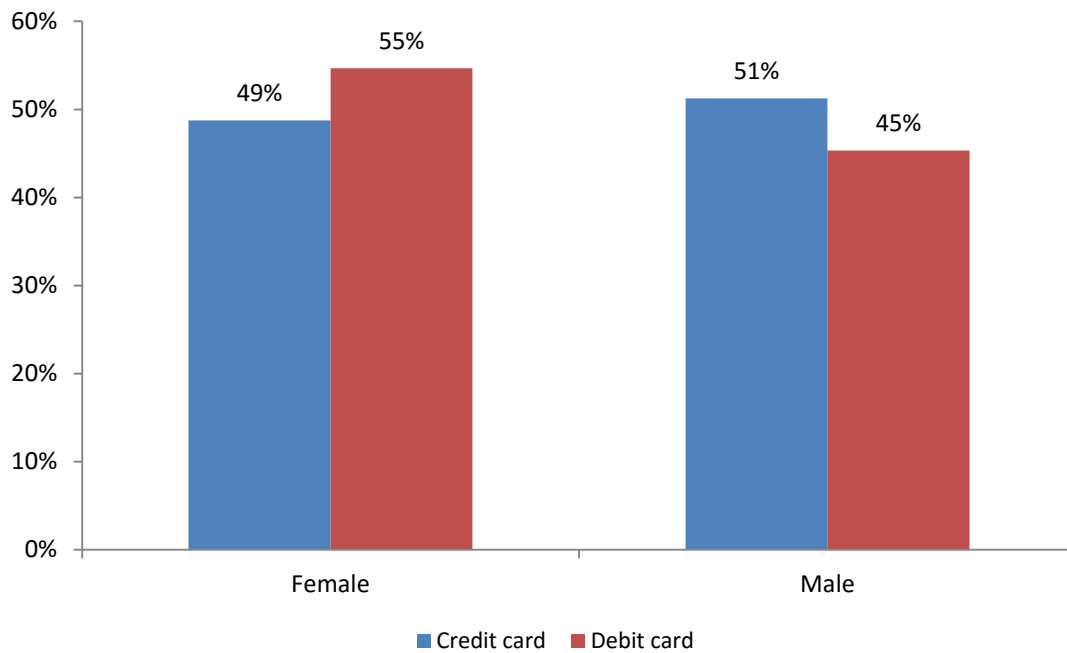
Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank, Data processing: IOBE/FEIR

Figure 2.56: Share of transactions with redeemed points, by card type



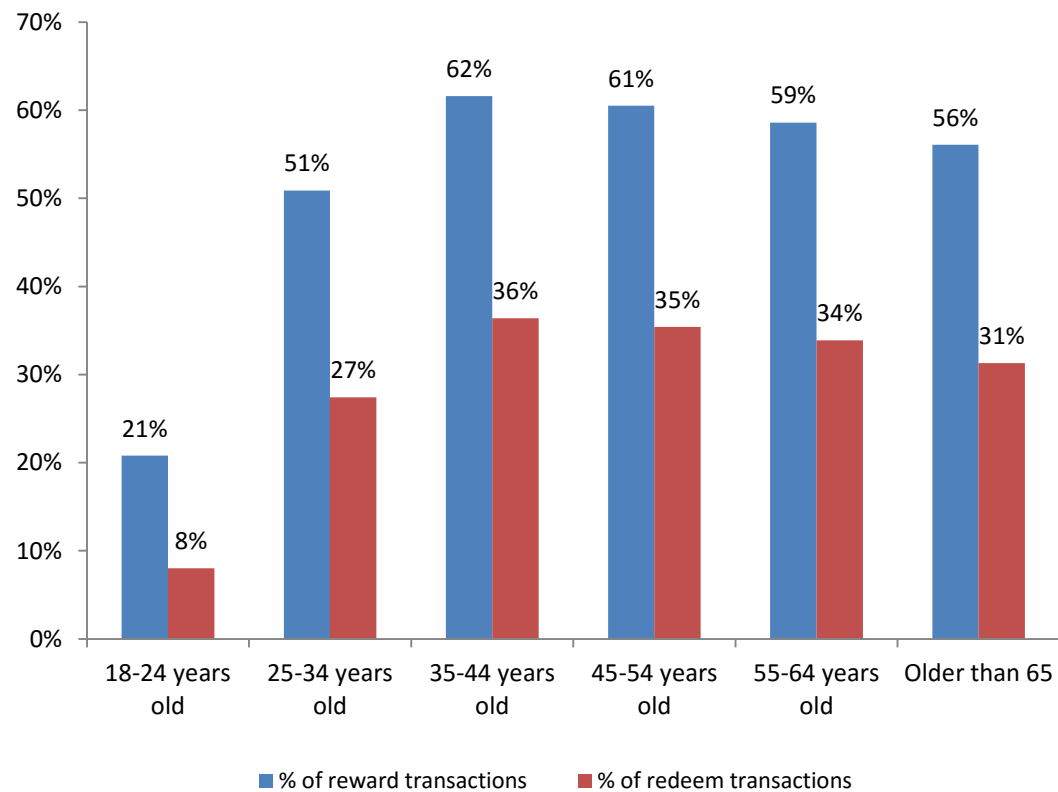
Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank, data processing by IOBE

Figure 2.57: Share of transactions with debit and credit cards, by gender



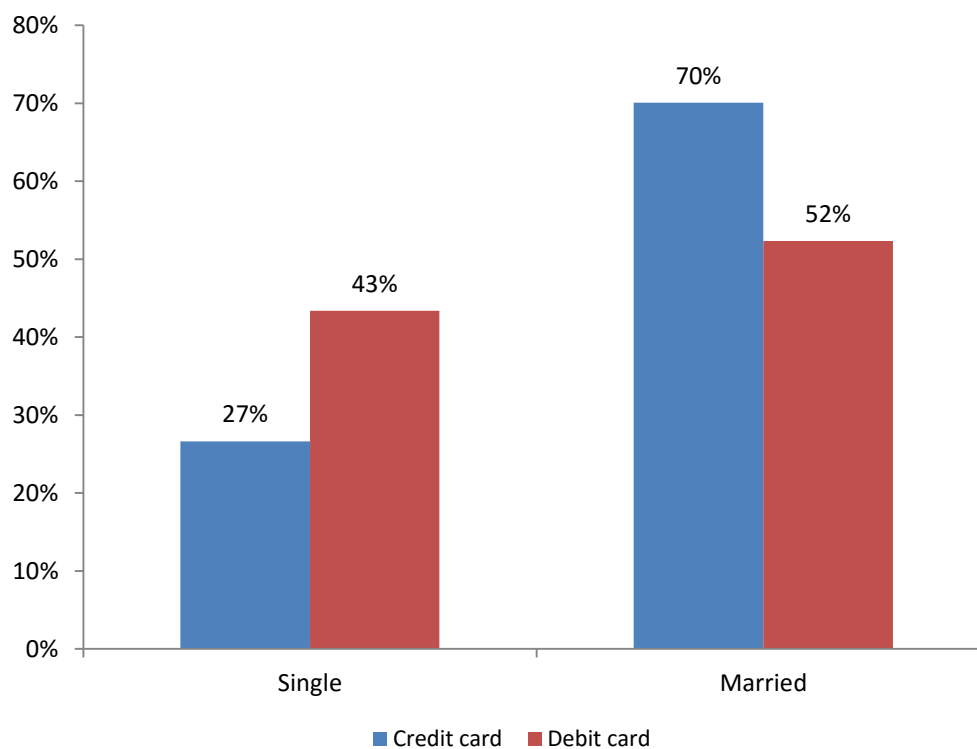
Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank, Data processing: IOBE/FEIR

Figure 2.58: Share of transactions with reward and redeem points, by age category



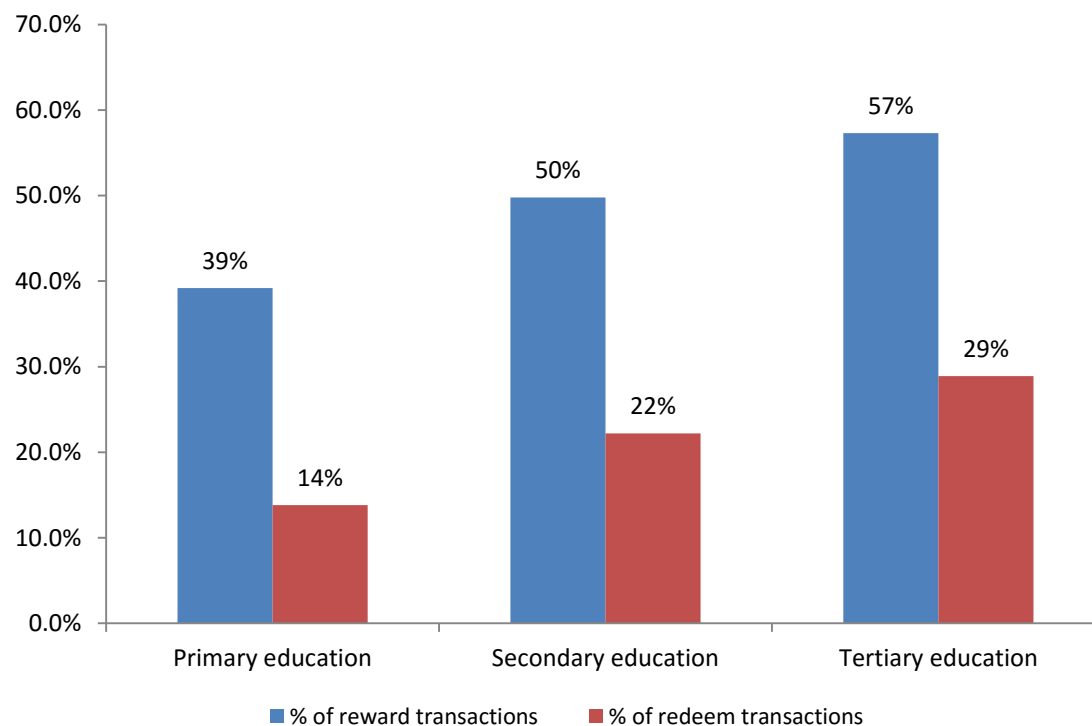
Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank, Data processing: IOBE/FEIR

Figure 2.59: Share of transactions with credit and debit cards, by card type and marital status



Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank Data processing: IOBE/FEIR

Figure 2.60: Share of transactions with reward and redeem points, by card type and educational level



Source: National Bank, Piraeus Bank, Alpha Bank and Eurobank, Data processing: IOBE / FEIR

As expected, the higher share of transactions by married people, compared to singles, results in more frequent redemption of points. In the case of the married, 70% of the credit card transactions and 52% of the debit card transactions involved redemption, whereas among the singles the corresponding rates stood at 27% for credit and 43% for debit cards respectively (Figure 2.59).

The level of education also affects the reward and redemption options. Card users with higher educational level seek to exploit the benefits provided from their card, redeeming the points earned through digital transactions. In contrast, the redemption of points is less common among the users with low educational level (Figure 2.60).

2.5 Impact of the bank holiday and the capital controls

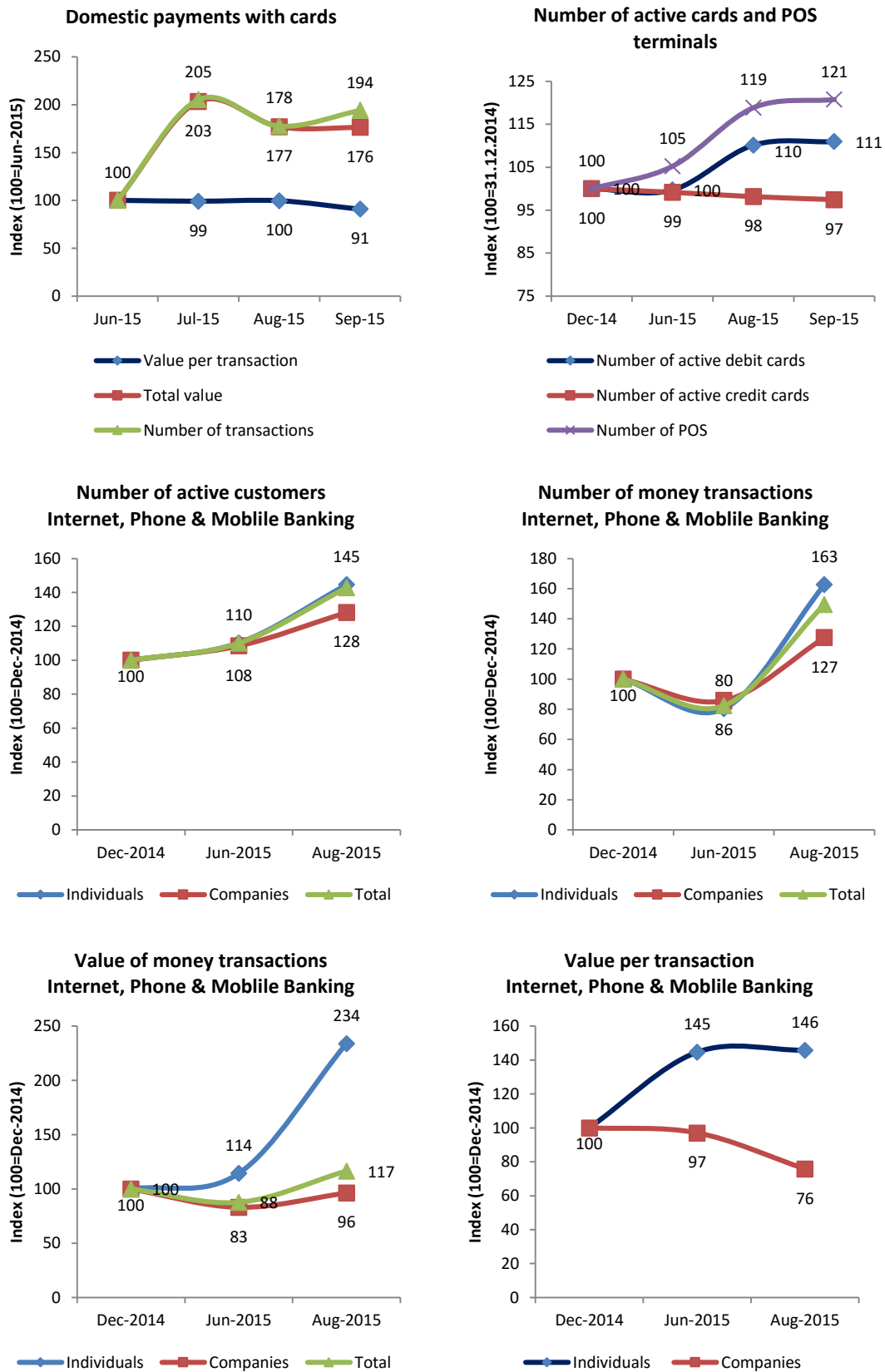
A referendum regarding a draft agreement for an extension of the bailout programme for Greece was announced on 27 June 2015. The threat of interruption of the liquidity support to the Greek banking system through the Emergency Liquidity Assistance (ELA), due to the impending end of the bailout programme on 30 June 2015, intensified the deposit flight in the hours and days after the announcement. In order to secure the liquidity in the banking system, a decision was made on 28 June 2015 to impose a bank holiday and capital controls.

During the bank holiday, which ultimately lasted for three weeks (until 20 July 2015), the branches of the financial institutions remained closed, with certain exceptions. Particular bank branches remained open to the public exclusively to allow pensioners and recipients of other benefits (e.g. for unemployment), which did not have cards for withdrawals from Automated Teller Machines (ATM), to receive part of their pensions and benefits. They were also allowed to apply for debit cards. For the duration of the bank holiday, the acceptance of credit and debit cards for payments within the country was made compulsory, while the refusal of a card payment was considered a criminal offense. Meanwhile, a daily limit of €60 per card was imposed for cards issued in Greece, which became a weekly limit from 28 July 2015. Meanwhile, no restrictions were imposed on the use of e-banking and payment cards for transactions within the country.

The bank holiday, the compulsory acceptance of payment cards and the daily limit on ATM withdrawals gave a significant boost to the diffusion of digital payments (Figure 2.61). Both the value and the number of domestic transactions with payment cards issued in Greece more than doubled, month on month, in July 2015 (+103% and +105% respectively). With the end of the bank holiday and the gradual relaxation of the capital controls, the use of cards slightly declined (-13% in August from July), remaining however much higher compared with June (+77% in value terms and +78% in a number of transaction terms).

The course of transactions in September, the first month with capital controls after the summer holidays, is also of interest. During that month, the total value of transactions slightly declined (-0.4% from August), but the number of transactions returned to growth (+9.2%). This is an indication of a momentum for EMP diffusion in the daily transactions of lower value, as the average value per transaction with cards declined by 9.2% in September, having remained stable in the previous months.

Figure 2.61: Key EMP figures in 2015

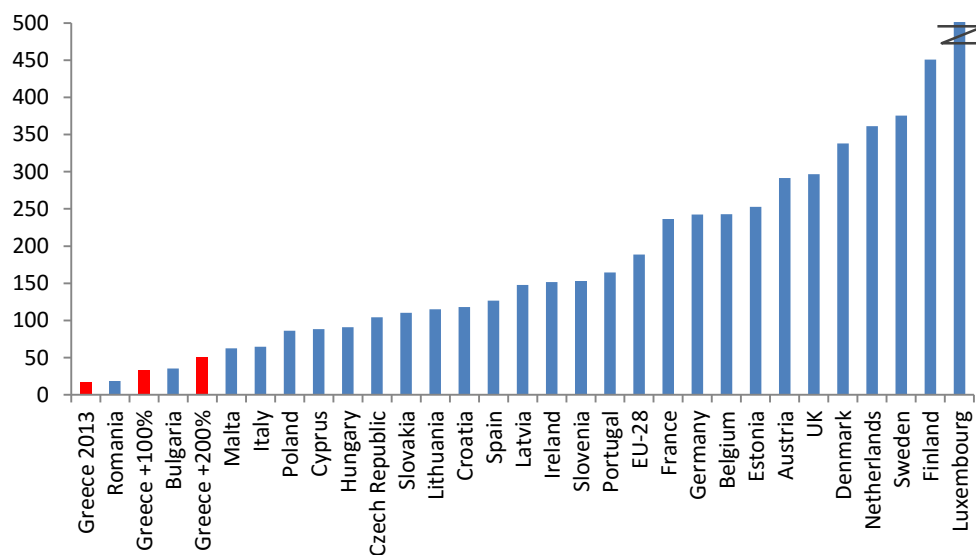


Source: Banks members of the Hellenic Banking Association. Data processing: IOBE

The use of other EMP that do not require POS terminals (banking through computer terminals, phones and mobile devices) also increased rapidly. During the summer months, the value and number of payment transactions through this channel increased by 33% and 81% respectively. Note that the growth rates were significantly higher for private individuals (+105% and +102%). It is also interesting to note the significantly higher average value per e-banking transaction of private individuals in June, compared with the end of the previous year (+45%).

The extraordinary conditions in the domestic banking market led to significant changes in the structural characteristics of the payment system. In particular, the number of active debit cards increased by 10% in the first two summer months after the imposition of the transactions. A similar development was observed in the number of POS terminals, which increased by 19% by the end of August from the start of the year (+13% since the end of June). The number of active e-banking customers increased by 43% during the same period. In September, however, the growth momentum of the number of active debit cards and POS terminals weakened (+0.7% and +1.6% from August respectively).

Figure 2.62: Projection of the ranking of Greece based on the number of digital payments per inhabitant



Source: European Central Bank, IOBE assumptions

Given the expected course of further relaxation of the capital controls, the use of EMP is likely to fall from the high levels observed in the past few months, limiting in such a way the benefits from their increased use. In addition, despite the impressive percentage growth in EMP transactions after the imposition of the capital controls, there is still a lot of room for significant further increase. Under the conservative assumption that the use of EMP per inhabitant has remained unchanged in the remaining EU countries, doubling the number of EMP transactions per inhabitant (from their 2013 level) would lead Greece to take the second place from the bottom in the ranking, overtaking only Romania (Figure 2.62). Correspondingly, tripling the number of transactions would result in a gain of only one more place in the ranking, with Greece nudging ahead of Bulgaria as well. As an indication of the potential for further growth, the number of EMP transactions per inhabitant in Greece

should increase by more than 11 times from its 2013 level in order to reach the EU average for this indicator.

2.6 Summary

The aim of this section was to examine the progress of the country with respect to the use of electronic means of payment, using data on digital payments in Greece for the period from 2000 to 2013 and comparing the position of the country with that of the remaining countries of the European Union.

Even though the number of digital payments more than doubled between 2000 and 2013, their value fell significantly during the crisis. The use of EMP in Greece considerably lags behind the rest of the EU. Despite the growth recorded since 2001, Greece continues to occupy very low positions in the rankings based on most EMP categories. Even after the impressive growth of digital transactions with the imposition of bank holiday and capital controls, the use of EMP per inhabitant remains very low for an EU country.

In addition, the preferred types of digital payments seem to differ significantly in Greece and in the rest of the Euro area countries. Even though credit transfers are the prevalent means in both regions, cheques remain a popular payment instrument in Greece, while in contrast direct debits have a substantially higher share in the Euro area.

Regarding the payment cards, the use of debit cards has increased significantly over the past few years in Greece. Meanwhile, the use of credit cards, in the aftermath of their rapid growth in the preceding decade, contracted during the crisis, due both to the fall of private consumption and the reduction of the credit limits by the financial institutions.

Compared with the other Euro area countries, the gap has widened both in terms of the number of transactions per inhabitant and the value of transactions as a percentage of GDP. Furthermore, the card transactions in Greece are still dominated by credit cards, in contrast with the Euro area where the debit cards have a more prominent presence.

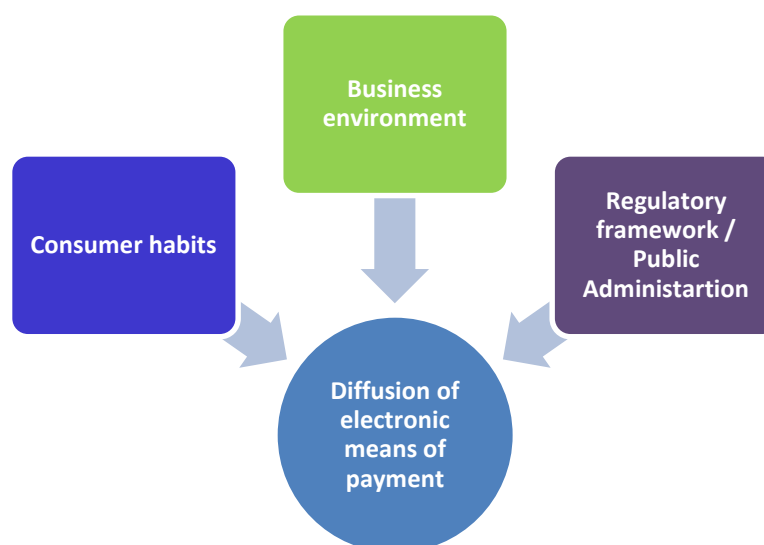
Regarding the remaining means of payment, the gap between Greece and the Euro area has remained considerable and in certain cases has increased. An exception to this is the use of cheques, which has remained significant in Greece, despite their decline during the crisis.

The above observations indicate that despite the economic crisis, which reduced income and consumption expenditure, the consumers and the enterprises in Greece are gradually incorporating the electronic means of payment in their daily transactions. This observation stems mainly from the large growth rate in the number of transactions with debit cards, credit transfers and direct debit. Despite the progress in the use of digital payments in Greece, the gap from the EU countries with widespread use of EMP remains very significant. Taking into account the importance of high EMP adoption rate for the reduction of the shadow economy and for economic growth, the reasons that explain why Greece lags behind should be thoroughly examined and suitable incentives should be found, in order to overcome the obstacles to the use of EMP in Greece, which is attempted in the remaining chapters of the study.

3. BARRIERS IN THE DIFFUSION OF ELECTRONIC PAYMENTS

This chapter presents the main factors associated with the low penetration of electronic payments in Greece compared with other EU countries. As noted in a relevant study,⁴ the efficiency and effectiveness of technological applications do not depend only on developed infrastructure, but also on the interrelations between the government, the individuals and the enterprises.

Figure 3.1: Factors affecting the penetration of electronic payments



In this regard, the main factors affecting the EMP diffusion can be classified in the following categories: i) the role of the state ii) consumer behaviour and iii) business operation.

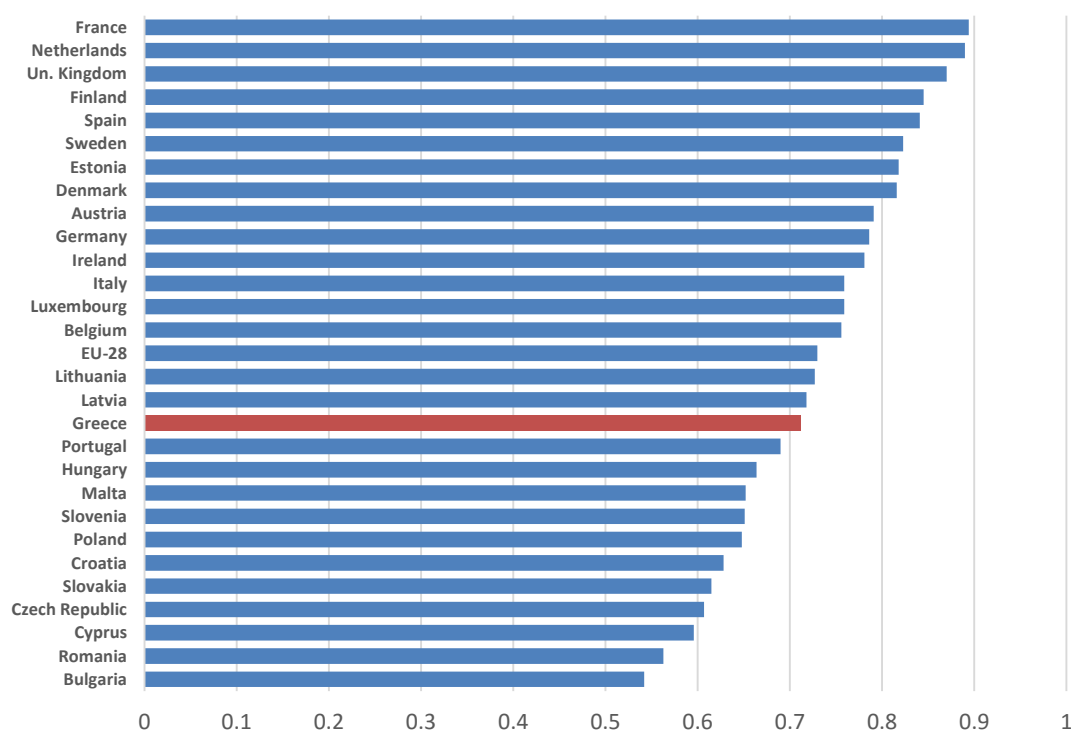
3.1 The role of the state in the adoption of electronic payments

The use of electronic means of payment and their penetration depends on the interplay of factors related both to the private sectors (firms and individuals), and the public sector and its willingness to implement measures that encourage the use of these applications. Technological advances and digital platform applications enabled many governments to increase their effectiveness with the use of electronic payment systems. Services such as the submission and payment of tax obligations or credit transfers to bank accounts of the individuals by the government (for instance, to cover hospital expenses and allowances) is part of everyday life in many countries. Therefore, the Public administration has a dual role of a regulator, setting the rules governing electronic payment transactions and at the same

⁴ 2011 Government E-Payments Adoption Ranking, A global index and benchmarking study, Economist Intelligence Unit.

time of a user that adopts and promotes the use of electronic payments, reaping substantial benefits in terms of reduced costs and increased tax revenues.

Figure 3.2: E-Government development index (EGDI), 2014



Source: United Nations E-Government Survey

In Greece, in the past, the individuals were obliged to submit – along with their tax returns – a statement with the annual expenses paid by credit cards in the context of determining their imputed income. This regulation was a major disincentive for the use of electronic payments, imposed during a period when the card transactions in other European countries were growing rapidly, which in part explains the delay observed in Greece.

Since then, the specific disincentive for the use of cards has been eliminated, whereas over the past years the public administration has adopted digital technologies aimed at cost savings and better services to the business sector and the wider public (for instance, the operation of the “ERMIS” portal and the TaxisNet tax return system). In addition, Law 3862/2010 transferred Directive 2007/64/EC of the European Council to the national legal framework, defining common rules for payments in the internal market of the EU. This legislation covers the entire spectrum of electronic payments (from onsite credit transfers to payments with cards, via the internet or through mobile phones), excluding cash and checks payments.

Similarly, Law 3979/2011 determines the regulatory framework for electronic governance in the public sector (including local authorities and state agencies that operate under private law), which promotes new technologies and allows for the use of electronic payments for transactions between the private and public sectors. Additionally, with Law 4172/2013 since the beginning of 2014 all transactions above €500 should be executed through bank payments, which has contributed to the wider use of e-banking services by the enterprises.

Thus, the regulative framework in Greece with regard to electronic payments has been harmonized with EU regulations. Besides, the financial system of Greece, as a member-state of the Eurozone, is an integral part of the unified payment systems of the Eurosystem (TARGET2, SEPA, T2S).

Nevertheless, the performance of the public administration as a catalyst for the penetration of electronic transactions and payments can be further improved. An indication of the public administration's limited role is the relatively low ranking of Greece, according to the e-government development index (EGDI), as the country stood at the 17th position among the 28 EU member-states in 2014.

Greece is lagging behind member states such as France, Netherlands, Italy, Germany, Belgium and the Scandinavian countries, which make substantial investments in electronic governance and are classified, according to the specific index, among the top EU countries with developed electronic governance. Therefore, there is a significant potential for further development of the electronic services provided by the State to the public, which can have a catalytic effect on the penetration of electronic payments. In this framework, initiatives by the Ministry of Finance for a wider use of digital technologies and electronic payments, such as the mandatory use of credit transfers for payments at the customs offices (ICISNet), the ban of cash payments in the Public Tax Authorities and the electronic invoice, are significant steps towards the implementation of the necessary measures adopted by the government for the penetration of electronic payments.

3.2 Consumer behaviour

From the consumer perspective, the low use of electronic payments is mainly associated with a distrust regarding the security of personal data and privacy concerns, the level of internet penetration and economic factors.

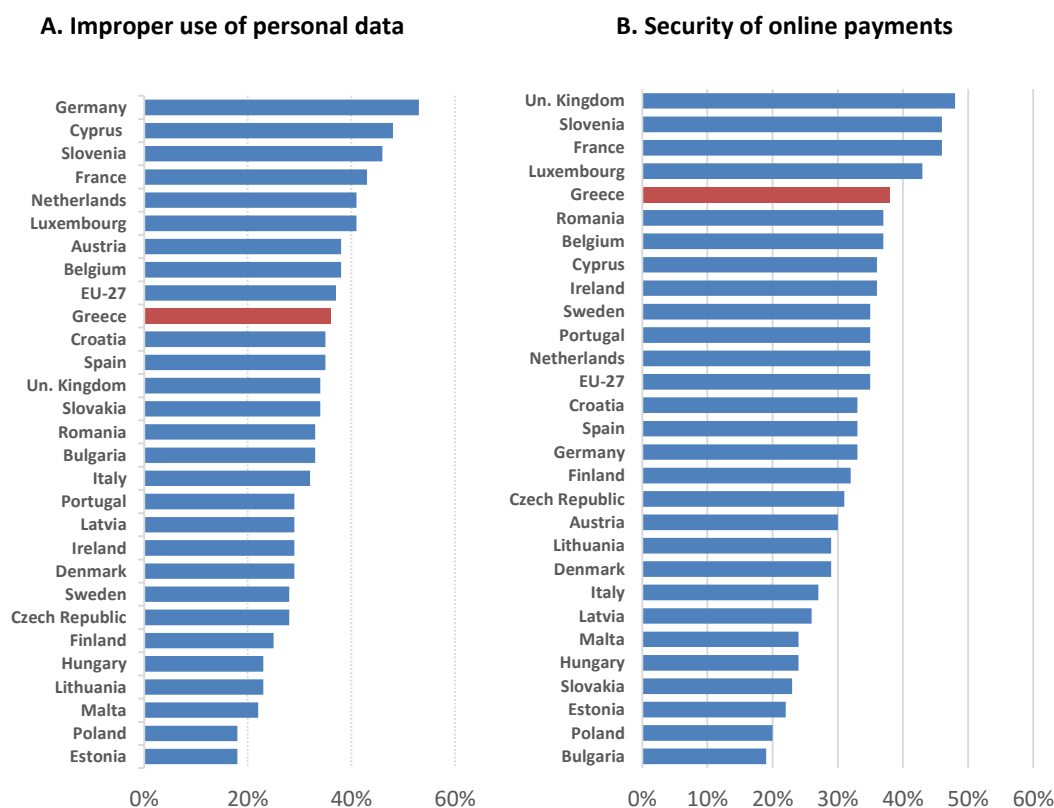
3.2.1 CONSUMER PERCEPTIONS

According to the Eurobarometer, the main issues that the consumers report with respect to bank services or purchases from the internet are related to the treatment of personal data and the security of online payments. In Greece, the proportion of consumers who express concern about these issues is among the highest compared with other EU countries (more than 1 out of 3 respondents in both issues, Figure 3.3). In addition, the distrust about the safety of online transactions in Greece was stronger in 2013, in comparison with the corresponding survey of 2012. In particular, the respective index grew by 13 units, in contrast to other member-states, such as the United Kingdom and Netherlands, where the index declined. Respectively, the concern of Greek people for internet transactions and online purchases is mentioned as the key driver (7 out of 10 internet consumers) in the e-commerce survey conducted by the Athens University of Economics and Business.

However, the heightened concern of the consumers in Greece over the safety of payments is not justified by the actual data regarding fraud cases in card payments (Figure 3.4). In 2013, fraud was observed in 0.01% of all card transactions (1 out of 10000), when the respective share is double in the Eurozone (0.019% of transactions). The difference is more evident in

terms of value, where only 0.006% of the card transactions was affected by fraud in Greece in 2013, against 0.034% in the Eurozone. Fraud cases in the use of cards are comparatively few, both taking into account the number of cards (1.8 cases of fraud per 1000 cards in Greece against 12.8 fraud cases per 1000 cards in the Eurozone) and based on the population of the country (2.3 cases of fraud, with total value of €249, per thousand inhabitants in Greece, compared with 18.5 cases of fraud, with €2378 total value, per thousand inhabitants in the EU).

Figure 3.3: Results from the Eurobarometer survey with regard to internet security

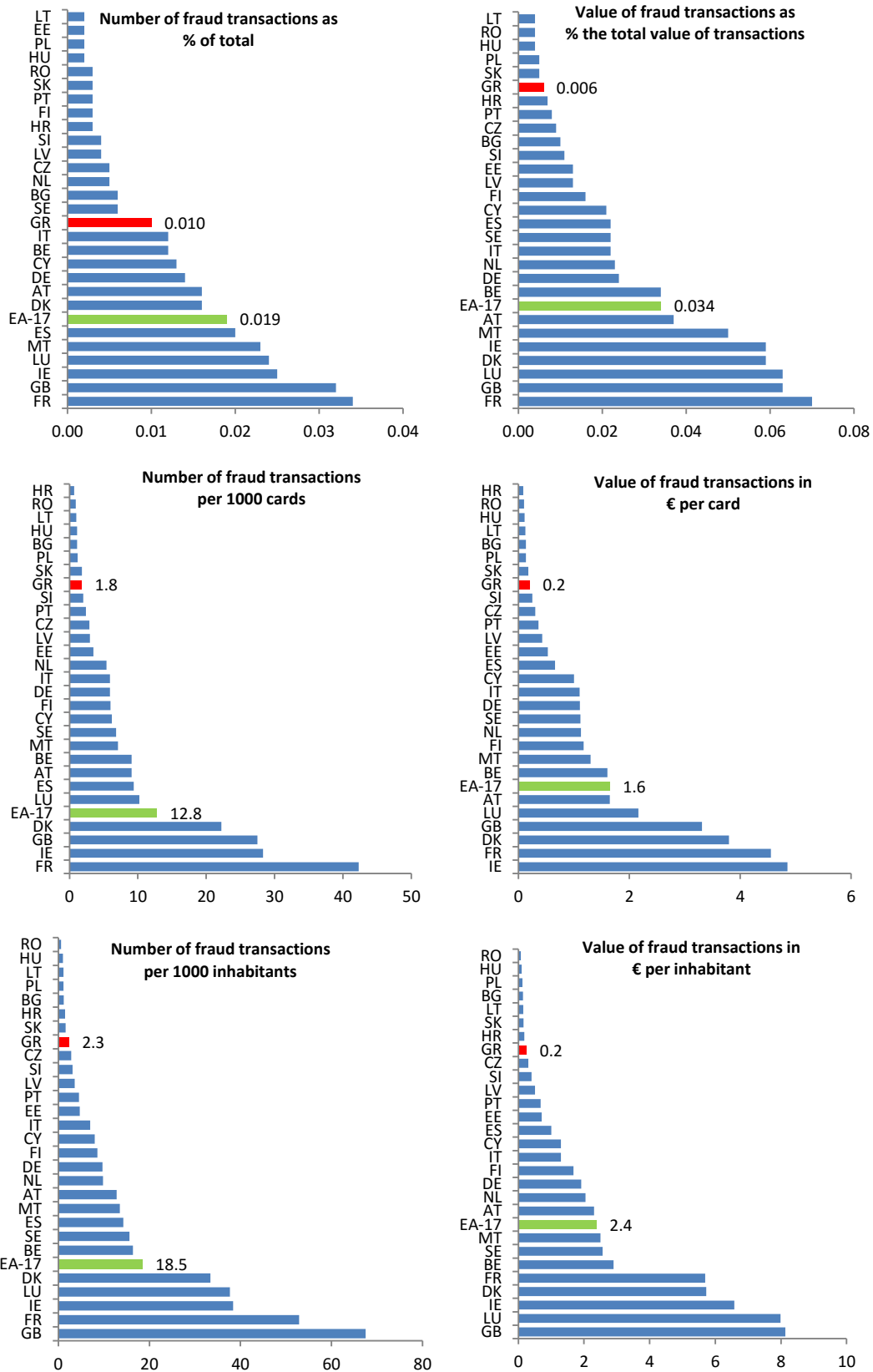


Source: Eurobarometer

Another reason that may partly explain the low adoption of cards, which however has not been sufficiently quantified, is the consumers' perception of a reduced control over their expenditure and as a consequence their debt to the banks. The use of credit cards facilitates transactions, yet this convenience may raise concerns over indulging in compulsive buying that would exceed their household budget constraints. In contrast, the use of debit cards does not lead to debt accumulation, yet the awareness about them is still small. Even in this case, the ease of conducting transactions with cards is possibly associated with the sense of a loss of control over spending out of an available outstanding balance.

In contrast, the cash payments offer a more direct sense of the fact that money is spent on a purchase, as the consumer hands the money out in order to pay for the purchased product or service. The corresponding card transaction instead is made in a way that is not directly perceptible by the consumer, since the money transfer is not tangible in this case. In this way, the "disciplinary" element involved in the surrender of cash for the consumers afraid of losing control of their spending seems to be reduced in the case of card payments.

Figure 3.4: Number and value of fraud transactions in EU countries



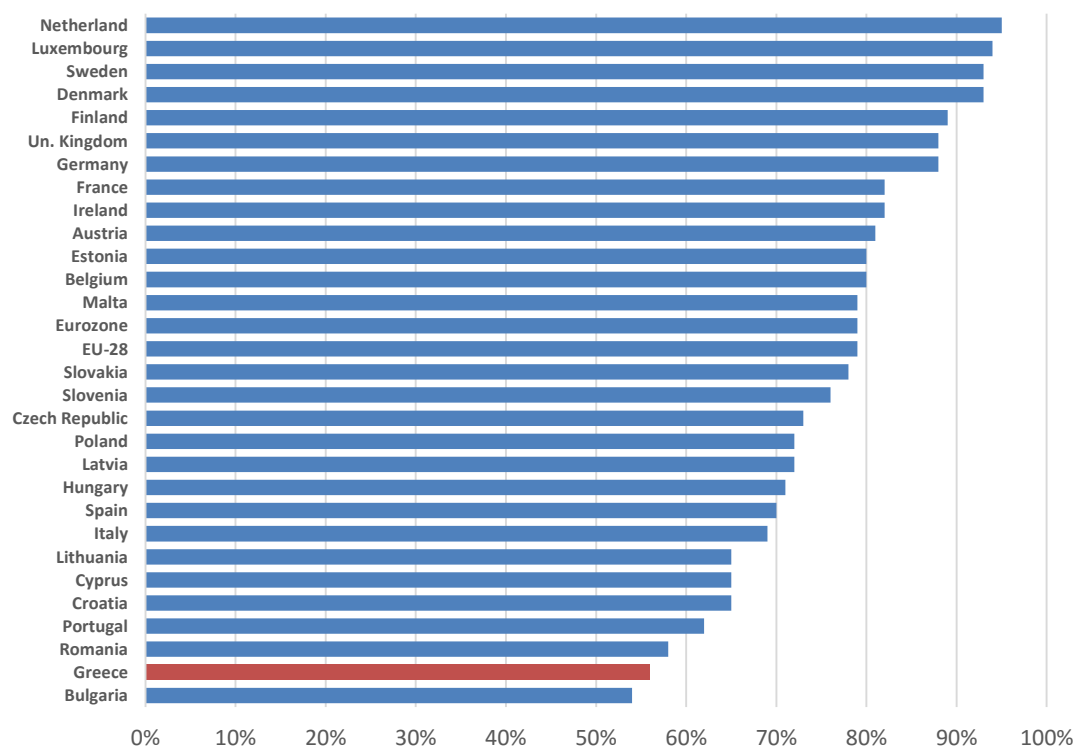
Source: ECB (2015)

The extensive use of mobile phones, which support third-party applications and the development of m-banking applications by the banking institutions can support the reduction of this particular factor of reluctance by the consumers. With these applications, the consumers can have a direct access to the balance of their bank accounts and cards. In addition, notifications in mobile phones (even with short messages that do not require the use of the internet - SMS) each time a digital payment is made can strengthen the sense of control and security of the consumers. Therefore, the banking institutions might examine the use of an SMS notification service without additional cost for the consumers, or the use of push notifications as a default choice in the case of m-banking applications.

3.2.2 INTERNET PENETRATION

The use of electronic payments, especially for the purchase of goods and online services, is also affected by the level of internet access. Usually, the use of cash (or checks) in transactions is also associated with the lack of internet access.

Figure 3.5: Households with access to the internet* in EU-28, 2013



(*) Share of the total number of households in the country

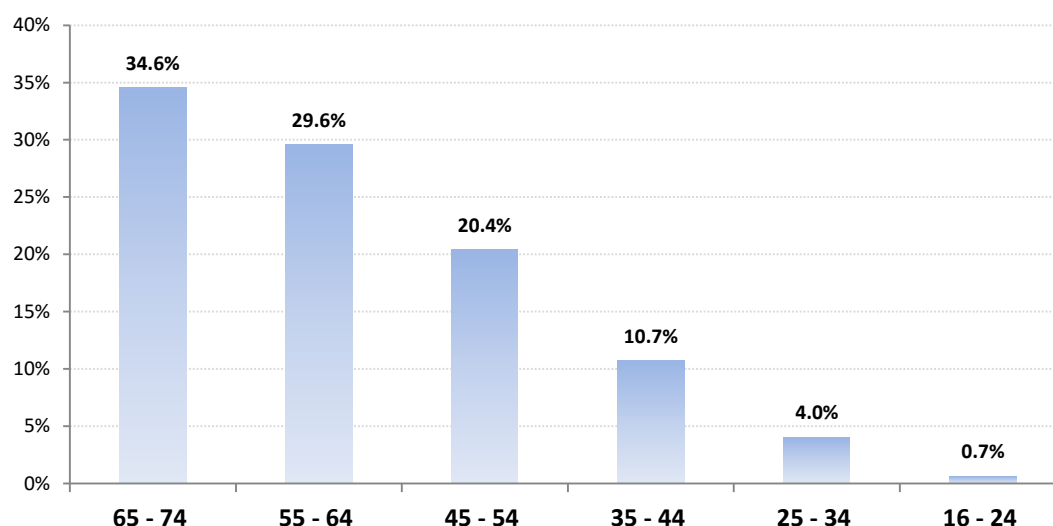
Source: Eurostat

In Greece, the share of households with internet access was the second lowest in the EU in 2013. In contrast, in the countries where the use of electronic payments is widespread, such as those in Northern Europe, the respective share is higher than 90%, which indicates the strong correlation between the two issues (Figure 3.5).

The small penetration of the internet, but also of the electronic means of payment, is related to the difficulty in changing habits, especially in the case of technologies which come in place

of cash transactions. This trend is stronger in older people where the use of personal computers, the internet and smartphones (systems that support electronic payments) is less common. According to a survey of ICT use in 2014,⁵ one out of three respondents in Greece aged 55 to 74 years has never made use of a personal computer or the internet (Figure 3.6). This survey also indicates that lack of skills, followed by insufficient information and the equipment cost, are the main reasons for the lack of internet access at home.

Figure 3.6: Population by age group that has never used personal computers and the internet in Greece, 2014



Source: Hellenic Statistical Authority

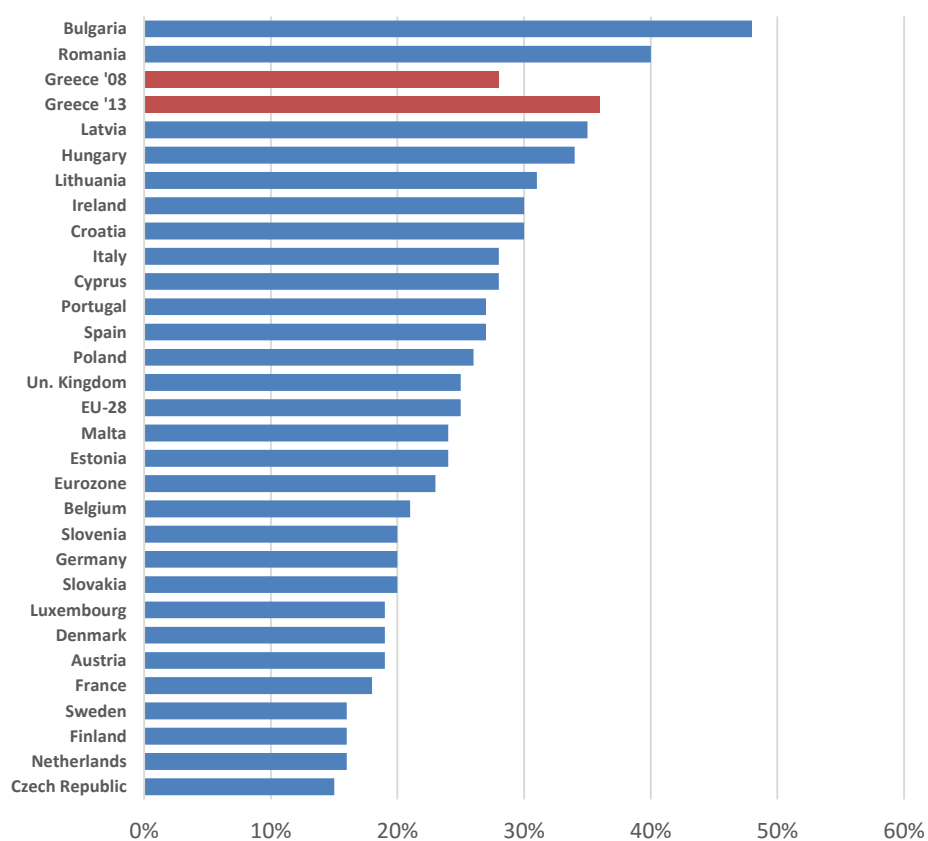
3.2.3 ECONOMIC FACTORS

The lower penetration of electronic payments in Greece is also associated with the recession in which the Greek economy has been over the past six years. It has been observed that social groups suffering from poverty are less likely to use contemporary technology or make use of electronic services.

Low-income households either do not have bank accounts or the account balance is rather small, which limits the use of digital payments, given that most electronic means of payment are linked to a bank account. This is also related to other factors such as unemployment (long-term unemployment in particular) and the level of education. In addition, low-income consumers might prefer cash payments because of the feeling of a better expenditure control while the perception - possibly due to insufficient information on the use of debit cards - that electronic payments are associated with additional fees (such as interest payments and late payment charges) makes them sceptical on their use. In Greece, the share of the population at the risk of poverty in 2013 stood at 33% having increased by 8 percentage points compared with 2008 as a result of the economy recession (Figure 3.7).

⁵ Hellenic Statistical Authority, Department of Population Statistics and Labor Market.

Figure 3.7: At risk of poverty rate of households in EU-28, 2013



Source: Eurostat

In general, the use of electronic payments is related to the level of economic activity, since higher growth is usually associated with higher EMP use. For instance, a strong correlation has been observed between GDP per capita and the level of the “Government E-Payments Adoption Ranking”, indicating that the use of electronic payments is higher as the GDP per capita increases.⁶ In contrast, the use of cash is preferred more often when the economy contracts, mainly by consumers who avoid paying taxes, as a means to preserve their purchasing power.

Finally, the use of electronic payments is closely related to the transactions value. Cash is more popular for smaller-value transactions (e.g. €10 euro or less), whereas the use of other means of payment is more common for high-value transactions, where the risk of loss or theft is higher. Also, cash transactions may require a trip to an ATM or a bank branch for a withdrawal.

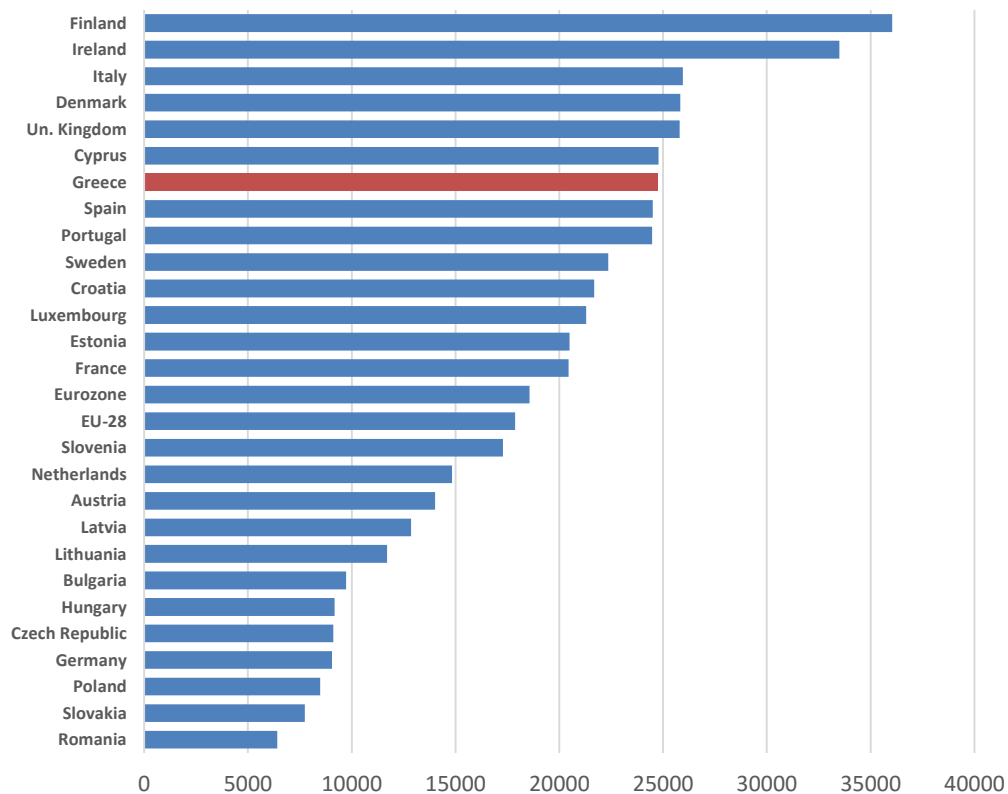
3.3 Business factors affecting the use of electronic payments

The domestic banking institutions have made significant investments in the past few years (e.g. in new IT systems), while initiatives that emphasize the role of electronic bank transactions have been adopted over the past years. As a result, the use of electronic

⁶ 2011 Government E-Payments Adoption Ranking

banking services by the Greek enterprises has increased. A large number of their transactions, such as salary payments and tax obligations (e.g. paying for social security contributions, income tax of employees and VAT) are now executed through e-banking.

Figure 3.8: Number of POS terminal per million inhabitants in EU member-states, 2013



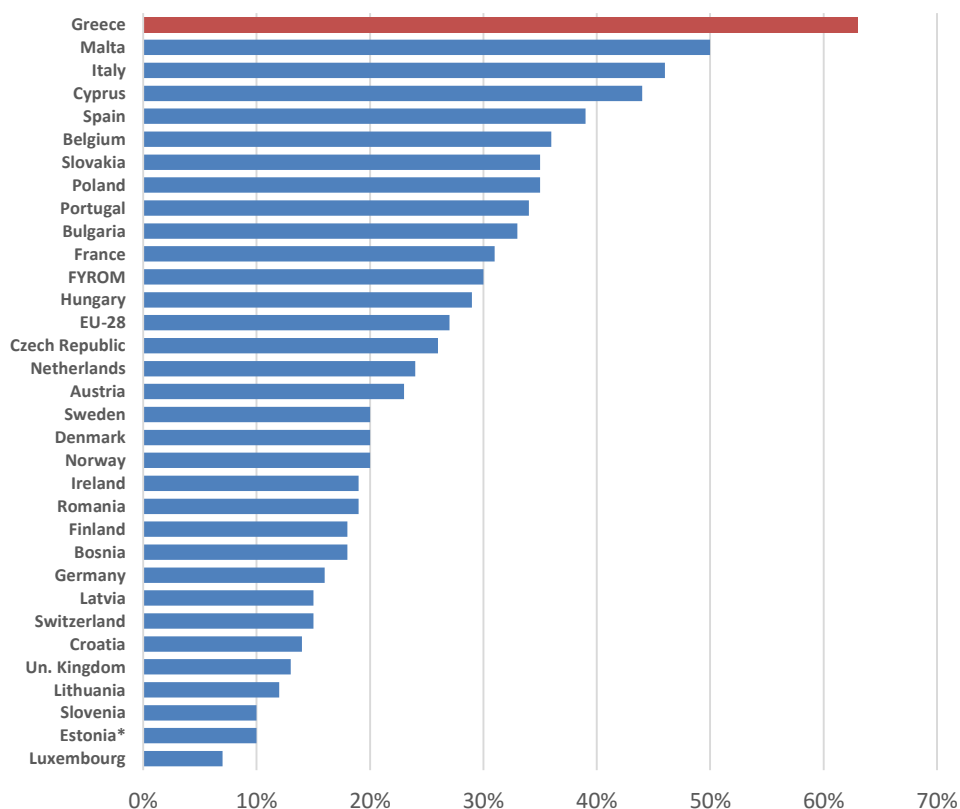
Source: European Central Bank

In addition, the diffusion of electronic payments is affected by the degree that enterprises provide their customers with access to these transactions. For instance, the Electronic Funds Transfer at Point of Sales (EFTPOS) terminals, which form an alternative network of banking services, enable the customers to make transactions with credit, debit and prepaid cards. According to the European Central Bank, the number of POS terminals per million inhabitants in Greece is among the highest in the EU (Figure 3.8). This may be associated with the developed tourism industry in the country since the enterprises in the island regions of the country (hotels, restaurants, retail trade shops) transact with a large number of visitors from Northern Europe and the USA, where payments with credit or debit cards are common.

However, the number of POS terminals in the country declined by 12% annually over the period 2011-2013, due to the recession in the Greek economy and the transformation of the business pattern regarding the use of these terminals in Greece. In particular, the share of independent providers, which can service transactions from different banking institutions with the same terminal, has increased. In this way, the necessity for multiple terminals at the same point of sale is reduced.

Additionally, electronic payments are not usually supported in the sectors with a high rate of self-employment, such as in free-lance professionals. Considering that Greece has the largest share of self-employment among the EU-28 countries (32% against 15% in EU and the Eurozone in 2013) this can be an additional cause of the lower penetration of electronic payments.

Figure 3.9: Share of enterprises with less than 10 employees in the turnover of the retail trade industry (excluding vehicles), 2012



Source: Eurostat Processing: IOBE/FEIR

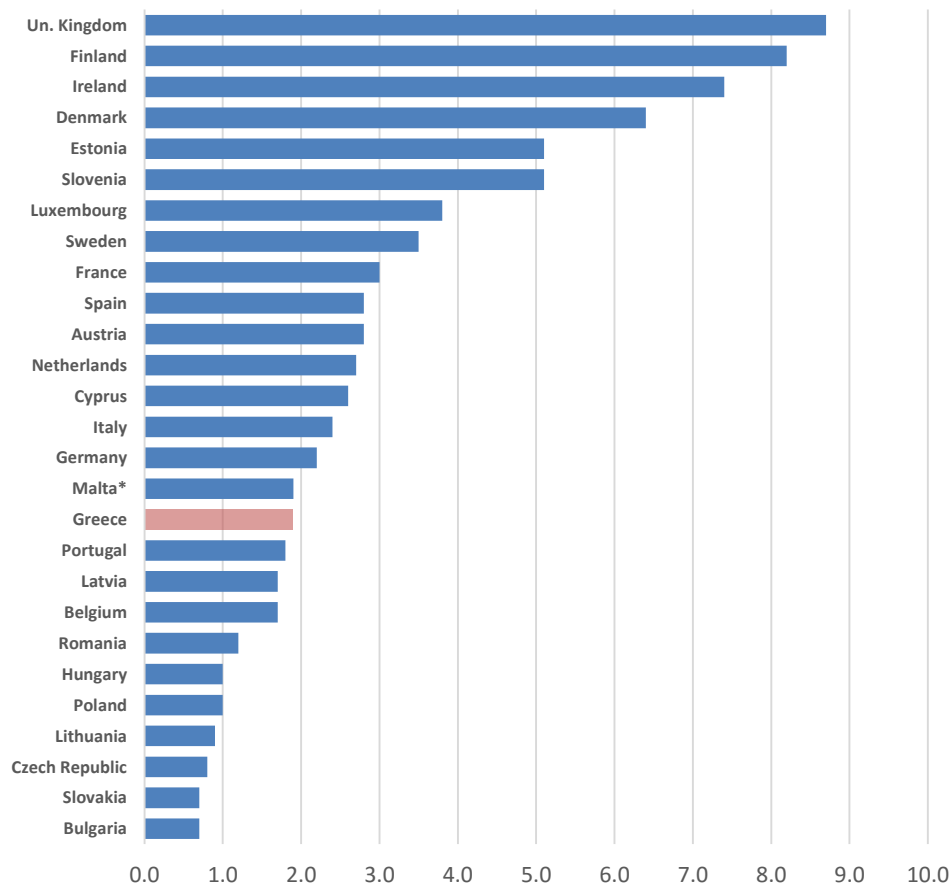
Note: * Data for Estonia refer to 2011.

The fragmented business structure of retail trade also has a negative impact on the penetration of electronic payments. The fixed operating cost of a POS terminal in very small firms is spread over a very small turnover, leading to higher cost of card use per transaction. In Greece, almost 63% of turnover in the retail trade in 2012 came from enterprises employing up to 9 persons when the respective share in the EU was only 27%. According to this index, Greece stood first among 33 European Countries (Figure 3.9).

The assessment of the coverage of the POS network in Greece deteriorates when the number of enterprises is taken into account. There are on average 1.9 POS terminals per retail firm in Greece, with the country standing at the 17th position among the 27 EU countries with available data (Figure 3.10). However, the index might still overestimate the coverage of the network with POS terminal in Greece in comparison with other European countries, since the shift in the business pattern to one terminal serving transactions with different banking institutions has not been completed yet.

Apart from the coverage, the speed of transactions executed with POS is also an issue. According to experts participating in workshops in the context of this study, the communication systems through which these transactions are executed in Greece require an upgrade. In addition, card transactions are usually more time-consuming compared with cash payments also due to the insufficient infrastructure and business processes in the stores (for instance, cashiers without POS or POS terminals at the stand of the store supervisors that are often left unmanned).

Figure 3.10: POS terminals per retail trade enterprise, 2012

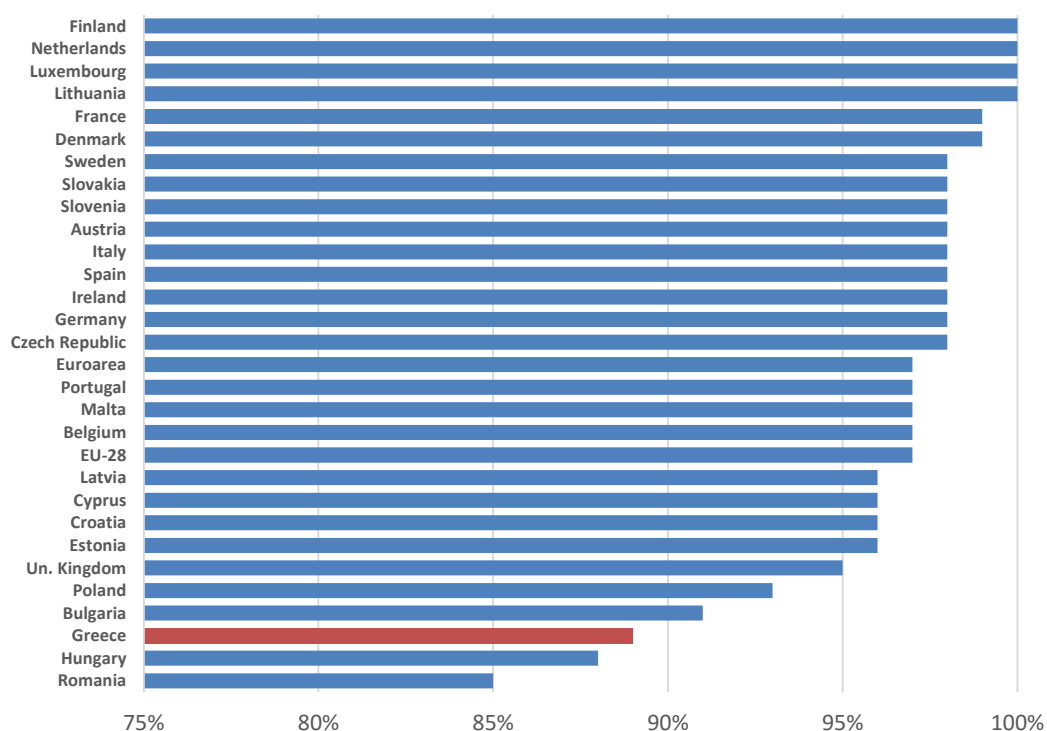


Source: ECB, Eurostat. Processing: IOBE/FEIR.

Note: * Data concerning Malta refer to 2010.

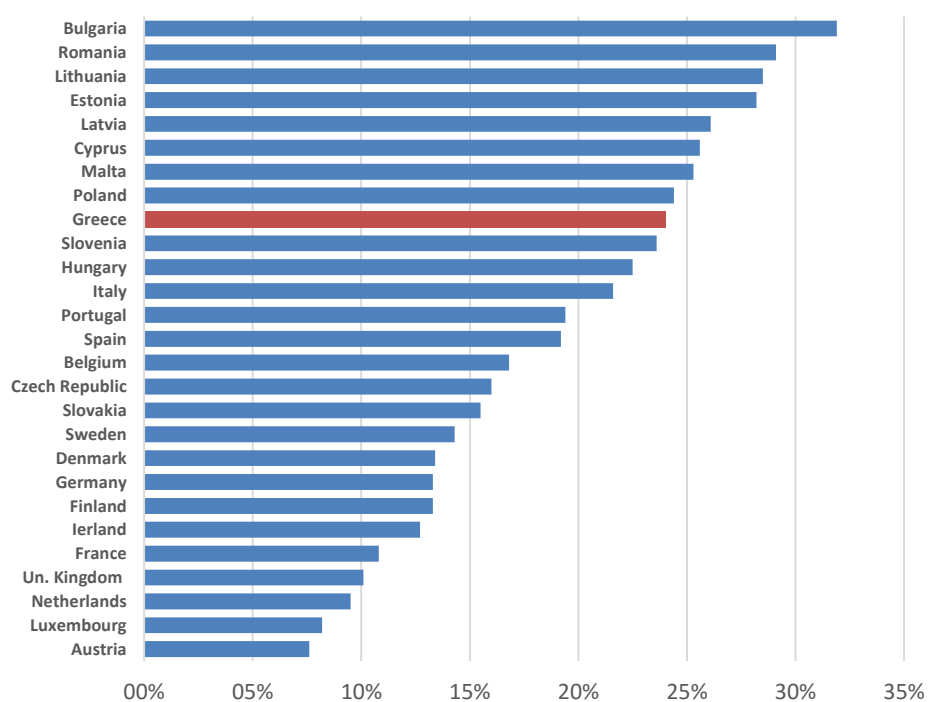
As on the consumer side, the level of internet access is a significant factor for the adoption of electronic transactions and payments by the businesses that provide goods and services to final consumers and other enterprises. According to available data, one out of ten enterprises in Greece did not have internet access in 2013. Although small, this ratio is among the highest among the EU countries and significantly higher than in the other Eurozone countries, where almost all enterprises have access to the internet (Figure 3.11).

Figure 3.11: Enterprises with access to the internet in EU-28 countries, 2013



Source: Eurostat

Figure 3.12: Informal economy as percentage of GDP in EU-27 member-states



Source: European Commission

Additionally, the penetration of electronic payments in a country is associated with the level of the shadow economy. Studies underline the role of developed payment systems for curbing the shadow economy since the electronic transactions contribute to the reduction of

informal economic activities.⁷ According to EU data, the size of the informal economy in Greece stood at approximately 24% of the GDP in 2012⁸ (among the highest in the EU, Figure 3.12).

In this context, the adoption of electronic payments by the enterprises in the transactions with their customers reduces their ability to hide part of the conducted transactions and to evade taxes. This serves as a counter-incentive to these enterprises in the adoption of digital payments.

3.3 Conclusions

The assessment of the existing legal framework did not find any particular regulatory barriers to the use of electronic payments. In contrast, there are legislative arrangements that target their adoption. Additionally, in the context mainly of the fiscal consolidation process, the Public Administration is working on developing mechanisms that would promote further the electronic transactions of the public sector with the businesses and the wider public. However, there is still unrealised potential for a stronger role of the government as a catalyst for the expansion of electronic payments.

Many consumers, on the other hand, hesitate to use electronic payments because of privacy concerns, which partially explains the low penetration of electronic payments in Greece. The low adoption of new technologies, the lack of internet access and the recession of the economy, which has reduced the disposable income of many Greek households, are additional obstacles.

Respectively, a large number of enterprises support electronic payments, as evident from the relatively high share of POS machines per inhabitant compared with other EU countries. However, the fragmented structure of the retail trade industry and the substantial number of self-employed in the country have contributed to the low adoption of electronic payments, given that it is easier for very small enterprises and for free-lance professionals to avoid the recording of transactions and to hide taxable income.

⁷ Schneider, Friedrich, 2013. The shadow economy in Europe, 2013. ATKearney. Manthos Delis, Tax evasion and electronic payments.

⁸ Shadow Economy and Undeclared Work, European Commission
http://ec.europa.eu/europe2020/pdf/themes/07_shadow_economy.pdf

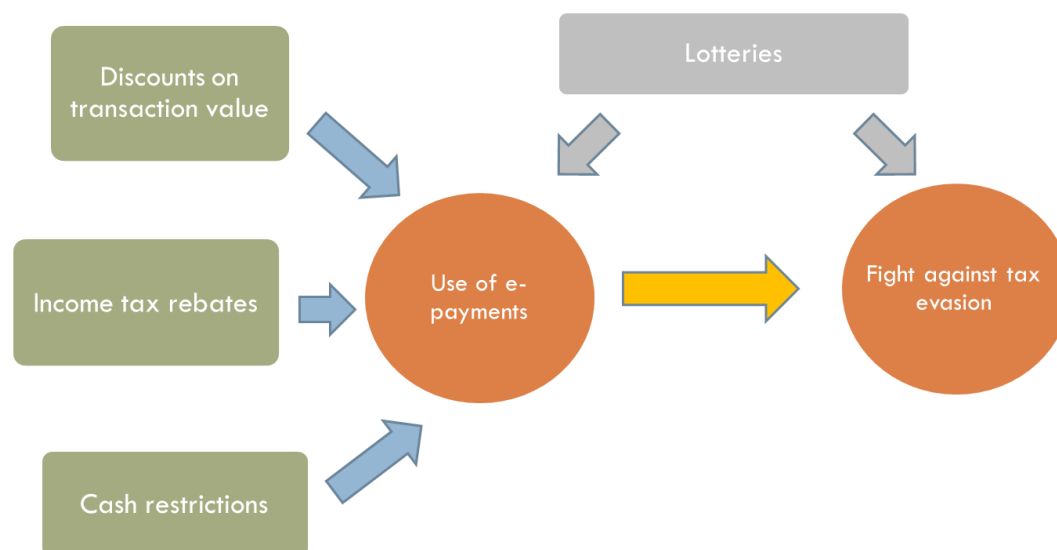
4. INCENTIVES FOR THE USE OF ELECTRONIC MEANS OF PAYMENT

The present chapter presents incentives to increase the use of electronic means of payment (EMP), applied in Greece and abroad. We assess reward schemes designed by the banking sector and schemes implemented at country level in order to boost EMP use. Achieving high rates of electronic payments is important for a country, as according to the international literature, an annual increase of the use of electronic payments by 10% for a period of four years may limit the shadow economy by up to 5% (Kearney 2013).

4.1 Incentives to boost the EMP use at country level

The need to limit tax evasion steered many countries towards the implementation of measures that support the increase of EMP use. These measures can be grouped in three categories: a) discounts on transactions, b) discounts on income tax and c) cash ban. Besides those policies, some countries adopted measures to reduce the number of non-recorded transactions and, by extension, to combat tax evasion that do not necessarily lead to more frequent EMP use, such as receipt lotteries (Figure 4.1).

Figure 4.1: Measures to combat tax evasion in retail transactions



4.1.1 DISCOUNT ON TRANSACTION VALUE

Some countries promote the use of EMP by providing significant discounts or cash refunds to the consumers when the purchase is conducted with the use of payment cards. Such a measure has been implemented in South Korea since 1994. The use of payment cards resulted initially in discounts of around 0.5 percentage points (Jeon 2013). The discount increased to 1 p.p. in 1996, to 2 p.p. in 2000 and back to 1 p.p. in 2004. In 2009 and 2010, the discount rate increased temporarily to 1.3 p.p.

Since 1999, an annual ceiling was imposed on the returned amount per household, which was initially set at 3 million won (around €2,500), raised in 2000 to 5 million won (almost €4,200). The ceiling was temporarily increased to 7 million won (€5,900) in 2009 and 2010. Higher discounts were applied to stores and sectors with greater exposure to cash

payments, such as restaurants and hotel resorts (1.5 percentage points from 2005 to 2007, 2.5 p.p. in 2008, 2.6 p.p. in 2009 and 2010 and 2.0 p.p. from 2011 onwards).

Meanwhile, the discount scheme was expanded in 2004 to include transactions carried out with cash through a new receipt control network. The companies maintaining this network supply the participating stores with terminals that collect the transaction data, which are then forwarded to the national tax authority. For each transaction, the stores participating in the network insert the payment or loyalty card in the terminal. In the case of cash payment, the employees type the mobile phone number of the consumer in the terminal. The extension of the discount scheme to cash transactions helped the smaller firms and entrepreneurs with smaller annual turnover, which considered the use of payment cards disadvantageous, participate in the receipt control system.

Similar measures are implemented in Uruguay since mid-2014, where the use of EMP results in a reduction of up to 100% of the applicable tax. In particular, the use of debit cards or electronic money is rewarded with a discount of 2 percentage points. A temporary discount of additional 2 p.p. the first year and 1 p.p. during the second year was introduced for purchases with the use of credit and debit cards of value below 4 thousand *unidades indexadas* (around €47 according to the 30/3/2015 exchange rate). In special cases (i.e. for holders of family and social allowance cards), the discount can reach the full value of the tax.⁹

In Argentina, the use of debit cards is rewarded with a discount of 5 percentage points and a maximum refund of 1,000 Argentine pesos (€105 according to the 30/3/2015 exchange rate). The refund is deposited to the account of the cardholders on a monthly basis. This measure was initially implemented in 2001, with a similar incentive for the use of credit cards (discount by 3 p.p.), to limit the shadow economy during a period of intense economic crisis. Since then, the scheme has been renewed annually. Measures and schemes with similar benefits for the consumers were designed in Colombia as well, but their implementation has been delayed.

4.1.2 INCOME TAX DISCOUNTS

Besides the discounts that the consumers enjoy on their transactions, there are also in some cases income tax discounts for both the consumers using EMP and the firms that accept those means of payments. South Korea is a bright example of establishing incentives in this direction.

In South Korea, the use of payment cards rocketed within a decade, strengthening the public finances of the country, which were in poor shape after the crisis of 1997. Besides the discounts on the value of the transactions, the Korean government adopted other policies to increase the use of payment cards by the consumers and the firms, such as income tax discounts, a lottery with payment slips and other administrative measures, presented in the next sections of the present chapter. The income tax discount, applied both on the supply

⁹ Ley Nº 19.210 - Inclusión Financiera y promoción del uso de medios de pago electrónicos, 29/4/2014 (<http://www.parlamento.gub.uy/leyes/ AccesoTextoLey.asp?Ley=19210&Anchor=>)

side (stores) and the demand side (consumers), was a major pillar of the scheme adopted in South Korea.

Significant reductions were applied in the taxable income of the consumers, depending on the volume of transactions made with payment cards. In particular, wage-earners could enjoy deductions in their taxable income, provided that at least 10% of their income was spent through the use of payment cards. The threshold was adjusted over time, with the growth of the use of payment cards, to 15% in 2005, 20% in 2008 and 25% of income from 2010. Initially, the discount rate was set at 10% of the increment above the threshold. Subsequently, the discount rate was raised to 20%, while currently it equals 15% of the additional expenses above the threshold. At a later stage, an increased discount was set for debit card transactions (30%) and for transactions in street markets.

In an effort to limit the cost of the scheme, a ceiling was imposed on the amount of the tax discount, which was initially set to at most 10% of the income or 3 million won (€2,500). The fixed component of the ceiling was later increased to 5 million won (€4,200) while today it has returned to its initial level. The ad valorem component is currently set at 20% of the income of an employee. Transactions with the state (debt payments, insurance contributions, employer contributions), payment of public utilities and other types of payments such as paying household rents are exempt from this scheme.

In parallel, significant incentives were provided to the entrepreneurs as well. Since 1997, a 50% discount was implemented on the income tax corresponding to the incremental payments made with payment cards, compared with their level from the preceding year. This discount was reduced to 40% in 2010. Since 2001, the firms can alternatively opt for a discount on tax corresponding to all sales paid with payment cards. This discount was set at 20% in 2001, 10% in 2003, 5% between 2004 and 2009 and 4% since 2010. The implementation of the receipt control network (described in the previous section) provided the opportunity to take into account cash transactions as well. This measure was withdrawn in 2011, as the payment cards reached a high penetration rate.

The implementation of the above incentives resulted in a significant diffusion of the payment cards in the country. The number of companies, participating in the card payments network, increased from 23,100 in 1999 to 745,100 in 2008. The number of participating companies from the services sector increased from merely 1,100 in 1999 to 201,100 in 2008 (Jeon 2013).

In 2010, more than 65% of private consumption was conducted with the use of payment cards (57% with credit cards and 8% with debit cards). The corresponding percentage in 1999 was limited to 14.7% (exclusively with the use of credit cards).^{10,11}

The increased use of payment cards in South Korea led to significant improvements in tax compliance. The percentage of the taxpayers that submitted tax return statements to the authorities increased from 17.8% in 1997 to 68.6% in 2008. As a result, the income tax paid to the State tripled from 3.7 trillion won (€3.1 billion) in 1997 to 11.7 trillion won (€9.9

¹⁰ Korean Institute of Public Finance, "Credit card simulation policy in Korea, assessment and recommendations", 2011.

¹¹ MasterCard Worldwide (2013), Development of Korea Electronic Payment Industry

billion) in 2008, growing significantly faster than the country's nominal GDP. While the country's GDP increased by 6.5% on average between 2000 and 2009, the total income tax revenues over the same period increased by 13.6% per year on average.

4.1.3 CASH BAN

Greece is among many countries that have banned the use of cash for transactions above a certain value. In some countries, all transactions with the Public Administration and with some branches of the public sector are executed exclusively with EMP. In other cases, the circulation of low-value coins has been abandoned, as the penetration of contactless payments facilitates the use of payment cards and smartphones for low-value transactions.

In greater detail, all payments with the public sector exceeding €300 in Bulgaria are conducted through electronic channels, while similar measures are implemented in Germany for amounts over €500. In Spain, cash is banned for transactions above €2.500 between companies or freelancers and the public sector.

Italy has banned the use of cash for amounts over €1.000 since 2012 while there are currently plans to extend the measure to transactions with the public sector for amounts over €50. The use of mobile points of sale (mPOS) by specific professions (taxi drivers, freelancers, plumbers and electricians) has become mandatory.

Similar measures were adopted in mid-2014 in Uruguay. Payments for purchasing products or services above 160,000 *unidades indexadas* (around €1,900 with the exchange rate of 30/3/2015) were allowed only with the use of EMP or cheques. After a two year adjustment period, salaries, pensions, bonuses and freelancer fees will be paid only by crediting bank accounts, avoiding payments in cash.¹²

In South Korea, the tax incentives were accompanied by imposing the use of credit cards in companies and businesses above a certain size (Jeon 2013). The participation of all companies and sole proprietorships with an annual turnover above 150 million won (€125,000) in the card network was made mandatory since 1999. For sole proprietorships that offer professional services, the turnover threshold for compulsory participation in the card network was initially set at 48 million won (€40,000). These thresholds were adjusted downwards, based on the branch of activity of the sole proprietorships, and were finally set to 24 million won (€20,000) for all enterprises from 2001 onwards. Since 2008, the participation in the card network is mandatory for health clinics, doctors and all sole proprietorships that offer professional services, regardless of their annual turnover.

In parallel, measures were set to limit the commission charged by the banks and to define fines for denial of card payments. Mandatory acceptance of payment cards was introduced in 2001 for the companies obliged to participate in the card network. Since 2002, a fine equal to 5% of the transaction value and not less than 5,000 has been set for card refusals. By implementing the "three-strikes-out" rule since 2005, the punishment for the companies,

¹² Ley Nº 19.210 - Inclusión Financiera y promoción del uso de medios de pago electrónicos, 29/4/2014 (<http://www.parlamento.gub.uy/leyes/ AccesoTextoLey.asp?Ley=19210&Anchor=>)

violating repeatedly this rule became considerably stricter. In addition, since 2008, a company violating the rule even once would lose all tax exemptions and discounts.

In 2007, incentives were provided to promote the filing of complaints regarding companies refusing card payments. Initially, the reward was set at 50,000 won (around €42), with a maximum reward of 2 million won per year (€1,700). Afterwards, the rewards were reduced for transactions below 250,000 won (€210) to 20% of the transaction value, with a minimum reward of 10,000 won (around €8.4). The transactions with a value below 5,000 won (around €4.2) were exempt from this measure.

Meanwhile, many countries stopped the circulation of coins of lower value, as in quite a few cases the production and circulation costs exceed the nominal value of the coins. In addition, the gradual reduction of the circulation of these coins discouraged the use of cash. Indicatively, Belgium and the Netherlands stopped producing coins of lower value (one and two euro cents) since 2004 (Kearney 2013).

Similar incentives to promote the use of EMP and to reduce the use of cash are implemented by some companies, in cooperation with banks and the public sector. In the Netherlands, a significant number of the companies refuse cash payments and accept only debit and credit cards. Moreover, the number of cashier desks at supermarkets that do not accept cash is growing, with this measure expanding in small and micro firms as well.

In Sweden, the number of bars and restaurants that do not accept cash has increased significantly since 2006. In addition, more than half of the branches of the two biggest national banks process only electronic transactions.

In Greece according to an explanatory circular note of the General Secretariat for Information Systems (GSIS), in force since 2013, all transactions with the public sector should be conducted electronically. Moreover, according to the circular note 1027/9.9.2011, payments for sales of products and services to individuals above €1,500 should be conducted only with the intermediation of financial institutions. This measure was expanded to all transactions above €500 in 2014. Expenses that do not comply with the measure are not recognised as eligible for tax purposes.

4.1.4 TECHNOLOGICAL DEVELOPMENTS

The technological developments support the diffusion of EMP, even in low-value transactions. In Greece, the use of contactless transactions is facilitated by the fact that for purchases below €25, no PIN code is required. In addition, some banks, in cooperation with mobile network operators, support the use of smartphones for purchases from stores that participate in the contactless transaction network. In addition, smartphone applications can be used in Athens to buy and store e-tickets for transportation (metro, trains, buses, tram).

With innovative applications, the users can hail a taxi and payment with EMP, without using cash. The electronic wallet, a smartphone application that facilitates cashless transactions of any amount, is already being used in the UK, Spain and France with positive results.

4.1.5 ALTERNATIVE MEANS OF REDUCING TAX EVASION IN COMMERCIAL TRANSACTIONS

As already mentioned in the previous sections, the use of EMP could help combat tax evasion and contribute to the improvement of direct and indirect tax collection. However, there are other tools as well that aim to limit unrecorded transactions, without using EMP.

Lotteries with payment receipts are one such example. The use of receipt lotteries is widespread in many Asian and Latin American countries (China, Korea, Armenia, Indonesia, Bolivia, Philippines) and in some South-East Europe countries, such as Albania, FYROM and Slovakia. The customers can participate in prize draws, using each receipt's unique number. The implementation of this measure is being assessed in other SEE countries, such as Romania.

In greater detail, Taiwan implements a "uniform invoice lottery" since 1951. The prizes range from €6 to €300,000 for a draw that takes place once every two months. The receipts issued by shops with an annual turnover exceeding 200,000 new Taiwanese dollars (around €5,900) are eligible for participation in the lottery. It is estimated that during the first year of the lottery, tax revenues increased by 75%.

A similar lottery system is implemented in some areas of China since 1998. Up until 2003, the system was adopted by 12% of the Chinese tax offices, including those located in Beijing and in Shanghai. In 2009, the Chinese central government recommended the use of this measure in all tax offices in China. Initially, the system was implemented mainly for receipts from food services, but then it expanded by accepting receipts from other sectors as well. According to estimations (Wan 2010), the revenues from sales tax were significantly higher in areas that implemented the system (+17.1%). In those areas, the growth rate of tax revenues (from the sales tax 21.5% and any other tax +10.4%) was also greater, compared to areas that did not implement the system.

In the Euro area, such a lottery is implemented in Portugal and Slovakia. In Portugal, more than 40 luxury cars, cash and other prizes have been allocated to the lucky receipt holders since the lottery was introduced in 2014. The public revenues from VAT increased by €563 million (+4%) while private consumption increased by 2%.¹³ According to the State's General Secretary, the number of issued receipts doubled as a result of adopting the lottery system.¹⁴

In Slovakia, the lottery is running since the autumn of 2013, with relatively limited impact. According to estimations of the Ministry of Finance, the revenues have increased by €7-8 million annually (Gábik and Strížencová 2014). The limited effectiveness of the lottery may be attributed to the fact that most of the receipts used in the lottery come mainly from big retail stores, where tax evasion is already limited.

It seems that the effectiveness of the lottery is strongly related with the extent of unrecorded transactions and VAT evasion. In countries such as Slovakia and Greece, where the tax evasion is concentrated in specific sectors of the economy (e.g. services), while a large number of small-value receipts are regularly issued by stores that do not evade taxes

¹³ Patricia Kowsmann, 10/03/2015, the Wall Street Journal

¹⁴ Δήλωση του Paulo de Faria Lince Nucio στο BloombergBusiness, 13 Φεβρουαρίου 2015

(e.g. supermarkets, chain stores), the effectiveness of the lottery measure could be extremely limited.

The lottery introduced in South Korea is a particularly interesting case. The lottery was initially implemented for shops that accept payment cards (February 2000). The measure was later expanded to the customers of the shops for transactions with payment cards (January 2001). The lottery offered 110 million won (around €93,000) to the shop-owners per draw. The lottery for the owners was funded by the Credit Finance Association of South Korea. Correspondingly, the cost of the lottery for the consumers was 1.5 billion won (€1.3 million) per draw, with a maximum win of 100 million won (€84,000), and was funded by the state. The target of this measure was to promote the use of payment cards even among consumers with low income. The scope of the lottery was extended to receipts from cash transactions and to shop-owners participating in the receipt control network. The lottery scheme was abandoned initially for shops accepting payment cards (2005) and later on for purchases conducted with credit cards (2006), as the penetration of credit card use was considered sufficient. In 2010, the lotteries for debit card transactions and for companies participating in the receipt control network were terminated as well.

4.2 Incentives for EMP use provided by banks and businesses

The banks operating in Greece offer reward programmes to promote the use of credit and debit cards. The reward programmes offer bonus points for each transaction and redemption in future transactions in participating stores. Some of the reward plans provide cash returns in the end of a specific period. Finally, all obligations to the public sector (such as income and property taxes) can be paid with credit cards in equal interest-free instalments, which is another incentive for the use of payment cards.

All major Greek banks (Alpha Bank, National Bank of Greece, Eurobank, Piraeus bank and Attica Bank) offer rewards programmes for the use of credit and debit cards, which differ with respect to the provided incentives and the participating companies. The main programmes encountered in Greece can be grouped in the following categories:

- Refund plans: The use of debit and credit cards is rewarded by returning funds at the end of a period. The existing plans by the domestic banks can be classified in two categories. In the first category, the bank deducts the reward from the monthly balance of the credit card (i.e. Attica bank). In the second category, the reward can be exchanged only for purchases from participating stores (i.e. Eurobank).
- Reward point plans: Reward points are collected with the use of credit and debit cards. In Greece, the existing plans differ with respect to the number of points per each euro spent and with respect to how these points are redeemed (special offers and discounts). For example, using certain payment cards in specific mobile network operators or in purchases from specific department stores provides more reward points per spent euro, compared to purchases from other companies.
- Air miles plans: The use of payment cards to purchase air tickets or other goods and services with third-party stores is rewarded with award miles, which can be exchanged for tickets, seat upgrades, hotel discounts and other offers to travellers

by airline alliances. Such reward programmes are provided by Piraeus Bank, Alpha Bank and Eurobank.

- **Coupon programmes:** The consumers buy coupons for purchases from participating stores, which provide discounts with the redemption of the coupons. Such a plan was recently introduced by Piraeus Bank, which offers higher discounts when the coupons are bought with cards issued by the bank.

4.3 *Effectiveness of the incentives for EMP use in Greece*

In this section, we use transaction data on the use of EMP from the four largest Greek banks, in order to quantify the impact of incentives on the use of cards. In particular, we use data on electronic transactions of 40,000 individuals, covering the period from 2010 to 2014.¹⁵ We estimate the elasticity of various incentives provided by the banks in order to promote the use of EMP. We examine a number of alternative econometric models, generated under a different set of assumptions, moving from the general to the special case.

4.3.1 **METHODOLOGICAL APPROACH OF THE EMPIRICAL ANALYSIS**

The key purpose of the econometric investigation in this section is to assess the effectiveness of the incentives provided by the banks, in order to promote the use of EMP by the consumers. In the analysis that follows, we use panel data on electronic transactions with all types of payment cards, taking into account the incentives provided by the banks from 2010 to 2014.

The main incentive that the banks provide to boost EMP use is based on a mechanism of reward points. The points are converted in value, wherever possible, with the use of a different exchange rate for each bank, as they can be redeemed in a future transaction with the same or other payment instruments of that particular bank.

We use a linear model in the empirical investigation. We present first the random effects and then the fixed effects estimations. We should stress that income is not included as an explanatory variable, due to lack of data.

In the tables that follow, one asterisk denotes estimations that are statistically significant at the 10% level of statistical significance, two asterisks - results statistically significant at the 5% level of significance and lastly three asterisks - results statistically significant at the 1% significance level.

4.3.2 **RESULTS**

Table 4.1 and Table 4.3 (in the Appendix) contain the results from the estimations of linear models that explain the variability of the number of electronic transactions. The first table presents the results under the assumption of random effects while the second shows the results for the fixed effects case. We transform the variables in logarithmic form, in order to be able to use the results as elasticities.

¹⁵ The data sample is described in more detail in Section 2.4, page 52 of this study.

The elasticity of the number of transactions with respect to the value of rewards is positive and statistically significant, ranging in the interval from 0.276 to 0.294, depending on functional form and other assumptions. Thus, it can be characterised as inelastic. Similarly, the elasticity of the number of transactions with respect to the value of redeemed reward points varies between 0.080 and 0.091 and can be characterised as highly inelastic.

In addition, the number of transactions is lower among older age individuals. The number of transactions grows over time with a linear trend. Furthermore, being employed is associated with making more transactions, while the number of transactions tends to be lower among women.

Tables 4.4 and 4.5 present the corresponding estimates with the use of reward and redemption points, rather than values. The elasticity of the number of transactions with respect to the number of reward points ranges between 0.267 and 0.292 while the elasticity of the number of transactions with respect to the redemption points varies between 0.059 and 0.090.

Table 4.1: Results from regressing the number of transactions, with the reward value as explanatory variable, random effects

	LNumTrans	LNumTrans	LNumTrans
LRw dv	0.286 (0.010)***	0.294 (0.010)***	0.292 (0.010)***
LRdmv	0.084 (0.009)***	0.091 (0.009)***	0.090 (0.009)***
LAge		-0.463 (0.052)***	-0.430 (0.052)***
Trend		0.044 (0.004)***	0.044 (0.004)***
Gender			-0.055 (0.025)**
Empl			0.086 (0.033)***
TertEduc			0.146 (0.027)***
_cons	4.395 (0.022)***	-82.670 (8.302)***	-81.722 (8.301)***
N	8,727	8,550	8,550

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

The time trend and being employed have a positive impact on the number of electronic transactions. Similarly with the previous set of results, being a woman is associated with a lower number of transactions.

Tables 4.2 and 4.6 show the results for explaining the variation in the value of electronic transactions, using the value of reward and redemption, together with demographic characteristics, as explanatory variables. The elasticity of the transaction value with respect to the reward value ranges between 0.299 and 0.324 while the elasticity of the transaction value with respect to the redemption value varies between 0.040 and 0.051. The time trend, being employed and being a university graduate have a positive impact on the value of

electronic transactions. In contrast, women tend to have a lower value of transactions. The results do not change substantially when we use the reward and redemption points, instead of the values (Tables 4.7 and 4.8).

The four last tables repeat the estimations, using, in addition, the number of electronic transactions as an explanatory variable. In these estimations, the coefficient signs for the time trend and redemption points or values change. This implies that controlling for the number of transactions, the transaction value falls over time. Meanwhile, the value of transactions is lower when it involves the use of redemption points. In addition, the transaction value for a given number of transactions is higher among the married and older individuals.

Table 4.2: Results from regressing the value of transactions, with the reward value as explanatory variable, random effects

	LFullAmt	LFullAmt	LFullAmt
LRwdv	0.325 (0.014)***	0.323 (0.014)***	0.324 (0.014)***
LRdmv	0.051 (0.012)***	0.049 (0.012)***	0.051 (0.012)***
LAge	-0.168 (0.053)***	-0.129 (0.052)**	-0.127 (0.052)**
Gender		-0.052 (0.027)*	-0.050 (0.027)*
Empl		0.110 (0.037)***	0.109 (0.037)***
TertEduc		0.177 (0.029)***	0.176 (0.030)***
Trend			0.009 (0.005)*
_cons	9.302 (0.208)***	9.032 (0.207)***	-8.849 (10.362)
N	8,550	8,550	8,550

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

4.3.3 CONCLUSIONS

The econometric analysis reveals a positive relationship between the incentives offered by the domestic banking institutions and the use of payment cards, both in terms of transaction frequency and value per transaction. In addition, the redemption of points is correlated with a higher total value of transactions, which comes from a higher number of transactions, despite the lower average transaction value. In addition, it seems that both the number and the value of transactions is higher among younger individuals, men, the employed and the university graduates. Lastly, the total value and the number of transactions follow a secular upward trend when we control for changes in the incentives and the other variables in the model. Meanwhile, the average value per transaction falls over time, as the electronic means of payment diffuse into more daily transaction categories, but perhaps also as a result of the economic crisis.

4.4 Summary

The present chapter presents incentives to increase the use of electronic means of payment, applied in Greece and abroad. We describe reward schemes designed by the banking sector and schemes implemented at country level in order to boost EMP use and curb tax evasion.

These measures can be grouped in three general categories: a) discounts on transactions, b) discounts on income tax and c) cash ban. In addition, the technological progress and the simplification of the required technical means contribute to a further diffusion of the digital payments. Lastly, quite a few countries have adopted alternative measures to encourage the issue of receipts and to reduce tax evasion, such as lotteries with payment receipts.

The discount on transactions is implemented when the purchase is made with the use of payment cards. Such a measure has been implemented in South Korea already since 1994. Over time, the discount rate was not fixed, changing with the diffusion rate of card transactions and the set targets. Particularly for enterprises with heightened exposure to cash transactions, such as tourist accommodation and restaurants, the discount rate was set higher, compared with transactions in other sectors. A similar measure was implemented in Uruguay as well since mid-2014, where the use of EMP results in a reduction of up to 100% of the applicable tax. In Argentina, the use of debit cards is rewarded with a discount of 5 percentage points and a maximum refund of 1,000 Argentine pesos (€105 according to the 30/3/2015 exchange rate). Measures and schemes with similar benefits for the consumers were designed in Colombia as well, but their implementation has been delayed.

In certain cases, income tax discounts are provided as well, both for the consumers who pay with EMP and for the enterprises accepting digital payments. South Korea is a typical example, where the consumers enjoy income tax discount, provided that the spending with payment cards exceed a certain threshold, initially set at 10% of their income. The threshold was adjusted over time, following the growth of payment card diffusion in the economy. On the other hand, the businesses enjoy 50% discount on their income tax for year-on-year incremental sales with payment cards within a particular tax year. The implementation of these incentives in South Korea had a positive impact both on the diffusion of cards and on the tax compliance rate, as the number of taxpayers that filed tax return statement tripled.

Quite a few countries (Greece, Bulgaria, Germany, Italy, Uruguay, South Korea) have also adopted the measure to ban the use of cash for large-value transactions. Some countries have also adopted the exclusive use of EMP for transactions with the public administration, but also in certain branches of the private sector. Lastly, the circulation of small coins has also been interrupted, as the diffusion of contactless transactions facilitates the use of cards and mobile phones for payments even in low-value transactions.

Apart from the above incentives, there are other tools aimed at curbing unrecorded transactions, without necessarily promoting the use of EMP, such as sale receipt lotteries. Such lotteries are primarily adopted in Asian and Latin American countries (China, Korea, Indonesia, Bolivia, the Philippines) and in the region of South-East Europe (Albania, FYROM, Slovakia). The implementation of the lottery in Portugal since April 2015 is estimated to have contributed to higher tax collection by €563 million. In contrast, the measure proved to be less effective in Slovakia, as it raised tax revenues by only €7-8 million per year. Ultimately, it

seems that the efficiency of the receipt lottery measure is not guaranteed, as it depends on the extent of the lack of sales records and VAT evasion. The implementation of such a measure was also recently examined in other SEE countries, including Greece and Romania.

Apart from the state, the banks also provide incentives to boost the use of EMP. In Greece, the banks implement loyalty programmes that provide rewards for the use of credit and debit cards. The programmes usually entail the collection of reward points for each transaction and exchange of the points for discounts in participating stores. Few of the existing programmes entail the return of cash at the end of an administrative period. The main programmes encountered in Greece can be grouped in the following categories:

- Cash refund programmes, either at a bank account of the consumer or against purchases at participating stores.
- Programmes of collecting reward point. The points correspond to gifts, gift cheques or discounts at participating stores.
- Programmes of collecting air miles, which can be exchanged for tickets, seat upgrades, hotel discounts and other offers to travellers by airline alliances.
- Coupon programmes, where the consumers receive discount coupons for purchases in participating stores. The discount rate is higher when the payment is made with a card of the bank that administers the programme.

The econometric analysis revealed a positive relationship between the incentives offered by the domestic banking institutions and the use of payment cards, both in terms of frequency of use and value per transaction. In addition, it seems that the number and the value of transactions are higher among younger consumers, men, the employed and university graduates. Lastly, the total value and the number of transaction grow over time when the incentives and other variables in the model are kept constant while the average value follows a downward trend.

4.5 Appendix

Table 4.3: Results from regressing the number of transactions, with the reward value as explanatory variable, fixed effects

	LNumTrans	LNumTrans	LNumTrans
LRwdv	0.275 (0.012)***	0.286 (0.012)***	0.286 (0.012)***
LRdmv	0.080 (0.010)***	0.088 (0.010)***	0.088 (0.010)***
Trend		0.044 (0.004)***	0.044 (0.004)***
_cons	4.471 (0.022)***	-84.063 (8.818)***	-84.063 (8.818)***
R ²	0.31	0.33	0.33
N	8,727	8,550	8,550

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.4: Results from regressing the number of transactions, with the reward points as explanatory variable, random effects

	LNumTrans	LNumTrans	LNumTrans
LRwdp	0.267 (0.009)***	0.267 (0.009)***	0.292 (0.010)***
LRdmp	0.059 (0.009)***	0.059 (0.009)***	0.090 (0.009)***
LAge		-0.302 (0.043)***	-0.430 (0.052)***
Trend		0.032 (0.004)***	0.044 (0.004)***
Gender			-0.055 (0.025)**
Empl			0.086 (0.033)***
TertEduc			0.146 (0.027)***
_cons	3.017 (0.019)***	-60.614 (8.033)***	-83.133 (8.302)***
N	10,868	10,691	8,550

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.5: Results from regressing the number of transactions, with the reward points as explanatory variable, fixed effects

	LNumTrans	LNumTrans	LNumTrans
LRwdp	0.277 (0.011)***	0.289 (0.011)***	0.286 (0.012)***
LRdmp	0.081 (0.010)***	0.088 (0.010)***	0.088 (0.010)***
Trend		0.047 (0.004)***	0.044 (0.004)***
_cons	3.068 (0.023)***	-91.423 (8.631)***	-85.442 (8.821)***
R ²	0.31	0.33	0.33
N	10,868	10,691	8,550

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.6: Results from regressing the value of transactions, with the reward value and the number of transactions as explanatory variables, fixed effects

	LFullAmt	LFullAmt	LFullAmt
LRwdv	0.299 (0.016)***	0.299 (0.016)***	0.301 (0.016)***
LRdmv	0.040 (0.013)***	0.040 (0.013)***	0.041 (0.013)***
Trend			0.008 (0.006)
_cons	8.619 (0.027)***	8.619 (0.027)***	-6.621 (11.248)
R ²	0.20	0.20	0.20
N	8,550	8,550	8,550

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.7: Results from regressing the value of transactions, with the reward value and the demographics as explanatory variables, random effects

	LFullAmt	LFullAmt
LRwdp	0.320 (0.013)***	0.324 (0.014)***
LRdmp	0.024 (0.011)**	0.051 (0.012)***
LAge		-0.127 (0.052)**
Trend		0.009 (0.005)*
Gender		-0.050 (0.027)*
Empl		0.109 (0.037)***
TertEduc		0.176 (0.030)***
_cons	7.229 (0.023)***	-10.231 (10.365)
<i>N</i>	10,867	8,550

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.8: Results from regressing the value of transactions, with the reward value, the number of transactions and the demographics as explanatory variables, fixed effects

	LFullAmt	LFullAmt
LRwdp	0.315 (0.016)***	0.301 (0.016)***
LRdmp	0.035 (0.013)***	0.041 (0.013)***
Trend		0.008 (0.006)
_cons	7.286 (0.029)***	-7.882 (11.253)
R^2	0.21	0.20
<i>N</i>	10,867	8,550

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.9: Results from regressing the value of transactions, with the reward points as an explanatory variable, random effects

	LFullAmt	LFullAmt	LFullAmt
LRwdv	0.207 (0.013)***	0.207 (0.013)***	0.203 (0.013)***
LRdmv	-0.012 (0.011)	-0.012 (0.011)	-0.015 (0.011)
NumTrans	0.009 (0.000)***	0.009 (0.000)***	0.009 (0.000)***
Empl		0.072 (0.028)**	0.073 (0.028)***
TertEduc		0.110 (0.024)***	0.112 (0.024)***
Trend			-0.019 (0.005)***
_cons	7.794 (0.032)***	7.710 (0.038)***	46.263 (9.227)***
<i>N</i>	8,727	8,727	8,727

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.10: Results from regressing the value of transactions, with the reward points and the number of transactions as explanatory variables, random effects

	LFullAmt	LFullAmt	LFullAmt
LRwdv	0.207 (0.016)***	0.207 (0.016)***	0.200 (0.016)***
LRdmv	-0.007 (0.012)	-0.007 (0.012)	-0.010 (0.012)
NumTrans	0.007 (0.000)***	0.007 (0.000)***	0.007 (0.000)***
Trend			-0.017 (0.005)***
_cons	7.910 (0.041)***	7.910 (0.041)***	41.554 (10.147)***
R^2	0.34	0.34	0.34
<i>N</i>	8,727	8,727	8,727

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.11: Results from regressing the value of transactions, with the reward points and the demographics as explanatory variables, random effects

	LFullAmt	LFullAmt	LFullAmt
LRwdp	0.212 (0.012)***	0.212 (0.012)***	0.214 (0.012)***
LRdmp	-0.031 (0.011)***	-0.030 (0.011)***	-0.027 (0.011)**
NumTrans	0.009 (0.000)***	0.009 (0.000)***	0.009 (0.000)***
LAge		0.136 (0.037)***	0.128 (0.040)***
Trend		-0.023 (0.004)***	-0.022 (0.004)***
TertEduc			0.154 (0.023)***
MarStat			0.020 (0.021)
_cons	7.054 (0.020)***	53.140 (8.830)***	50.060 (8.838)***
<i>N</i>	10,867	10,690	10,690

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note:* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.12: Results from regressing the value of transactions, with the reward points and the number of transactions as explanatory variables, fixed effects

	LFullAmt	LFullAmt	LFullAmt
LRwdp	0.223 (0.016)***	0.216 (0.016)***	0.216 (0.016)***
LRdmp	-0.014 (0.012)	-0.016 (0.012)	-0.016 (0.012)
NumTrans	0.007 (0.000)***	0.007 (0.000)***	0.007 (0.000)***
Trend		-0.016 (0.005)***	-0.016 (0.005)***
_cons	7.127 (0.028)***	39.398 (10.192)***	39.398 (10.192)***
R^2	0.34	0.34	0.34
<i>N</i>	10,867	10,690	10,690

Source: National Bank of Greece, Piraeus Bank, Alpha Bank and Eurobank. Data processing: IOBE.

Note:* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

5. ELECTRONIC PAYMENTS, THE INFORMAL ECONOMY AND ECONOMIC DEVELOPMENT

The electronic means of payment (EMP) contribute to higher tax revenues, either by limiting the informal economy or through stronger economic growth, due to an enhancement of the transactions infrastructure. This chapter offers a brief literature review on electronic transactions and their role in limiting the informal economy, but also their relation to economic growth. The basic measurement models of the shadow economy are also critically presented. Along these lines, the empirical relationship of electronic transactions with tax revenues is also examined using macroeconomic data.

5.1 *Electronic transactions and the informal economy*

Recent studies show that the shadow economy in Greece was close to 24% of the total GDP in 2013 (€ 182 billion)¹⁶. Respectively, the size of the shadow economy ranged close to €43 billion, compared with a budget deficit of €23 billion, i.e. 12.7% of the Greek GDP, during the same year. Overall in Europe in 2013, according to the same source, the share of the estimated shadow economy amounted to 18.5% of the total GDP, recording a steady decline after 2003, with the exception of a slight increase in 2008.

Highlighting the informal or shadow economy¹⁷ and its impact on tax evasion and economic development is an important starting point for the implementation of the appropriate policy measures in the direction of expanding the use of electronic payment instruments. In places where the conditions favour the shadow economy, the extended use of electronic payments and the reduction of the use of cash in financial transactions could act as a policy tool against tax evasion and further expansion of the informal economy.

But how can the electronic transactions contribute to the reduction of the shadow economy? According to recent studies^{18,19}, the main mechanism through which this could happen is that the electronic payments improve tax collection and save costs to the state, along the whole value chain of financial transactions, while, at the same time, they reduce bureaucracy in banks and public services, boosting economic growth and market development.

Moreover, there is evidence that the delay in VAT collection is negatively correlated with the use of EMP. Among 26 member countries of the EU, Greece is at the third highest position based on the percentage shortfall in revenues from VAT (VAT gap), which amounted to 39%, behind Romania with 48% and Latvia with 41% (Figure 5.1). At the same time, as presented above, Greece is far behind the other countries in the EMP penetration rate. The negative relationship between the VAT gap and the EMP penetration holds throughout the EU, as the

¹⁶ Schneider (2013)

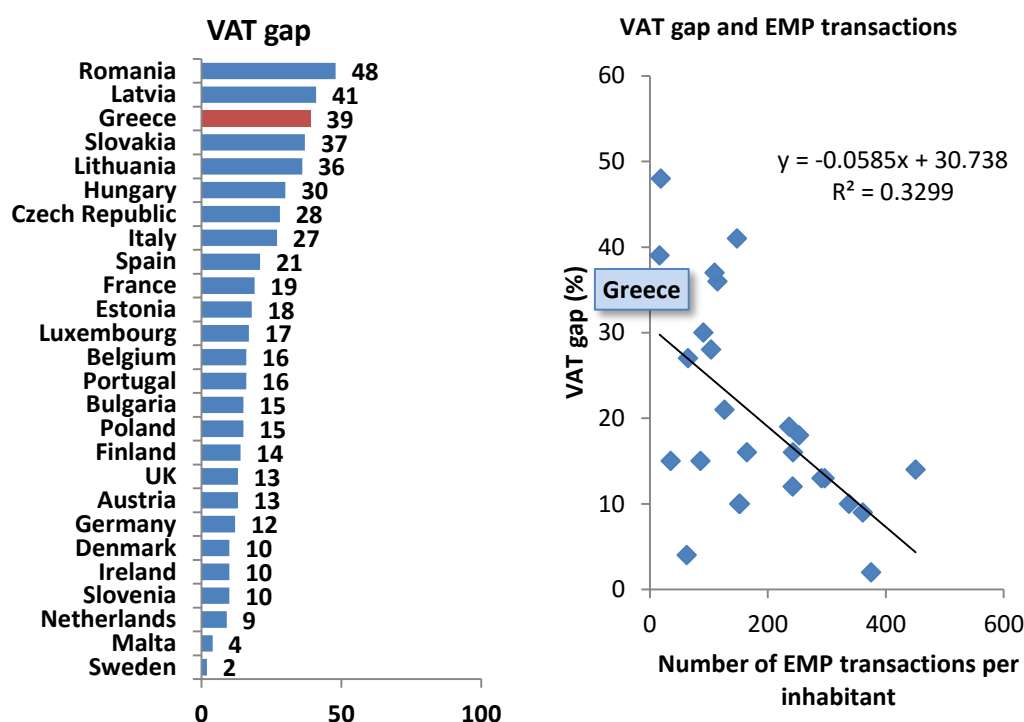
¹⁷ In this text, the terms 'shadow economy' and 'informal economy' include transactions from legitimate activities, which are not subject to state control mechanisms and include undeclared work, which covers about 2/3 of these transactions, but also the incomplete recording of commercial activities in order to avoid taxation.

¹⁸ Schneider (2013)

¹⁹ Rogoff (2014)

EU countries with low EMP transactions per capita tend to have higher VAT gap (correlation coefficient $r=-0,57$).

Figure 5.1: VAT gap and EMP transactions per inhabitant



Source: European Commission, ECB. Data processing: IOBE

5.1.1 KEY DRIVERS OF INFORMAL ACTIVITY

The main causes of the shadow economy are largely identified with tax and social security burdens, the intensity and extent of labour regulations, the quality of public services and the state of the formal economy of a country.²⁰ The burden of total taxation and social security contributions is one of the main reasons for the existence of the informal economy while relevant empirical results provide statistically significant evidence of the negative impact of tax hikes on the shadow economy.²¹ Since taxes affect labour and leisure choices, by directing part of the labour supply towards the informal economy, the distortions in the overall tax burden often provide a significant impetus to the shadow economy.^{22,23}

The number of regulations is another important factor that limits the freedom of choice for people who transact in the formal economy. These regulations include provisions and restrictions in the labour market (such as minimum wages, dismissal protections and restrictions on foreign nationals) and barriers to trade (e.g. import quotas). Studies reveal a

²⁰ Schneider, F., Buehn, A. and C. Montenegro. (2010).

²¹ Schneider (2007)

²² Dell'Anno (2003)

²³ Giles, David, E.A. and Tedds, L. M. (2002).

positive correlation between the number of regulations and the size of the informal economy.²⁴

Additionally, the expansion of the informal economy may lead to a reduction in government revenues, which in turn reduces the quality and quantity of public services and goods. Eventually, this can lead to an increase in tax rates for businesses and households, often combined with the deterioration of the quality of public goods and public administration, thus leading to even stronger incentives for participation in the informal economy.

Finally, the conditions prevailing in the formal economy play an important role in the decision of people to take part in the shadow economy.²⁵ In a prosperous formal economy, people have many opportunities to earn a good salary, whereas, in a recessionary phase of the economy, a part of the workforce tries to compensate its income loss from the formal economy through complementary activities that remain unregulated, resorting thus to shadow transactions.

5.1.2 METHODS OF MEASURING THE INFORMAL ECONOMY

Despite the estimations that have been occasionally made, the informal or shadow economy is by definition difficult to measure. However, many different methods are developed for this purpose. Tax audits provide only some indications about the size of the shadow economy since they are usually addressed to suspected offenders and thus are biased estimators of the overall behaviour of the individuals. Regular surveys of household expenditure and income, usually run by the national statistical services, can also provide information on deviations that might indicate undeclared income. The special surveys that directly ask about undeclared income or cash payments carry the risk of bias from non-response. Meanwhile at a macroeconomic level, the conclusions on the informal economy size that can be drawn from inconsistencies between expenses, income and assets, collected from various sources for national accounts purposes, are limited.

Currency Demand Approach

The most popular methods in the academic literature for measuring the shadow economy are based either on macroeconomic demand models for cash holdings (sometimes together with data from bank accounts) or consumption of a standardised product, such as electricity. The approach of currency demand, or else the "index" method, represents a macroeconomic approach that uses a variety of financial and other indicators, which contain information about the development of the shadow economy (over time) and the "traces" that it leaves behind. This method was first used by Cagan (1958), who calculated the correlation of currency demand and the tax burden (as one of the causes of informal economy) in the United States for the period from 1919 to 1955.

This approach was later made more specific in various ways,²⁶ largely assuming that the shadow (hidden) transactions were made in the form of cash payments, so as not to leave

²⁴ Johnson, Kaufmann and Zoido-Lobaton (1998)

²⁵ Bajada and Schneider, 2005, Feld and Schneider, (2009)

²⁶ Breusch, (2005)

traces to the audit authorities. An increase in the size of the shadow economy will, therefore, increase the demand for cash, creating excess monetary demand. In such a model, many possible factors, such as changes in income, payment habits, interest rates, and so on, are being controlled. In addition, variables such as direct and indirect tax burden, government regulations and the complexity of the tax system, which are hypothesised to be the main factors that push people to work in the informal economy, are also included in the estimated equation.

In these models, the excess demand for cash or the amount that remains unexplained by the conventional / standard factors is then attributed to the growing tax burden and other reasons that lead people to work in the informal economy. The data on the size and trend of the informal economy can then be calculated, as a first step, comparing the difference between monetary demand, where the direct and indirect tax burden (and regulations) are at their lowest level and monetary demand, under the current / actual burden of taxation and government regulations. Assuming, in a second stage, the same velocity of cash in the shadow economy with that of the "legal" money in the form of M1 circulating in the formal economy, the size of the shadow economy can then be calculated and compared to the official GDP.

Critique of the currency demand approach

The approach of the demand for cash is one of the most frequently used methods of measuring the shadow economy and while it has been implemented in many OECD countries, it has nevertheless been criticised for various reasons. One of the most important critical points is that not all transactions in the informal economy are made using cash, albeit usually most of them.²⁷ In addition, most studies consider only one particular factor, usually the tax burden, as the main cause of the shadow economy, while they also assume the same velocity of money in the official economy and the shadow economy. However, there is considerable uncertainty about the velocity of money in the formal sector, while the velocity of money in the shadow economy is even more difficult to measure.²⁸

The model of structural equations (MIMIC)

The assessment of the size and trend of the shadow economy is a difficult and demanding task and the currency demand or electricity approaches heavily rely on the existence of an index that "must" capture all the effects of the shadow economy. However, these effects appear simultaneously in production, labour and money market, while the factors that create and determine its size, are not restricted only to the tax burden. To avoid these issues, mainly, models that measure the shadow economy are developed in the relevant literature, based on structural equations approaches and the statistical theory of unobserved variables. The latter assumes that there are multiple causes and indicators of the phenomenon, which is to be measured.

²⁷Isachsen and Strom (1985) used the method in Norway in 1980, concluding that approximately 80% of the total shadow transactions were conducted through the use of cash

²⁸ Ahumada, Alvaredo, Canavese A., and P. Canavese (2004)

The application of these models in order to assess the shadow economy is known as the MIMIC method (multiple indicators - multiple causes), which assumes that there are multiple causes leading to the existence and development of the informal economy, as well as multiple effects / signals, which transpire in specific indicators. The MIMIC models are used to estimate the size of the informal economy in different countries. The main idea behind these models is to examine the unobserved / latent variables and their relation to a set of observed variables (causes and indicators). Regarding the estimation of the shadow economy, the idea is to present the product or income from the shadow economy as a latent variable, which has causes and effects (signs) that are observable, but the shadow economy itself cannot be measured directly. The unobservable variable is the one that ultimately connects its causes with its indicators.

Critique of the structural equations models

The main critique, however, that has been made for these models is that there is no clear distinction between the causal and indicator variables, i.e. between the variables which directly affect the shadow economy and those on which the activities of the shadow economy are reflected. In other words, the main disadvantage of the MIMIC method is that there is no clear distinction or a theoretically justified rule for choosing between the indicators and the causal variables. For example, when an economy is in a recession with high unemployment, people have a stronger incentive to work in shadow activities. This can be considered as a causal variable, but the GDP per capita and other magnitudes are also used as result indicators that reveal the size of the shadow economy. Therefore, there is a degree of arbitrariness in the use of a particular variable as a causal variable, i.e. as the factor that causes the problem, or as an indicator, to which the problem is reflected.²⁹ A further criticism that has been made about the model is that its results can be unstable for small changes in either the time period of the data or the group of the examined countries.³⁰ Furthermore, these models have also been criticised for the fact that they are not based on a comprehensive economic theory to guide their robust specialisation and the complexity of their evaluation strategy.³¹

Therefore, these methods for estimating the shadow economy suffer from certain disadvantages and pitfalls. Hence, any attempt to interpret or use their results should be made carefully, cross-checking the results with other studies or with the use of microeconomic data.

5.2 Electronic transactions and economic development

The electronic transactions, in addition to offering significant benefits with respect to reducing the informal economy, also contribute more directly to economic growth. In this sense, electronic payments not only constitute an alternative solution to facilitate transactions or occasionally reduce the transaction costs, compared to other payment

²⁹ Breusch (2005)

³⁰ Helberger and Knepel (1988)

³¹ Breusch (2005)

methods such as cash and checks, but they can also generate significant benefits in terms of stronger economic development.

5.2.1 SOCIAL COST OF PAYMENT INSTRUMENTS

The adoption of electronic transactions reduces the cost of the payment system, whereas the most efficient payment systems increase the rate of growth and development.³² The speed of adoption of electronic payments in a country depends on the interaction between the initial infrastructure costs (associated with the implementation of electronic payments) and technological developments.³³ With the development of new technologies and the reduction of the infrastructure cost related to electronic payments, paperless payments become relatively cheaper and the market share corresponding to these payment methods increases.

The payments by cash or checks not only incur a production cost, but also costs of administration, transportation and secure placement. According to a study of the European Central Bank (ECB)³⁴ on the social and private costs of different payment instruments³⁵, the social costs of cash payments represent almost half of the total social spending. Cash payments have on average the lowest cost per transaction followed closely by payments through debit cards. However, in some countries, cash do not always present the lowest unit transaction cost, as in more than one-third of the countries in the study sample, the transactions with debit cards have lower unit costs than cash transactions. In any case, the study finds that there are significant economies of scale in all means of payment, thus increasing the use of a payment instrument reduces its social cost per transaction. This result is due to the existence of fixed costs that do not vary with the number or value of transactions.

5.2.2 EFFECTS OF ELECTRONIC PAYMENT METHODS ON MACROECONOMIC AGGREGATES

In the half century since their introduction, the transactions made with credit and debit cards has altered the way, place and time of consumer payments for goods and services. The empirical literature on the welfare benefits of electronic payments has also assessed their effects on macroeconomic variables such as consumption, trade and economic growth.

Zandi and Singh (2010, 2013) evaluate the impact of payment cards penetration on private consumption. The penetration level of cards is defined as the value of transactions with credit and debit cards as a percentage of total consumer spending while real private consumption is examined as a function of real disposable income, interest rates and card penetration.

The authors measure the impact of the shift from paper to electronic payments and find that the use of credit and debit cards stimulates economic growth. The study estimates that for the 51 sample countries, which together represent 93% of the world's gross domestic

³² Callado, Hromcova and Utrero (2010).

³³ SCLPartners (2013).

³⁴ ECB (2012).

³⁵ With the participation of 13 national central banks in the European System of Central Banks (ESCB).

product (GDP), the use of payment cards has added 1.1 trillion dollars to private consumption and GDP from 2003 to 2008. The real global GDP increased by 0.2% annually on average, more than it would have grown without the use of the cards, reaching 3.2% overall for the study period.

For the period between 2008 and 2012, the estimations were repeated and the authors found that the use of electronic payment cards has added 983 billion dollars to the GDP of the studied countries. In other words, the use of cards increased consumption by around 0.7% on average in the 56 sample countries. This increase is equivalent, according to the study, to an average additional increase in GDP by 0.17 percentage points per year for these countries as a whole and by 1.8% overall increase in real global GDP over the examined five-year period. The additional GDP growth from the increased card usage resulted in the creation of 1.9 million jobs during the study period. Projecting these results in the future, a 1% increase in the use of cards in the examined countries would amount to an annual increase of 0.056% in consumption and 0.032% in GDP.

Notably, according to the above studies, the debit and credit cards have a similar effect on consumption and GDP. In countries where the majority of cards used in transactions are debit cards, such as Norway and Denmark, consumption and GDP grew at the same or higher rate than in countries that mostly use credit cards. The studies conclude that the transition from paper to electronic payments is a positive development and support the adoption of policies that lead to its acceleration.

5.2.3 CAUSAL RELATIONS BETWEEN ELECTRONIC TRANSACTIONS AND ECONOMIC DEVELOPMENT

The growth of electronic payments in recent years could be interpreted through various factors that affect it. Nevertheless, even a simplified approach to the available data can provide preliminary results on this development. Specifically, the relationship between economic growth, measured roughly in terms of GDP per capita, and various other indicators of electronic payments, such as the number of POS terminals, the number of ATMs, the number and value of transactions of credit and debit cards, can be crucial to the understanding of these trends.³⁶ Recent studies³⁷ show that the relationship between the number of POS, credit and debit cards and ATMs per million inhabitants, compared to GDP per capita is strongly positive. Higher levels of economic growth are associated with the shift to an expanded use of electronic payments.

In order to assess the magnitude of this relationship, the elasticity between GDP per capita and the various electronic payment means was estimated, using a simple regression analysis:³⁸

$$e_i = a + \gamma y_i + \varepsilon_i$$

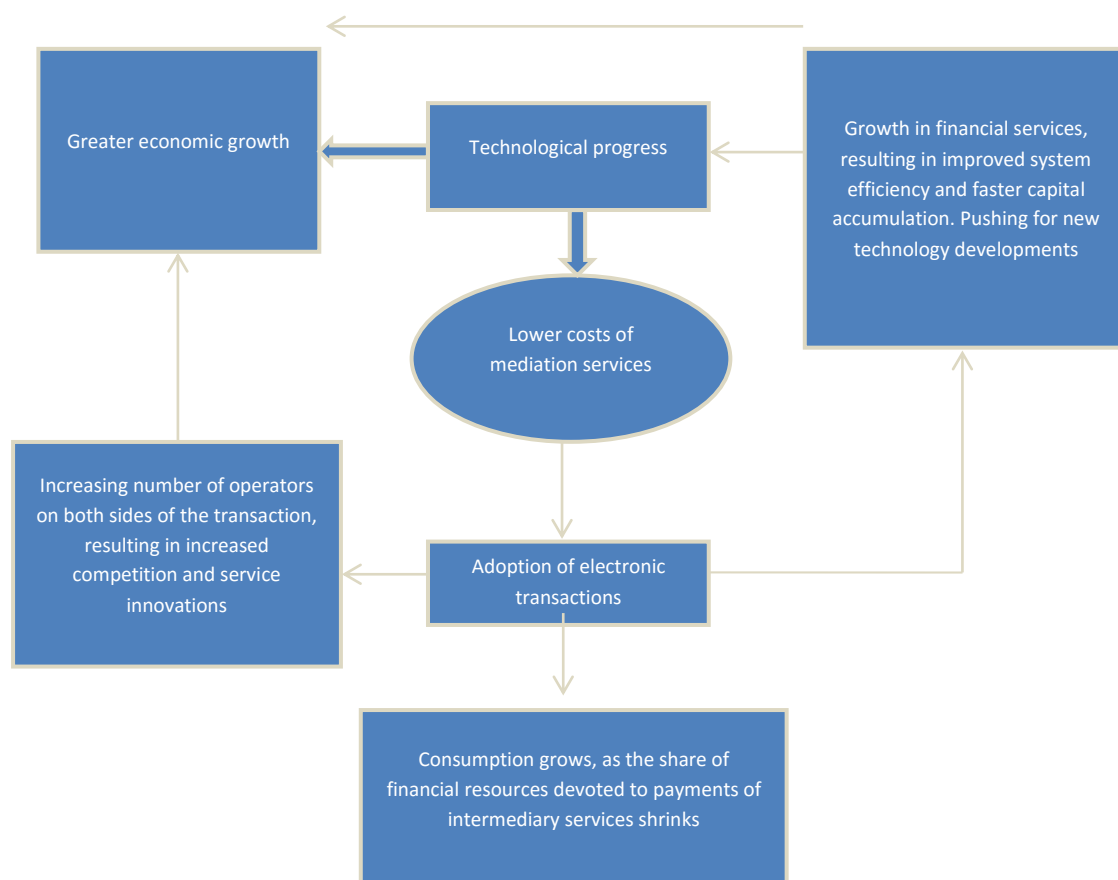
³⁶ Bolt, Humphrey and Uittenbogaard, (2008).

³⁷ SCLPartners. (2013).

³⁸ Where e_i represents the logarithm of the number of credit and debit cards per million inhabitants, the logarithm of the number of POS per million inhabitants or the logarithm of the number of ATMs per million inhabitants in a country i .

Based on the above equation, three different elasticities were calculated. The results showed that the elasticity of POS terminals in terms of per capita GDP was significantly higher than that of credit, debit cards and ATMs. This result is consistent with the evolution of payment systems in recent years. Stronger growth in POS terminals is observed over the recent years in emerging economies with higher income levels. However, such an analysis assumes the existence of a causal direction from economic growth to electronic payments. The strict form of the relationship between the electronic payment system and economic welfare can be bidirectional, effected through different channels in one or the other direction.

Figure 5.2: Electronic transactions and economic development



Source: SCLPartners. 2013. *Electronic Payments, E--Commerce and Economic Activity: Theoretical Review and New Evidence for Developed and Emerging Market Economies*

The positive relationship between the electronic system of payments and economic growth can be summarized as follows (Figure 5.2).³⁹ Technological progress lowers the cost of intermediation services, which promotes further the adoption of electronic payments. This, in turn, increases consumption, as the share of financial resources corresponding to the mediation costs shrinks, creating a welfare gain for the economy. Moreover, the adoption of electronic payments promotes the development of financial markets, leading to benefits associated with an increasing efficiency of the system, faster capital accumulation and technological progress, which creates greater economic growth. Finally, the adoption of

³⁹ SCLPartners. (2013)

electronic payments increases the number of those involved on both sides of a transaction, which leads to stronger competition and services innovations.

5.3 *Effect on tax revenues in Greece*

In the section that follows, the relationship of electronic transactions and tax revenues in Greece is examined using macroeconomic data. In particular, the econometric part of the study uses various components of the Greek national accounts, along with a set of data from the European Central Bank (ECB)⁴⁰ on transactions with electronic payment instruments. The frequency of the data is annual. We focus on the last 15 years, due to data availability constraints. The exact years involved in each assessment vary, depending on the availability of the time series used each time.

The results of the empirical investigation indicate that the increase in the use of payment cards is associated with a statistically significant increase of the tax revenues per GDP in Greece, thus highlighting the emphasis that must be given by the state to increasing EMP use in order to combat tax evasion and reduce the informal economy.

5.3.1 **METHODOLOGICAL APPROACH**

This section summarises the econometric techniques that were followed. Our aim is to detect a relationship between two or more variables. More specifically, we consider the total revenues from taxation as the dependent variable and then proceed to the statistical exploration of alternative econometric models.

From the economic theory, we know that total taxation is a function of total income in the economy, as well as other determinants. In this analysis, we will focus mainly on the impact of electronic means of payments on the amount of tax revenue.

The methodology used for the assessment of alternative models is the generalised method of least squares (GLS), which ensures the homoscedasticity of the errors and gives efficient statistical estimates. Additionally, we apply all the appropriate transformations to the variables before the estimations, in order to correct for non-stationarity of the time series. However, the small number of available observations is a serious problem, even for simple econometric models. Therefore, we should be particularly careful when interpreting the results.

As a dependent variable, we use the sum of the components of tax revenues, such as indirect taxes, income taxes, capital taxes and other tax subcategories with a lesser contribution to the overall tax revenue. The EMP variables that we use are the annual value of electronic transactions, the number of ATMs and the number of POS. The value of electronic transactions in the econometric investigation is broken down per EMP category as follows: [1] per card type (debit, credit, debit but credit-enabled, prepaid), [2] cards issued in Greece or abroad, [3] electronic money stored in another payment instrument, besides cards (e-money storage) and [4] other electronic transactions.

⁴⁰ The data from the ECB are described in detail in Chapter 2.

We use simple, linear econometric models, where both the dependent and the independent variables are expressed in logarithms. We selected this functional specialization for two reasons: first, in order to avoid any econometric problems that might arise from non-stationarity of the time series and second, in order to be able to interpret the estimates as elasticities. The elasticity in this study is a measure of the sensitivity of the tax revenue reaction caused by a change in a particular determinant when all other determinants remain constant.

At this point, we should emphasise that the estimates we present should be interpreted more as an indication of the magnitude of any such change. The relatively restricted time series, their non-stationarity and the correlations observed between the explanatory variables do not allow for a complete examination of the relationship between different means of payment and tax revenues. However, the careful use of the results, under the proper sensitivity analysis over the changes in parameter values resulting from the econometric investigation, can help us quantify the effects of the incentives for the use of EMP.

5.3.2 RESULTS

The tables below provide the results of the estimations. The asterisk denotes the estimates that are statistically significant at 5% significance level, whereas the two asterisks denote the estimates that are statistically significant at 1% significance level. In the tables, we present only the models that have the best explanatory power with respect to the tax revenues and at the same time satisfy all the necessary statistical properties.

In the first model (Table 5.1), we observe that the elasticity of tax revenues to Gross Domestic Product (GDP) amounts to 0.54, i.e. it is positive and at the same time less than one. This means that if we increase the value of total economic activity by 1%, taxation will be increased by 0.54%.⁴¹

Table 5.1: Econometric investigation results regarding the use of EMP

Variable	Model 1	Model 2	Model 3	Model 4
GDP	0.541824*	0.582021*	0.414087*	0.491754*
Cards issued abroad	0.026821*			
Domestic cards		0.092380*		
Debit Cards			0.246289*	
All Cards				0.235175*
\bar{R}^2	0.607905	0.852786	0.810890	0.704079
BIC	-4.073952	-4.370034	-5.150524	-3.671828

Source: IOBE

In Model 1, we observe that the elasticity of taxation with respect to the value of the transactions with cards issued abroad is relatively small (0.03), but statistically significant. An increase in the value of transactions with cards issued abroad by 1% results in 0.03%

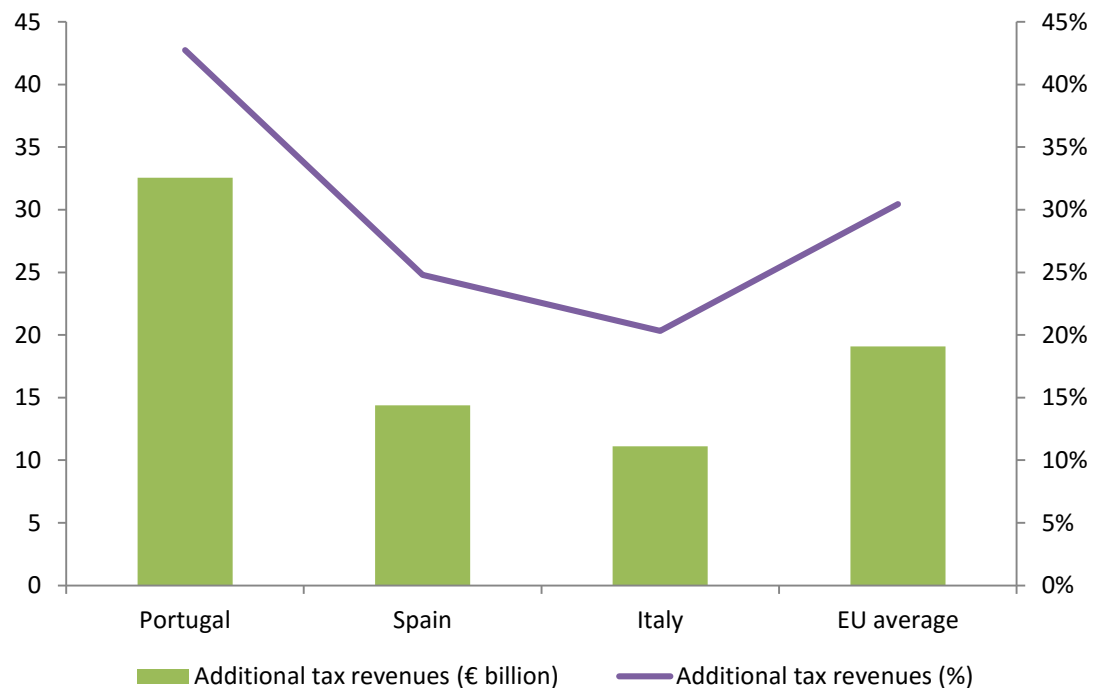
⁴¹ Of course these figures are not absolute and must be interpreted accordingly. When the elasticity of tax revenue is less than one in absolute value, it means that the percentage change in tax revenue is less than the percentage change in the determinant that is under consideration. When the elasticity is positive it means that tax revenues are moving in the same direction as the change in the determinant factor of interest. In other words, if the determinant increases, so do the tax revenues and vice versa.

increase in state revenues. Model 2 presents the elasticity of taxation with respect to the value of transactions with payment cards issued domestically. The corresponding elasticity is significantly higher (0.09).

Model 3 presents the elasticity of taxation with respect to changes in GDP and the value of transactions with debit cards. The change in tax revenues from an increase of debit card transactions is depicted in the elasticity of tax revenues with respect to the use of debit cards. This elasticity amounts to 0.25. This model has the best explanatory power compared to the others when evaluated with the Schwartz criterion, which is widely used for the selection of alternative econometric models.

In Model 4, we examine the combined effect of all types of payment cards together and GDP. The elasticity of tax revenues with respect to the value of all transactions with cards is 0.24. This means that for a 1% increase in the use of payment cards, we will end up with a 0.24% increase in the tax revenues.

Figure 5.3: Additional tax revenues in Greece on the basis of turnover to GDP of other countries



Source: ECB. Data processing: IOBE

To illustrate the value of the elasticity, we present a hypothetical example for the height of the additional tax revenues in Greece, in the case in which the penetration of payment cards was equivalent to that of other EU countries (Figure 5.3). If the value of transactions with payment cards in Greece (3.2% of GDP) corresponded to the level observed on average in the EU (14.8% of GDP), the tax revenues based on the estimated elasticity would have been higher by about 30% (€19 billion). Based on data for the transactions value of other southern European countries, the tax revenues in Greece would be higher by 20% and 25% respectively, in the case of a card penetration similar to that in Italy (8.3% of GDP) and Spain (10.6 % of GDP). Even higher though (43%) would be the tax revenues in case the

penetration level of payment cards was similar to that observed in Portugal (34% of GDP). Of course, it should be noted that the analysis based on elasticity has a limited power when it comes to very large changes in the explanatory variables, as in this hypothetical example.

In our analysis, we also performed additional estimations of a large number of alternative econometric models, using various functional forms and different groups of explanatory variables. Despite the increased complexity, the explanatory power of the model did not seem to improve remarkably.

5.4 Conclusions

In recent years, there has been a considerable development of the payment systems, and the electronic payments in particular, worldwide. In the market for retail payments, debit and credit cards have gradually increased and, up to a certain degree that varies across countries, have replaced cash payments.

The measurement of the impact of the electronic transactions on economic growth and welfare has been the subject of extensive debate and investigation. According to the literature, the penetration of electronic payment instruments contributes both to the reduction of the informal economy and the expansion of economic activity in general. From the findings of our empirical investigation, we observed that the increased use of electronic payment instruments for conducting transactions could be an important and effective tool to combat tax evasion in Greece.

The studies converge to the conclusion that the benefits from the expanded use of electronic transactions, in terms of reduced transaction costs, restricted informal economy, increased tax revenues, stronger growth and better social welfare, can be substantial.

5.5 Appendix: Results of the econometric estimations

Table 5.2: Econometric results, cards issued abroad

Dependent Variable: LTAX
Method: Least Squares
Date: 04/19/15
Sample (adjusted): 2004 2013
Included observations: 10 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	0.541824	0.000887	610.5564	0.0000
LFOREIGNCARDS	0.026821	0.002844	9.430266	0.0000
R-squared	0.651471	Mean dependent var		1.359800
Adjusted R-squared	0.607905	S.D. dependent var		0.044758
S.E. of regression	0.028027	Akaike info criterion		-4.134469
Sum squared resid	0.006284	Schwarz criterion		-4.073952
Log likelihood	22.67235	Hannan-Quinn criter.		-4.200856
Durbin-Watson stat	1.798824			

Source: IOBE

Table 5.3: Econometric results, domestic cards

Dependent Variable: LTAX
Method: Least Squares
Date: 04/18/15
Sample (adjusted): 2000 2013
Included observations: 14 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	0.582021	0.003507	165.9503	0.0000
LDMCARDS	0.092380	0.013082	7.061490	0.0000
R-squared	0.864110	Mean dependent var		1.329118
Adjusted R-squared	0.852786	S.D. dependent var		0.063453
S.E. of regression	0.024346	Akaike info criterion		-4.461328
Sum squared resid	0.007113	Schwarz criterion		-4.370034
Log likelihood	33.22929	Hannan-Quinn criter.		-4.469779
Durbin-Watson stat	1.176399			

Source: IOBE

Table 5.4: Econometric results, debit cards

Dependent Variable: LTAX
 Method: Least Squares
 Date: 04/20/15
 Sample (adjusted): 2005 2012
 Included observations: 8 after adjustments
 HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	0.414087	0.013457	30.77012	0.0000
LDEBITS	0.246289	0.020072	12.27042	0.0000
R-squared	0.837905	Mean dependent var		1.373548
Adjusted R-squared	0.810890	S.D. dependent var		0.037720
S.E. of regression	0.016403	Akaike info criterion		-5.170384
Sum squared resid	0.001614	Schwarz criterion		-5.150524
Log likelihood	22.68154	Hannan-Quinn criter.		-5.304335
Durbin-Watson stat	3.290153			

Source: IOBE

Table 5.5: Econometric results, all cards

Dependent Variable: LTAX
 Method: Least Squares
 Date: 04/20/15
 Sample (adjusted): 2000 2013
 Included observations: 14 after adjustments
 HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	0.491754	0.007383	66.60896	0.0000
LALLCARDS	0.235175	0.028896	8.138752	0.0000
R-squared	0.726842	Mean dependent var		1.329118
Adjusted R-squared	0.704079	S.D. dependent var		0.063453
S.E. of regression	0.034518	Akaike info criterion		-3.763122
Sum squared resid	0.014298	Schwarz criterion		-3.671828
Log likelihood	28.34185	Hannan-Quinn criter.		-3.771573
Durbin-Watson stat	0.830628			

Source: IOBE

6. POLICY IMPLICATIONS

6.1 Introduction

According to the literature and the empirical research presented in the previous chapter, the use of electronic means of payment (EMP) is positively correlated with the tax revenues of the state, which contributes to the reduction of the size of the shadow economy. In addition, the use of EMP in Greece is exceptionally limited, while the shadow economy and tax evasion have a particularly strong presence, compared with other developed economies. Therefore, the implementation of suitable incentives to boost the use of EMP, taking into account the present obstacles to their further diffusion, offers a possibility to limit the shadow economy and to boost significantly public finances. This chapter of the study contains proposals on policy measures that could be adopted in Greece in order to strengthen the use of EMP and as a result, increase the tax revenues raised by the state.

6.2 Targeting of the policy measures

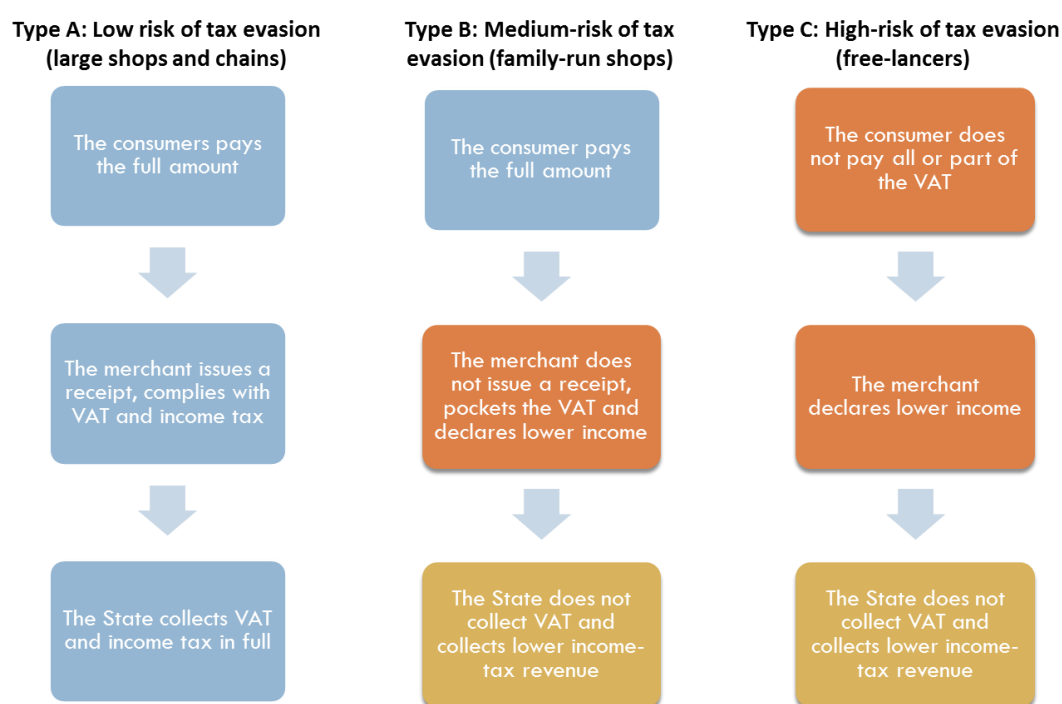
As presented in Chapter 4 of the study, a multitude of measures and incentives has been adopted internationally to boost the use of EMP. Both economic theory and the international experience show that the effectiveness of the measures differs significantly depending on their implementation scope. Meanwhile, the incentives come at a cost in terms of public expenditure. Therefore, the measures should be appropriately targeted in order to be efficient.

The adoption of measures with a universal scope is justified by the need to overcome the network effects, characteristic of payment instruments, where the value of a service is limited by the fact that the number of users is relatively small. The relatively limited acceptance of digital payments by the enterprises reduces the usefulness of the EMP to the consumers. Meanwhile, their limited use by the consumers limits the benefits to the enterprises from accepting digital payments, as the fixed cost of installation and maintenance of the infrastructure that supports these payments is spread over a small number of transactions. In addition, the low EMP diffusion consolidates over time through consumer habits, formed at a social level through imitation and the exchange of information, largely determining our consumer behaviour, especially with regard to repetitive actions, such as the payment for goods and services. The consumer habits do not change easily with the emergence of a new technology.

Hence, the adoption of incentives, even for transactions where the risk that a receipt is not issued and the tax is evaded (with a cash payment) is low, could have a net positive impact on curbing the size of the shadow economy. The implementation of such incentives could increase the overall use of EMP over the critical mass that is necessary in order to overcome the network effects, making the digital payments a daily habit. The refusal to accept digital payments in transactions with higher tax evasion risk would be harder in the case of a widespread EMP use as the carrying of cash by the consumers for their daily transactions is limited when the diffusion of EMP is high.

Next, the study attempts to quantify the fiscal impact from a set of complementary policy measures for boosting the EMP use. The scope of the proposed incentives and administrative measures (Table 6.1) differs depending on the tax evasion risk grade of each transaction (low, medium, high – Figure 6.1). For transactions with a limited tax evasion risk, the incentives of universal scope include a periodic refund to the consumers when the transaction is performed with an EMP through a POS. Given the universal scope of this incentive and the need to limit its cost, we examine the imposition of a relatively small refund rate (1% discount on the transaction value) and an upper limit on the total refund per household. Additional measures in this risk category include further diffusion of digital payments in the wider public sector, e.g. by installing POS terminals in all public utility services.

Figure 6.1: Transaction categories, depending on the tax evasion risk



Source: IOBE

The general scope measures, however, have a limited strength with regards to creating incentives for the use of EMP in transactions with an intermediate tax evasion risk (category B, based on Figure 6.1). In the transactions where the gain from tax evasion incurs exclusively to the merchants, as is the case for example in tourist enterprises or small stores that do not reduce the final price paid by the consumers when a receipt is not issued, the discount that could incentivise the consumers to insist on paying with EMP should be deeper (e.g. 5%). Further measures that could be adopted in this risk category are the compulsory installation of POS terminals, with the imposition of fines when a digital payment is refused. In order to strengthen the monitoring of this measure, incentives can be provided to the consumers that have justifiably reported a digital payment refusal.

Table 6.1: Policy measures per transaction category

Policy measures	Category A: Low risk of tax evasion	Category B: Intermediate risk	Category C: High risk of tax evasion
Incentives	1% refund on the transaction value	5% refund on the transaction value	<ul style="list-style-type: none"> • 10% refund on the transaction value • EMP lottery
Administrative measures	Digital payments in all public services (such as tax office, electricity and water utilities)	Mandatory POS terminal installation	Mandatory EMP use for payments of more than €30

Source: IOBE

On the other hand, as the operation cost of the POS terminals could significantly impact the profitability of very small enterprises, the possibility of providing incentives to this category of enterprises should be examined. These incentives include discounts on the corporate income tax, based on a target for the share of turnover paid through electronic means, a subsidy for the installation of POS terminals with a corresponding reduction of the bank fees and the option to participate in a lottery.

Lastly, even a discount of 5% and tax incentives to the enterprises might not be sufficient to incentivise the use of EMP in transactions where the merchants can reduce the final price of the service paid by the consumers when the transaction is made in cash without the issue of a receipt (e.g. in construction, repair services and health services). In this case, the discount that we examine stands at 10% of the transaction value. In such a way, the revenue per recorded transaction raised from VAT during the implementation of the measure would be quite low, but the expected increase of the recorded transactions of this category would lead to a significant increase of the registered revenue by the professionals offering these services. As a result, the fiscal outcome would strengthen mostly from higher income tax inflows and social security contributions.

However, as the gain to the consumers from tax evasion in these cases could reach the total of the VAT, evading the tax might be the preferred option for the consumer, even with quite a large discount on the transaction value. In these cases, a lottery could be additionally adopted, where the value of the first prize exceeds significantly the benefit that a consumer could gain from not paying VAT.

In this case as well, it is preferable that the lottery covers only digital payments, in order to contribute to the overcoming of the network effects, but also to reduce the administrative cost to the consumers and the state from tasks such as collection of receipts, communication of receipt codes and check of the legitimacy of the codes. Besides, the effectiveness of the measure of a compulsory collection of paper receipts that has been in force in Greece in the past few years has been quite limited. This is mainly due to the objective difficulties for the tax audit authorities to check all paper receipts. Meanwhile, the measure does not preclude the exchange of paper receipts between individuals, but also with accounting offices, in case of an impending audit.

In addition, the technological infrastructure has developed sufficiently to allow for digital payments even in transactions that are performed in the premises of the consumer. Mobile point of sale (mPOS) terminals, which can be used in these cases, are already in operation. Thus, the mandatory use of the POS network, with a ban on the use of cash for transactions with a value above a reasonable threshold (e.g. €30) can be supported technically in this category of transactions.

6.3 Fiscal impact of the proposed measures

Next in this chapter, the proposed measures are presented in more detail, with estimates on their potential fiscal cost and benefit.

6.3.1 REFUND OF 1% IN TRANSACTIONS WITH LOW RISK OF TAX EVASION

We propose part of the tax revenue of each transaction, performed with EMP, for the purchase of goods or services by private individuals in sectors with low risk of tax evasion, to be returned to the consumer. The aim of this measure is to increase the acceptance of EMP, making them a common payment instrument, in order to overcome the network effects. In order to keep the total cost of the measure in check, but also for social justice reasons, an upper limit is proposed on the amount that can be returned per household each year.

The refund can be deposited in the bank account that the taxpayers declare in their tax return form (E1). Alternatively, taking into account the current conditions of limited liquidity, instead of making the refund in cash, the corresponding amount could be considered as income tax advance to be deducted from the income tax that is payable in the following year. The effectiveness of the second option, however, might be reduced for the same refund rate, resulting in a lower increase of EMP transactions and thus lower additional tax revenue.

In the simulations for the impact of this policy measure, we examined the case of a refund of 1% of the value of transactions, with an upper annual refund limit per household equal to €500. We assumed that the measure is adopted for transactions with e-money and payment cards issued in Greece, exempting from the measure credit transfers, cards issued abroad and direct debits. The credit transfers were exempt for technical reasons, as it was not possible to discern in the available data on credit transfers the transactions for the purchase of goods and services by final consumers from the remaining credit transfers. In case that such a separation is possible in the bank and/or tax collection systems, it is worth to examine the adoption of this measure for the case of credit transfers for the purchase of goods and services by final consumers as well.

In addition, we examined three alternative scenarios, based on different assumptions about the elasticity of the EMP use with respect to changes in the reward value and about the share of transactions that would not have been recorded were they paid in cash (Table 6.2). In particular, in the downside scenario, the elasticity is reduced by 50%, while the share of transactions with tax evasion in case of cash payments is set at 20%, which corresponds to about half of the VAT gap estimate of 39% for Greece (Center for Social and Economic Research 2013).

Table 6.2: Assumptions per scenario, refund of 1%

Assumptions	Downside	Base case	Upside
Elasticity of EMP use wrt reward value	0.16	0.32	0.32
Share of transactions with tax evasion	20%	20%	39%

Source: IOBE

Under the assumptions of the analysis,⁴² the transactions performed through POS terminals (payment cards and e-money) in sectors with low risk of tax evasion are expected to increase by €2.4–€7.6 billion (28%-118% growth from 2013), depending on the assumptions about the elasticity of the transaction value with respect to the value of rewards (Table 6.3). Note that the 1% discount on the transaction value is a very large boost, compared with the current incentives offered by the banks in cooperation with participating stores (about 0.13% on average over the total of payment card transactions).

Table 6.3: Expected first-year impact from a 1% refund of the transaction value

Impact	Downside	Base case	Upside
Increase in transaction value (%)	27,9%	118,1%	118,1%
New transactions (€ billion)	2,4	7,6	7,6
Fiscal cost (€ million)	70	114	114
VAT revenue from new transactions (€ million)	449	1420	1420
Income tax revenue (€ million)	49	155	155
Social security contributions (€ million)	89	281	281
Fiscal revenue (€ million)	586	1856	1856
Fiscal revenue increase (€ million)	117	362	724
Net fiscal impact (€ million)	47	248	610
Minimum growth for breakeven (%)	24,2%	25,0%	11,2%

Source: IOBE

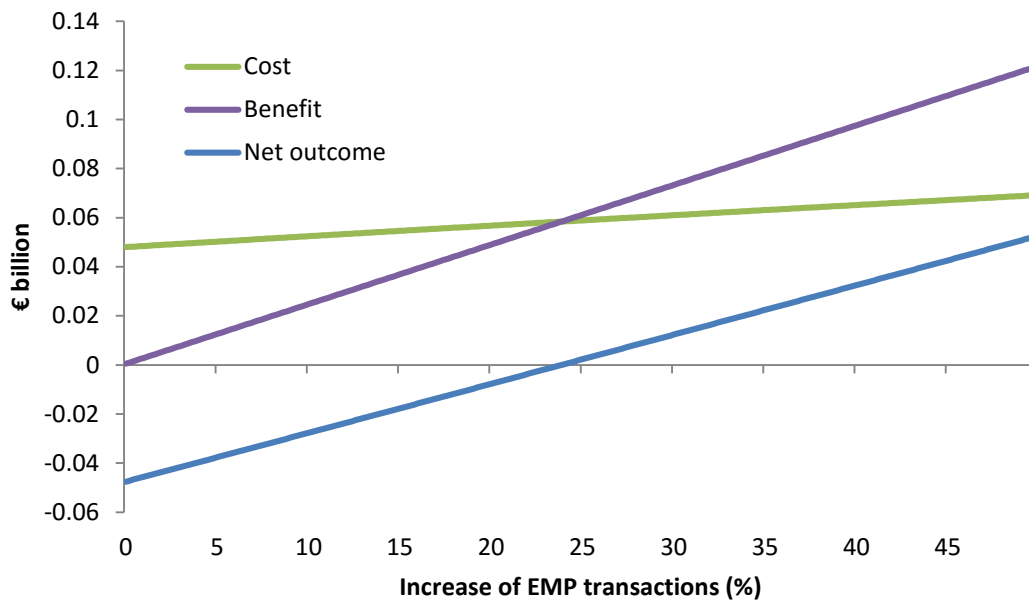
Note: Credit transfers and direct debit are not included

Note also that the increase envisaged in the base-case and upside scenarios is similar to the growth observed during the bank holiday this summer. Therefore, this measure essentially preserves the momentum gained by the use of EMP due to the imposition of the capital controls. Recall the observation of the analysis on the impact of the capital controls from Chapter 2 about the very large gap that still remains between Greece and the European Union average, even with doubling or tripling of the transactions executed with electronic means of payment (Figure 2.62 in Chapter 2).

The fiscal cost of the measure is estimated at the range of €70 to €114 million, depending on the achieved growth of transaction value. On the other hand, however, the VAT revenue from new transactions is estimated at about €0.4–€1.4 billion. Moreover, the income tax revenue that corresponds to the new transactions is estimated to range from €49 to €155 million.

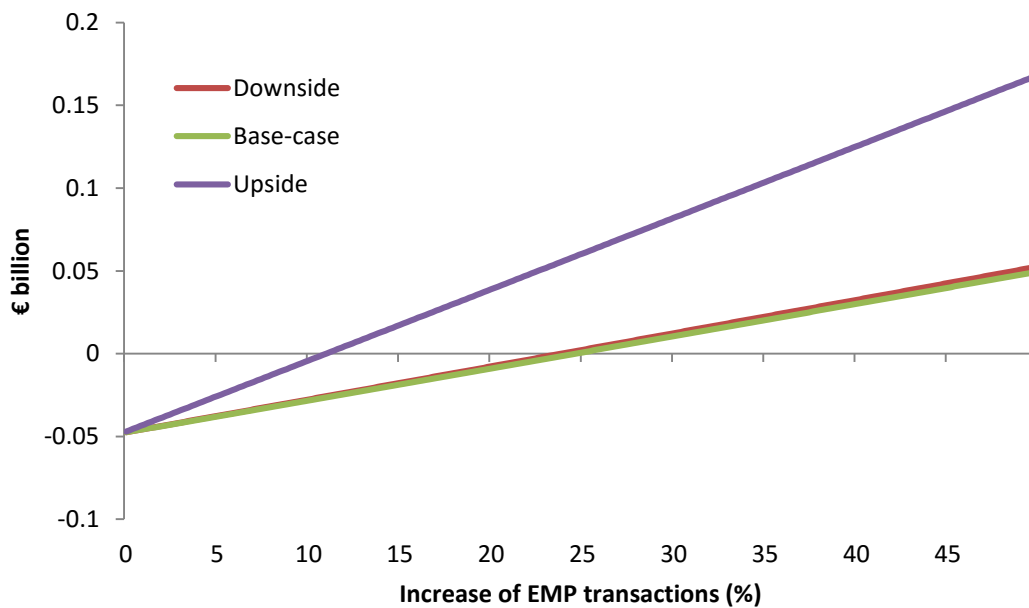
⁴²The methodological approach and the assumptions are presented in detail in the Appendix.

Figure 6.2: Fiscal cost and benefit, depending on the % growth of EMP use in the downside scenario



Source: IOBE

Figure 6.3: Net fiscal impact and EMP growth per scenario



Source: IOBE

Correspondingly, the increased transparency in the economy helps to curb the evasion of social security contributions. The contributions that correspond to the new transactions are estimated to range from €89 to €281 million. As a result, the total fiscal revenue that corresponds to the new transactions with payment cards and e-money are estimated at around €0.6-€1.9 billion.

However, as the new EMP transactions come in place of cash transactions, the increase of the fiscal revenue from the measure is not expected to be equal with the total fiscal revenue that corresponds to the new transactions, as some of the tax revenue would be collected even if the transactions were paid with cash. Here we assume that the loss of fiscal revenue in the counterfactual case where the corresponding transactions would be paid in cash is 20% in the downside and base-case scenarios and 39% in the optimistic scenario.

Under these assumptions, the growth of fiscal revenues due to the substitution from cash to payment cards or e-money is estimated at about €117-€724 million. Subtracting the fiscal cost of the measure, the net fiscal outcome is estimated at €47 million in the downside scenario and up to €610 million in the upside scenario. In the base-case scenario, the net fiscal impact is estimated at €248 million.

Evidently, the net fiscal impact grows with the rate of diffusion of EMP (Figure 6.2). This is due to the fact that the fiscal benefit grows faster than the fiscal cost as the value of EMP transactions increases.

Note that the anticipated growth in EMP transaction value should surpass a particular rate in order to ensure that the net fiscal impact is positive. This comes from the fact that the refund covers also EMP transactions that correspond to the current levels of EMP diffusion. The discount that the consumers enjoy on transactions that would have taken place with EMP even without the incentive does not offer any fiscal benefit.

Therefore, the success of the measure depends on achieving a satisfactory EMP growth. Under the assumptions of the analysis, the minimum growth rate from 2013 levels of the value of transactions through POS terminals, so that the measure is fiscally neutral (the break-even growth rate) is estimated at 24%-25% in the downside and base-case scenario and 11% in the upside scenario (Figure 6.3).

6.3.2 DIGITAL PAYMENTS IN PUBLIC UTILITIES

Providing the option to pay with EMP in the public utilities in Greece is an additional measure to boost the diffusion of digital payments in the country. Despite the fact that the companies offering these services are not suspected of tax evasion (in some of them the Hellenic Republic is a major shareholder), providing the option to pay with EMP in all offices and channels of these companies would contribute to the integration of the digital payments in the daily habits of the consumers, with knock-on effects on tax revenues from transactions in other sectors.

Under the assumptions of the analysis, the measure will have a positive fiscal impact even with a very small increase of the EMP use in the rest of the economy, as the cost of installing POS terminals in the offices of the public utilities is quite limited, compared with the benefit from the additional transactions with EMP in the rest of the economy. In particular, assuming that on average two additional POS terminals would be needed per office and that the procurement cost per POS terminal equals €100, the total cost of the measure is

estimated at about €324,000 (Table 6.4).⁴³ On the other hand, an increase by as little as 0.1% in EMP transactions through POS in the remaining economy would bring about €550,000 tax revenues, leaving about €225,000 in terms of a net fiscal benefit for the state coffers.

In case that the measure leads to a stronger increase of EMP use in the rest of the economy, the fiscal benefits increase while the fiscal costs remain unchanged. As a result, the net fiscal outcome stands at €2.4 million in case of EMP growth of 0.5% and at €5.2 million in case of 1% growth. Fiscal neutrality is achieved with an increase of EMP in the remaining economy by at least 0,06%.

Table 6.4: Expected impact from the option to pay with EMP in public utilities

Impact	Downside	Base case	Upside
Increase in transaction value (%)	0.1%	0.5%	1.0%
New transactions (€ billion)	5.8	28.8	57.6
Fiscal cost (€ million)	324	324	324
VAT revenue from new transactions (€ million)	1.1	5.4	10.8
Income tax revenue (€ million)	0.1	0.6	1.2
Social security contributions (€ million)	0.2	1.1	2.1
Fiscal revenue (€ million)	1.4	7.0	14.1
Fiscal revenue increase (€ million)	0.5	2.7	5.5
Net fiscal impact (€ million)	0.2	2.4	5.2

Source: IOBE

Note: Credit transfers and direct debit are not included

6.3.3 HIGHER DISCOUNT IN TRANSACTIONS WITH INTERMEDIATE RISK OF TAX EVASION

The risk and type of tax evasion differ significantly, depending on factors such as the type of transaction, economic activity sector (trade, services, food services) and company size. Meanwhile, the adoption of a higher discount on the transaction value increases significantly the required minimum growth of EMP so that the measure remains fiscally efficient. Therefore, the provision of a refund at a higher discount rate is reasonable only in transactions where tax evasion is more common (e.g. small stores, catering, taxis and other services).

The adoption of a 5% refund in the transactions with an intermediate risk of tax evasion is estimated to result in a doubling of the value of transactions with EMP in these sectors in the downside scenario and an increase by 428% in the base-case and upside scenarios. The large percentage growth can be explained with the fact that the current EMP diffusion in these sectors is rather limited.

The fiscal cost of the measure is estimated to vary between €45 and €114 million, depending on the achieved growth of EMP use in transactions with intermediate risk of tax evasion (Table 6.5). Correspondingly, the expected net benefit ranges between -€1 million and €182

⁴³ Under the assumption that the procurement of terminals is subsidised by the state. Note that there is a possibility to finance this measure with EU structural funds that might otherwise remain unused.

million. The minimum growth rate of EMP use in this category of transactions is estimated at 105% in the downside and base-case scenarios and at 53% in the upside scenario.

Table 6.5: Expected impact from a 5% refund in transactions with intermediate risk of tax evasion

Impact	Downside	Base case	Upside
Increase in transaction value (%)	99,2%	428,4%	428,4%
New transactions (€ billion)	0,5	2,0	2,0
Fiscal cost (€ million)	45	114	114
VAT revenue from new transactions (€ million)	88	379	379
Income tax revenue (€ million)	10	41	41
Social security contributions (€ million)	17	75	75
Fiscal revenue (€ million)	115	495	495
Fiscal revenue increase (€ million)	45	193	297
Net fiscal impact (€ million)	-1	79	182
Minimum growth for break-even (%)	105%	105%	53%

Source: IOBE

Note: Includes transactions with EMP through POS in sectors with intermediate risk of tax evasion

6.3.4 MANDATORY INSTALLATION OF POS TERMINALS IN SECTORS WITH HEIGHTENED TAX EVASION RISK AND INCENTIVES TO ENTERPRISES

The previously described refunds offer incentives to the consumers to perform transactions with EMP. However, the demand of the consumers for digital payments might not be strong enough to push the enterprises to provide the consumers with the ability to pay with EMP.

For this reason, we suggest the imposition of a mandatory POS availability, especially in enterprises in sectors with intermediate or high tax evasion risk (Table 6.18 in the Appendix). The measure could be strengthened with the imposition of fines in case of refusal of digital payments by the enterprises and the use of the proceeds, at least in part, to provide incentives to the consumers that have reported the offence.

On the other hand, the cost per EMP transaction for the very small enterprises is an additional reason for the difficulty of making digital payments in these enterprises. A significant part of the cost to install and maintain a POS terminal is fixed and does not vary with the number or the value of the transactions. As a result, the cost per transaction is very small for large companies where a large volume of transactions goes through the POS system. For these enterprises, the administrative cost of handling cash is often higher than the fee that they pay for EMP to the banks and companies that provide the POS terminals. In contrast, in companies with very small turnover, the POS cost per transaction could be much higher, which makes the use of EMP much less attractive for these enterprises.

We suggest that a subsidy should be provided for the installation of POS in these enterprises, perhaps using EU structural funds, with a corresponding reduction of the charge for the POS use, in order to reduce the EMP cost for these enterprises. The study quantifies the impact of this measure in cases where the company size limit, in turnover terms, is set at €150,000 per year.

Under the assumptions of the analysis (Table 6.15), the fiscal cost of the measure equals about €48 million (Table 6.6). Correspondingly, the fiscal benefit varies between €34 and €345 million, for a diffusion of EMP in this category of transactions from 1% to 10%. As a result, the net benefit ranges from -€14 million to €297 million for these particular EMP diffusion rates. The minimum EMP diffusion rate for fiscal break-even equals 1.35%.

Table 6.6: Anticipated impact from the mandatory installation of POS with subsidy

Impact	Downside	Base case	Upside
EMP diffusion rate (%)	1%	5%	10%
New transactions (€ billion)	362	1809	3619
Fiscal cost (€ million)	48	48	48
VAT revenue from new transactions (€ million)	68	338	677
Income tax revenue (€ million)	7	37	74
Social security contributions (€ million)	13	67	134
Fiscal revenue (€ million)	88	442	884
Fiscal revenue increase (€ million)	34	172	345
Net fiscal impact (€ million)	-14	124	297

Source: IOBE

Note: Includes EMP transactions through POS terminals in enterprises with an annual turnover below €150,000 and activity in sectors with heightened risk of tax evasion

One more incentive for the enterprises here is to provide them with a discount on their income tax obligations, based on targets for the share of turnover that they collect through digital payments. The expected impact of this particular measure is not examined in this study due to lack of suitable data, but the policymakers might want to consider it, as it provides an incentive for the use of EMP to larger enterprises as well.

6.3.5 DISCOUNT OF 10% IN TRANSACTIONS WITH HIGH RISK OF TAX EVASION

The previously examined incentives might not suffice for the recording of transactions and full tax compliance in cases where part or all of the VAT goes to the consumers in the form of an illicit discount. We suggest a refund of 10% of the transaction value, together with a lottery and a ban on the use of cash for transactions with a value higher than €30, in sectors where the frequency of this category of transactions is high (Table 6.18).

As a result of the 10% discount, the value of transactions with EMP through POS terminals in this particular category of enterprises is expected to increase by €0.4-€1.9 billion. The fiscal cost of this measure for these levels of EMP use is estimated at €69-190 million. Correspondingly, the fiscal revenue is expected to increase by €47-€297 million, resulting in a net fiscal outcome in the range of -€22 to €107 million. The minimum increase of the transaction value for a fiscally neutral outcome is estimated at 278% in the downside and base-case scenarios and at 148% in the upside scenario.

We should note, however, that even with the large discount that this measure offers, many consumers might continue to prefer dealing with cash without getting a receipt, as in many such cases the final price that they would pay would remain lower, compared with a digital payment, despite the 10% discount. Therefore, the downside scenario here has higher

probabilities to materialise. For this reason, the adoption of a lottery exclusively for this type of transactions could be examined as a complementary measure.

Table 6.7: Expected impact from a 10% discount in transactions with high risk of tax evasion

Impact	Downside	Base case	Upside
Increase in transaction value (%)	126%	599%	599%
New transactions (€ billion)	0,4	1,9	1,9
Fiscal cost (€ million)	69	190	190
VAT revenue from new transactions (€ million)	75	357	357
Income tax revenue (€ million)	8	39	39
Social security contributions (€ million)	15	71	71
Fiscal revenue (€ million)	98	467	467
Fiscal revenue increase (€ million)	59	280	374
Net fiscal impact (€ million)	-10	90	183
Minimum growth for breakeven (%)	165%	165%	95%

Source: IOBE

Note: Includes transactions with EMP through POS terminals in sectors with high risk of tax evasion

6.3.6 LOTTERY

The efficiency, in fiscal terms, of lotteries with receipts differs from country to country. For this reason, we suggest that a lottery only for transactions in sectors with a high risk of tax evasion, executed with EMP through POS terminals. The inclusion of frequent, everyday transactions, such as purchases in large supermarkets, where the incidence of unregistered transactions and tax evasion is small, would hamper the lottery's fiscal efficiency. The targeting of the lottery to transactions in sectors with widespread tax evasion increases the average probability of winning per transaction, improving the attractiveness of digital payments in this category of transactions.

Furthermore, the substitution of paper receipts with digital data on EMP transactions, executed through POS terminals, has additional benefits. It limits the administrative cost for the consumers that would like to take part in the lottery, freeing them from the obligation to collect receipts, to type and send the receipt code with short messages on their cell phones and other similar actions that discourage a more numerous participation in the lottery. Correspondingly, the cost for the state and/or the company that will organise the lottery would be lower in the case of a lottery for EMP transactions. Lastly, the EMP lottery, apart from the direct impact from recording high-risk transactions, contributes to the goal of overcoming the network effects for EMP use.

Based on the assumptions of the analysis, the net fiscal benefit of a lottery, offering €10 million per year in cash prizes, ranges between €6 million and €153 million, depending on the achieved diffusion of the digital payments in the transactions with high risk of tax evasion (from 1% to 10% in the simulations of the study). For the measure to achieve fiscal neutrality, the penetration of the EMP use in these transactions should equal at least 0.6%.

Table 6.8: Expected impact from the lottery

Impact	Downside	Base case	Upside
EMP diffusion rate (%)	1%	5%	10%
New transactions (€ billion)	171	855	1710
Fiscal cost (€ million)	10	10	10
VAT revenue from new transactions (€ million)	32	160	320
Income tax revenue (€ million)	3	17	35
Social security contributions (€ million)	6	32	63
Fiscal revenue (€ million)	42	209	418
Fiscal revenue increase (€ million)	16	82	163
Net fiscal impact (€ million)	6	72	153

Source: IOBE

Note: Includes transactions with EMP through POS terminals in sectors with high risk of tax evasion

6.3.7 BAN ON THE USE OF CASH

Lastly, even the possibility to win significant cash rewards in a lottery might not be a sufficient incentive to make the professionals in sectors with a strong incidence of tax evasion (such as health and other services - Table 6.18) record all their transactions and pay the corresponding taxes. Particularly for transactions in these sectors, the use of cash for transactions of value above €30 could be banned completely.

According to the current legislation in Greece, transactions with a value above €500 should not be paid in cash. The impact of this measure on tax evasion is rather limited, as most transactions are of lower value. Meanwhile, the monitoring of the compliance with this measure does not seem to be particularly effective.

The drastic reduction of the limit on accepting cash transactions, but only in sectors with very high risk of tax evasion, allows for an easier compliance control. The compliance with the measure could be strengthened further if all tax breaks are lifted for a professional or an enterprise that breaks the rule for the first time and if the licence to operate is withdrawn for recurring offences (three-strikes-out rule).

The provision of incentives to the consumers to report violations could also be examined. This measure would have a positive fiscal outcome as long as the reward to the consumers that report a violation does not exceed the fine paid by the enterprises for the violation. In case that the measure leads to an increase of the digital payments in these particular sectors by 1%-10%, we could expect a net increase of tax revenues by €16-€163 million.

6.4 Conclusions

The adoption of measures to boost the use of EMP could, under certain conditions, result in a significant reduction of tax evasion. The measures include:

- A refund by 1% of the transaction value for digital payments through POS terminals (payment cards and e-money) for the purchase of goods and services by individuals from sectors with low risk of tax evasion

- A refund by 5% of the transaction value for digital payments through POS terminals for the purchase of goods and services by individuals from sectors with intermediate risk of tax evasion
- A refund by 10% of the transaction value for digital payments through POS terminals for the purchase of goods and services by individuals from sectors with high risk of tax evasion
- Lottery for consumers that use digital payments in sectors with high risk of tax evasion
- Placement of POS terminals in all public utility branches
- Mandatory acceptance of digital payments, with a subsidy for the installation of POS terminals in enterprises with an annual turnover of less than €150,000 operating in sectors with intermediate or high risk of tax evasion
- Mandatory use of digital payments for transaction with a value above €30 in sectors with a high risk of tax evasion

We also propose that the likely fiscal and social impact of the following measures is examined in depth:

- Replacement of the mandatory collection of paper receipts with the obligation to make digital payments to the same amount
- Mandatory use of digital payments equal to 10% of the income for households that receive a tax reduction due to low income (a measure that relatively recently replaced the universal tax allowance)
- Reduction of the corporate income tax for companies that achieve EMP diffusion targets in their transactions with final consumers
- Lottery for companies that accept digital payments
- Boost of the catalytic role of the state in the diffusion of EMP
 - Mandatory use of credit transfers in the customs (ICISnet)
 - Universal use of EMP in the tax offices
 - Completion of the electronic invoice system
- Information and education actions, along the lines of the Banks in Action programme of the Hellenic Banking Association, which teaches finance in secondary education classes

The above measures are not alternative solutions to the same problem. Instead, they aim at the resolution of a different aspect of the low diffusion of EMP in Greece. For example, the measure for a general, but relatively small, discount is aimed at overcoming and utilising the network effects, while the ban of cash transactions is targeted at cases of very high risk of tax evasion.

Furthermore, given the presence of network effects, the adoption of each measure would have positive knock-on effects on the efficiency of the other measures. Therefore, the implementation of the measures in combination would result in higher EMP diffusion and thus bigger fiscal benefits.

Based on conservative assumptions about the growth of EMP use, the net fiscal outcome from the adoption of the proposed measures is estimated to approach €700 million (Table 6.9). Respectively, with a higher EMP diffusion due to the measures, the fiscal benefit increases much faster than the fiscal cost, reaching €1.6 billion in the upside scenario.

Table 6.9: Expected net fiscal outcome (€ million) per scenario and policy measure

Policy measure	Break-even*	Downside	Base case	Upside
1% refund	25%	47	248	610
5% refund	105%	-1	79	182
10% refund	165%	-10	90	183
Lottery	1%	6	72	153
POS in public utilities	0,1%	0	2	5
POS in small stores	1%	-14	124	297
Mandatory EMP use	0%	16	82	163
Total	-	46	696	1594

Source: IOBE

Note: *Minimum increase of transactions with EMP through POS for a positive net fiscal outcome in the transaction category targeted by each measure, using the assumptions of the base-case scenario.

In contrast, in case that the measures do not lead to a satisfactory growth of the consumer demand for digital payments, the outcome would likely be of limited benefit. There is also a similar risk in case that the improved availability of information that the heightened use of EMP offers to the tax audit authorities is not sufficiently utilised, leading to a lower than anticipated increase of tax revenues, despite the growth in EMP use. This highlights the importance of the proper communication of the measures to the consumers and the enterprises for the success of the measures, while the mobilisation of the tax audit authorities, based on the possibilities that the increased EMP use offers, would also have a crucial contribution.

We should note here that the above fiscal impact calculations refer to the first year of implementation of the measures. As the objectives of the measures are being met and the use of digital payments consolidates in consumer habits and business processes, the support measures for the use of EMP could gradually be withdrawn. In such a way, the fiscal cost would fall in the future, without reducing the fiscal benefit. Therefore, over the long run, the net fiscal benefit of the measures would be notably higher than the estimates presented here.

6.5 Appendix: Assumptions and methodological approach

6.5.1 REFUND OF 1% IN TRANSACTIONS WITH LOW RISK OF TAX EVASION

The estimation of the impact from 1% refund on EMP transactions through POS in sectors with low risk of tax evasion is based on data for the value of transactions with payment cards from the ECB database for 2014 (€5.8 billion) and for the tax revenues from VAT for

2014 from the web page of the Ministry of Finance (€12.6 billion).⁴⁴ Based on the distribution of turnover per four-digit sector of economic activity (ELSTAT), these sectors are estimated to represent about 86% of the Greek economy. Using this parameter, the value of transactions with payment cards in these sectors is estimated at €5.0 billion, while the revenues from VAT from these sectors is estimated at €10.8 billion.

The VAT rate is set at 23% of the pre-tax price (18.7% of the final price). The fact that certain goods are taxed at lower VAT rates is not taken into account in the calculations. Besides, the range of goods taxed at lower VAT rates was significantly curbed with the amendments in the VAT legislation adopted in July 2015 and is now limited primarily to certain basic commodities, such as pharmaceuticals and staple foods, with a limited share in the value of EMP transactions.

Table 6.10: Parameters for the estimation of the impact from 1% refund in sectors with low risk of tax evasion

Parameter	Value
Refund rate	1.0%
Refund limit per household per year	500 €
Value of transactions with payment cards in 2014 (€ billion)	5.8
VAT revenues in 2014 (€ billion)	12.6
VAT rate (% of final price)	18.7%
Share of sectors with low risk of tax evasion	86.3%
Value of EMP transactions through POS terminals (€ million)	5.0
VAT revenues in sectors with low risk of tax evasion (€ billion)	10.8
Value of rewards over value of transactions	0.13%
Social security contributions (% of turnover)	3.7%
Gross operating surplus (% of turnover)	12.3%
Depreciation expenses in retail trade and services (% of turnover)	5.3%
Corporate income tax rate (% of net earnings)	29.0%

Source: Ministry of Finance, ECB, Alpha Bank, Eurobank, National Bank of Greece, Piraeus Bank, Eurostat, IOBE assumptions

The ratio of the value of the rewards offered by the domestic banking institutions over the total value of transactions with payment cards is estimated to equal 0.13%, based on data provided by the banks. Based on data from Eurostat, the social security contributions are estimated to correspond to about 3.7% of the turnover in trade and services that primarily serve the final consumption of households. Accordingly, on average about 12.3% of the turnover corresponds to gross operating surplus, while the depreciation expenses take up about 5.3% of the turnover. As a result, about 7.0% of the turnover in these enterprises is estimated on average to represent taxable income. Accordingly, the corporate income tax rate is set at 29% of the net operating surplus (Table 6.10).

To estimate the impact of the refund limit per household, the total amount of the refund is allocated along the household income scale (67 categories), using the distribution of taxable

⁴⁴ Ministry of Finance, General Government Time Series, February 2015.

income for 2011, the last year with available data (Ministry of Finance 2011). In each income category, the refund amount is distributed per household, using the Generalised Pareto distribution, with parameter values $k=0.22405$, $\sigma=0.58096$ and $\mu=-0.74871$. The distribution of the refund at the household level (i.e. per tax return statement) allows for the estimation of the impact of setting the upper limit per household.

Table 6.11: Ranking of distributions, based on the results of goodness-of-fit tests

Distribution	Kolmogorov-Smirnov		Anderson-Darling		Chi-Squared	
	Statistic	Rank	Statistic	Rank	Statistic	Rank
General. Pareto	0.00878	1	0.61976	1	10.422	1
Pearson 6 (4P)	0.01714	2	3.0372	2	15.393	2
Burr (4P)	0.01884	3	6.5522	5	N/A	
Gen. Gamma (4P)	0.0202	4	6.1607	4	N/A	
Kumaraswamy	0.02359	5	9.7798	7	N/A	
Fatigue Life (3P)	0.02635	6	6.1042	3	61.569	4
Lognormal (3P)	0.02746	7	9.8176	8	91.008	6
Inv. Gaussian (3P)	0.02874	8	9.225	6	90.037	5
Weibull (3P)	0.03046	9	10.313	9	N/A	
Log-Logistic (3P)	0.03285	10	17.646	14	184.02	12

Source: Alpha Bank, Eurobank, National Bank of Greece, Piraeus Bank. Data processing: IOBE

The Generalised Pareto distribution was selected, as it had the best performance in the goodness-of-fit tests, based on data from the banking institutions on payment card usage per person. The Generalised Pareto distribution belongs to the class of distributions used in cases where there are few high-value and many low-value observations. The use of EMP is a characteristic case for such a distribution, as the number of individuals that make none or few digital payments is considerably larger compared with those that use EMP very frequently.

6.5.2 DIGITAL PAYMENTS IN PUBLIC UTILITIES

The estimation of the number of new POS terminals is based on data on the number of branches owned by the major public utilities (the Public Power Corporation, Hellenic Post, the gas distribution companies and the telecommunications company OTE), without taking into account branches of agents where the customers of the utilities can also pay their bills.

Table 6.12: Parameters for the estimation of the impact of expanding the access to EMP in public utilities

Parameter	Value
Number of new POS terminals	3.240
Number of PPC branches	80
Number of Hellenic Post branches	1.400
Number of gas distribution branches	10
Number of OTE branches	130
POS terminals per branch	2
Procurement cost per POS terminal (€)	100 €

Source: Ministry of Finance, ECB, IOBE assumptions

We also assumed that on average two POS terminals are needed per public utility branch. The cost per POS terminal was set at €100, which is considered achievable in an open tender for the procurement of the terminals.

6.5.3 REFUND OF 5% IN THE TRANSACTIONS WITH INTERMEDIATE RISK OF TAX EVASION

The estimation of the impact from the increased discount in transactions with intermediate risk of tax evasion follows closely the approach described for the 1% discount. The key difference concerns the fact that the calculations are performed on a different subset of the transactions and in particular in the transactions in sectors with intermediate risk of tax evasion (Table 6.18).

The share of recorded transactions with intermediate risk of tax evasion in the value of EMP transactions is estimated at 8.2% (Table 6.13). This percentage corresponds to the share of the sectors with intermediate risk of tax evasion in total turnover in Greece, using data from the Business Registry of ELSTAT at four-digit NACE level for the latest year with available data at this level of detail (2010). We assume that the same share can be applied to the tax revenues collected from these sectors in the form of VAT and corporate income tax.

Table 6.13: Parameters in the estimation of the impact from 5% discount in sectors with intermediate risk of tax evasion

Parameter	Value
Discount rate	5%
Refund limit per household per year	500 €
Share in recorded transactions	8.2%
Value of digital payments through POS terminals (€ million)	473
VAT revenue from sectors with intermediate risk of tax evasion (€ billion)	1.0

Source: Ministry of Finance, ECB, IOBE assumptions

In addition, certain parameters of the estimation differ per scenario (Table 6.14). In the downside scenario, the elasticity of EMP use with respect to changes in the reward value is reduced by 50%. Meanwhile, the share of new transactions where taxes would have been evaded if the payment was made with cash is set at the average for all transactions (39%), despite the fact that these are transactions with intermediate risk of tax evasion. The base-case scenario differs from the downside scenario in that the value of the EMP elasticity is set at the value that comes from the empirical analysis based on data from the banking institutions (0.32). Lastly, the upside scenario differs from the base-case scenario in that the share of transactions with tax evasion in case of cash payment in these sectors is set at 60%.

Table 6.14: Assumptions per scenario for the discount in sectors with intermediate risk of tax evasion

Assumptions	Downside	Base case	Upside
EMP elasticity with respect to the reward value	0.16	0.32	0.32
Share of transactions with tax evasion	39%	39%	60%

Source: IOBE assumptions

6.5.4 SUBSIDY FOR POS TERMINALS IN SMALL ENTERPRISES

According to the data from the Business Registry of ELSTAT for 2010, there are 482,00 enterprises with an annual turnover that does not exceed €150,000 in sectors with heightened risk of tax evasion. We also assumed that: a) one POS terminal is needed per enterprise, b) the cost of procuring the terminals equals €100 per unit and c) the subsidy covers 100% of the cost of the terminals.

Table 6.15: Parameters in the estimation of the POS subsidy cost for small enterprises

Parameter	Value
Number of new terminals (thousands)	482
Subsidy rate	100%

Source: ELSTAT, IOBE assumptions

6.5.5 DISCOUNT OF 10% IN TRANSACTIONS WITH HIGH RISK OF TAX EVASION AND LOTTERY

According to the data from the Business Registry of ELSTAT for 2010, about 5.5% of the turnover in the economy comes from enterprises active in sectors characterised in this study as having a high risk of tax evasion (Table 6.18). Both the tax revenues and the value of EMP transactions are allocated, using this share.

Table 6.16: Parameters in the estimation of the impact from a discount in sectors with high risk of tax evasion

Parameter	Value
Discount rate	10%
Refund limit per household per year	500 €
Share in recorded transactions	5,5%
Value of payments through POS (€ million)	319
VAT revenue in sector with high risk of tax evasion (€ million)	696

Source: Ministry of Finance, ECB, IOBE assumptions

Regarding the assumptions per scenario, the elasticity of EMP use with respect to change in the reward value does not differ from the measure of 5% discount in transactions with an intermediate risk of tax evasion (0.16 in the downside scenario and 0.32 in the base-case and upside scenario).

The difference lies in the assumptions regarding the share of transactions with tax evasion in case of cash payments. Here, in the transactions with a high risk of tax evasion, we assume that this share equals 60% in the downside and base-case and 80% in the upside scenarios.

Table 6.17: Assumptions per scenario for 10% discount in sectors with high risk of tax evasion

Assumptions	Downside	Base case	Upside
EMP elasticity with respect to the reward value	0.16	0.32	0.32
Share of transactions with tax evasion	60%	60%	80%

Source: IOBE

Table 6.18: Sectors of economic activity with heightened tax evasion risk

NACE Rev. 2	Sector description	No. of Enterprises 2010	Turnover 2010	Tax evasion risk
4110	Development of building projects	394	81,247,772.35	High
4120	Construction of residential and non-residential buildings	32,702	5,121,423,347.93	High
4299	Construction of other civil engineering projects n.e.c.	5,279	1,732,187,741.59	High
4321	Electrical installation	11,080	709,645,913.84	High
4322	Plumbing, heat and air-conditioning installation	11,716	555,637,709.52	High
4329	Other construction installation	1,973	295,051,109.93	High
4331	Plastering	2,908	37,861,725.42	High
4332	Joinery installation	7,009	311,620,269.99	High
4333	Floor and wall covering	6,995	101,540,646.87	High
4334	Painting and glazing	6,888	146,057,094.02	High
4339	Other building completion and finishing	753	43,000,552.33	High
4391	Roofing activities	697	20,461,628.54	High
4399	Other specialised construction activities n.e.c.	13,225	845,216,529.99	High
4520	Maintenance and repair of motor vehicles	15,798	1,179,249,383.27	High
4532	Retail trade of motor vehicle parts and accessories	3,353	455,008,870.40	Intermediate
4721	Retail sale of fruit and vegetables in specialised stores	3,688	444,762,781.00	Intermediate
4722	Retail sale of meat and meat products in specialised stores	7,078	1,467,362,249.82	Intermediate
4723	Retail sale of fish, crustaceans and molluscs in specialised stores	2,180	283,312,792.81	Intermediate
4724	Retail sale of bread, cakes, flour confectionery and sugar confectionery in specialised stores	7,613	881,549,921.00	Intermediate
4729	Other retail sale of food in specialised stores	3,215	501,698,063.46	Intermediate
4730	Retail sale of automotive fuel in specialised stores	5,707	8,304,760,243.99	Intermediate
4741	Retail sale of computers, peripheral units and software in specialised stores	1,267	744,291,695.70	Intermediate
4742	Retail sale of telecommunications equipment in specialised stores	1,112	932,059,245.90	Intermediate
4752	Retail sale of hardware, paints and glass in specialised stores	10,024	1,777,677,378.60	High
4776	Retail sale of flowers, plants, seeds, fertilisers, pet animals and pet food in specialised stores	5,018	498,310,533.33	Intermediate
4779	Retail sale of second-hand goods in stores	358	14,208,161.31	High

NACE Rev. 2	Sector description	No. of Enterprises 2010	Turnover 2010	Tax evasion risk
4781	Retail sale via stalls and markets of food, beverages and tobacco products	3,927	196,356,546.74	Intermediate
4782	Retail sale via stalls and markets of textiles, clothing and footwear	2,241	21,262,255.88	Intermediate
4789	Retail sale via stalls and markets of other goods	3,450	67,955,088.87	Intermediate
4932	Taxi operation	30,682	439,945,726.91	Intermediate
4942	Removal services	126	18,488,140.10	High
5510	Hotels and similar accommodation	7,912	3,365,311,027.12	Intermediate
5520	Holiday and other short-stay accommodation	18,946	385,768,498.96	Intermediate
5530	Camping grounds, recreational vehicle parks and trailer parks	310	60,503,867.28	Intermediate
5590	Other accommodation	667	20,317,846.61	Intermediate
5610	Restaurants and mobile food service activities	41,546	4,613,445,366.81	Intermediate
6910	Legal activities	41,307	623,266,693.11	High
7111	Architectural activities	18,751	644,652,012.74	High
7112	Engineering activities and related technical consultancy	48,330	2,718,914,717.77	High
7420	Photographic activities	3,494	123,587,365.13	Intermediate
7500	Veterinary activities	1,243	67,953,711.55	Intermediate
8219	Photocopying, document preparation and other specialised office support activities	2,240	94,414,701.19	Intermediate
8553	Driving school activities	2,239	59,029,950.10	High
8559	Other education n.e.c.	2,717	195,811,021.09	Intermediate
8560	Educational support activities	29	1,283,108.47	Intermediate
8621	General medical practice activities	219	19,776,669.73	Intermediate
8622	Specialist medical practice activities	847	75,787,840.51	Intermediate
8623	Dental practice activities	143	6,444,378.12	Intermediate
8690	Other human health activities	2,378	115,869,842.16	Intermediate
9511	Repair of computers and peripheral equipment	708	67,619,389.78	High
9512	Repair of communication equipment	69	7,904,309.15	Intermediate
9521	Repair of consumer electronics	1,113	47,659,078.13	Intermediate
9522	Repair of household appliances and home and garden equipment	1,899	78,325,037.75	Intermediate
9523	Repair of footwear and leather goods	907	16,747,484.72	Intermediate

NACE Rev. 2	Sector description	No. of Enterprises 2010	Turnover 2010	Tax evasion risk
9524	Repair of furniture and home furnishings	65	1,148,432.89	Intermediate
9525	Repair of watches, clocks and jewellery	159	31,325,176.44	Intermediate
9529	Repair of other personal and household goods	2,899	46,287,661.88	Intermediate
9601	Washing and (dry-)cleaning of textile and fur products	3,332	145,959,073.88	Intermediate
9602	Hairdressing and other beauty treatment	17,159	448,727,502.38	Intermediate
9604	Physical well-being activities	1,083	89,104,670.67	Intermediate
9609	Other personal service activities n.e.c.	1,381	38,391,952.16	Intermediate
Total for the intermediate risk of tax evasion category		193,288	25,336,491,641	
Total for the high risk of tax evasion category		239,260	17,104,057,869	
Total		967,517	308,845,485,753	

Source: ELSTAT, IOBE assumptions

7. CONCLUSIONS

The shadow economy is more prevalent in Greece, compared with the EU average, as its size in the country is estimated at 24% of GDP, compared with 19% of GDP in the EU (Schneider, 2013). This implies that the collection of tax revenues is comparatively low. Therefore, despite the major fiscal consolidation in the past few years, curbing tax evasion remains a top policy priority in Greece. Besides, the extent of tax evasion in the country results in an inequitable allocation of the tax burden.

In this regard, the diffusion of the electronic means of payment (EMP) is a major instrument for limiting the shadow economy. A wider use of these payments improves the transparency in the economy, as the use of an electronic payment instrument in a transaction implies that the transaction is recorded in the information systems of the banks, limiting the possibility to hide taxable income. Meanwhile, the large-scale diffusion of EMP contributes to the reduction of the cost of intermediation services, promotes the creation of new services, improves the efficiency of the trade transaction system, intensifies the competition in the markets for products and services and ultimately leads to higher consumption and economic activity. It is estimated that about 0.2 percentage points of the rate of growth of the global real GDP each year can be attributed to the widespread use of payment cards (Zandi και Singh, 2010, 2013).

The potential to boost tax revenues and economic growth in Greece through growth in EMP use is significant, given the lag in EMP use in Greece compared with other EU countries. In particular, the value of EMP transactions (excluding credit transfers) stood at only 6.6% of GDP in Greece, compared with 198.4% of GDP overall in the Euro area, while the number of transactions per inhabitant reached only 8.6 in the country, compared with 141 in the Euro area.

In the various rankings of the EU member-states based on EMP use, Greece occupies the bottom positions. Indicatively, based on the value of transactions with EMP per inhabitant in 2013, Greece ranked higher only compared to Croatia and Bulgaria, while in terms of the number of transactions per inhabitant Greece occupied the last position in the ranking.

The high share of credit cards and cheques in the number of transactions through the banking system is another significant difference between Greece and the rest of the Euro area. In contrast, debit cards and direct debits have a stronger presence in the Euro area.

With the imposition of the bank holiday for three weeks during the summer and the capital controls that are gradually being relaxed, the use of EMP recorded remarkable growth rates. Indicatively, the value of transactions with payment cards was higher by 76% in September, compared with June, while the number of transactions with payment cards during the same period increased by 94%. However, even with the sharp increase that was observed under the extraordinary circumstances during the summer of 2015, the position of Greece in the rankings did not improve much, due to the large gap from most other EU countries. There is, therefore, a significant potential for a further increase of the EMP use in the country, especially for debit cards and e-money, which have grown significantly over the past 2-3 years, albeit from a very low starting point.

It is imperative to examine the reasons why the performance in this area lags behind, in order to boost the use of EMP. The existing infrastructure does not seem to be a major obstacle, but the fragmented structure of retail trade and the use of several terminals per cashier till that is still observed in stores in Greece, implies that there are still quite a few retail points of sale that do not support the use of EMP. The key reasons for the low use of EMP also include heightened concerns of the consumers over the safety of online payments and the abuse of private information, the low speed in executing transactions through POS terminals, the low rate of new technology and internet diffusion, the limited role of the state as a catalyst for digital payments and the high poverty rate in the country due to the economic crisis.

While the above factors contribute to the limited EMP use, none of them seems strong enough to fully and convincingly explain on its own the observed lag. Nevertheless, the combined effect of these obstacles prevents the accumulation of a sufficient mass of transactions that could unleash the positive impact of the network effects, characteristic for goods such as EMP. When the EMP use is limited and when paying with EMP is not a daily habit of the consumers, the utility of the digital payments is low both for the consumers and the smaller enterprises. In addition, when the EMP diffusion is limited, the fixed costs of installing, maintaining and operating the relevant infrastructure is spread over fewer number of transactions, increasing thus the cost of EMP use per transaction.

Recognising the significance of EMP for curbing the shadow economy and the need for intervention due to network effects, particularly in the early stages of EMP penetration, a number of countries have adopted incentives and administrative measures to strengthen the use of EMP. The incentives include partial refunds when a transaction is carried out with EMP, income tax discounts when households, as well as enterprises, achieve targets for EMP use in their transactions, and lotteries for EMP transactions. The incentives are often accompanied by administrative measures, such as an obligation to accept EMP and a prohibition of cash use for higher value transactions.

Implementing a series of such measures in South Korea led to an increase in the share of card transactions in private consumption to over 65% in 2010, from 14.7% in 1999. In the same period, the total receipts deriving from income tax in the country were growing by 13.6% annually, significantly surpassing the pace of GDP growth (6.5% on average from 2000 to 2009).

The positive impact of the EMP diffusion on tax revenues is also revealed by an empirical analysis with data on the Greek economy. In particular, using annual time series for the value of transactions with payment cards, tax revenues and GDP for the last 15 years, we estimated that the tax revenues increase by 0.24 percentage points for every percentage point growth of the use of payment cards.

Taking into consideration the international experience, the study concludes with the following policy suggestions:

- A refund by 1% of the transaction value for digital payments through POS terminals (payment cards and e-money) for the purchase of goods and services by individuals from sectors with low risk of tax evasion

- A refund by 5% of the transaction value for digital payments through POS terminals for the purchase of goods and services by individuals from sectors with intermediate risk of tax evasion
- A refund by 10% of the transaction value for digital payments through POS terminals for the purchase of goods and services by individuals from sectors with high risk of tax evasion
- Lottery for consumers that use digital payments in sectors with high risk of tax evasion
- Placement of POS terminals in all public utility branches
- Mandatory acceptance of digital payments, with a subsidy for the installation of POS terminals in enterprises with an annual turnover of less than €150,000 operating in sectors with intermediate or high risk of tax evasion
- Mandatory use of digital payments for transaction with a value above €30 in sectors with a high risk of tax evasion

We also propose that the likely fiscal and social impact of the following measures should be examined in depth:

- Replacement of the mandatory collection of paper receipts with the obligation to make digital payments to the same amount
- Mandatory use of digital payments equal to 10% of the income for households that receive a tax reduction due to low income (a measure that relatively recently replaced the universal tax allowance)
- Reduction of the corporate income tax for companies that achieve EMP diffusion targets in their transactions with final consumers
- Participation in the lottery of companies that accept digital payments
- Boost of the catalytic role of the state in the diffusion of EMP
 - Mandatory use of credit transfers in the customs (ICISnet)
 - Universal use of EMP in the tax offices
 - Completion of the electronic invoice system
- Information and education actions, along the lines of the Banks in Action programme of the Hellenic Banking Association, which teaches finance in secondary education classes

It is estimated that the adoption of the examined measures will have a significant positive impact on tax revenues, provided that feasible targets for EMP transaction growth are met. The net fiscal benefit in the base-case scenario of the simulations is estimated to approach €700 million in the first year of implementation. Subsequently, as the EMP diffusion targets are met and the use of digital payments consolidates as part of the consumer habits, the incentives can be gradually withdrawn, resulting in a reduction of their gross fiscal cost and a corresponding increase in their net fiscal benefit.

The additional tax revenues grow much faster with the growth of EMP use, compared to the fiscal cost of the measures. On the other hand, an ineffective implementation of the measures that leads to a small increase of the value of EMP transactions might result in a negative outcome for the state. This result highlights the importance of an appropriate

design and communication of the measures to the consumers and the enterprises, and stresses the need for mobilisation of the tax audit authorities in the utilisation of the increased transparency provided by the wider EMP diffusion. Lastly, to restore the trust of the Greek public in the domestic banking system is also necessary, in order to achieve the targets for tax revenue growth by boosting EMP use.

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