

Cash, Check or Debit Card?

The Effects of Transaction Characteristics on the Use of Payment Instruments*

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Abstract

This paper aims at estimating the respective contribution of the three main determinants of the choice of the payment instruments at point of sale, namely the characteristics of individuals, the characteristics of payment instruments and the characteristics of transactions. Exploiting a unique and original data set on transactions realized by a representative sample of 1,447 french individuals, we use a nested logit model to explain the choice between cash, check and debit card. Estimation results show that *i.* the characteristics of transactions play a major role in the choice between cash and alternative payment instruments compared to the characteristics of payment instruments and to the characteristics of individuals; *ii.* the addition of individual characteristics in the regression does not have a significant incidence on the quality of the estimations; *iii.* the characteristics of transactions strongly influence the effects of the characteristics of the payment instruments and, hence, the choices of the payment instruments.

Key Words: Payment instruments.

JEL Classification: E4.

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1 Introduction

Following Baumol (1952), several theoretical works have tried to formalize the way people pay¹ and in the past few years a growing empirical literature is developed on this topic. Overall, empirical results based on micro-level data² show that the choice of payment instruments is mainly affected by three types of characteristics: the characteristics of individuals (*e.g.* age, education, etc.), the characteristics of payment instruments (*e.g.* rewards, etc.) and the characteristics of transactions (*e.g.* transaction size, place of purchase, etc.).

Two main methods are usually used to exhibit the impact of these characteristics. The first relies on *survey data*. Carow and Staten (1999), Stavins (2001), Kiser and *al.* (2008 a,b), among others, showed for instance that wealth, personal preferences and price sensitivity significantly influence the use of payment instruments. Likewise, Hayashi and Klee (2003) put forward the role of the transaction size and the physical characteristics of the points of sale (*e.g.* the absence of a cashier or the availability of self-service). However, despite the quality of the findings, survey data are not really suited for studying the influence of the characteristics of transactions since it is only possible to get estimated, partial and limited data. Now, integrating partial information on the characteristics of transactions in estimations may lead to overestimate the coefficients of the characteristics of transactions. One solution to overcome this limitation is to use an alternative method based directly on transactions. In a recent paper, Klee (2008) uses for instance *scanner data* from a grocery store in order to show how time difference in transactions affects the choice to use a debit card over a check. This method is ideal to observe the characteristics of the purchases but the main drawback is the lack of corresponding sociodemographic information since individuals are not identified at the checkout.

To simultaneously capture the impact of the three types of characteristics, an alternative way is to use the *method of diary* in which people self-report their purchases. This method allows to collect information on individuals and payment instruments using a standard survey approach and to get data on transactions with the diary. The method of diary has been implemented by Mot and Cramer (1992) and Boeschoten (1998) in the Netherlands.

¹See for instance Whitesell (1989), Santomero and Seater (1996) and their references therein.

²See Humphrey and *al.* (1996) for an empirical research based on aggregate data.

Controlling for individual characteristics, the authors show that the characteristics of the transactions (transaction size, type of commodity or service and the place of purchase) affect significantly the choice of payment instruments. However, due to the lack of data, they do not assess the effects of the characteristics of the payment instruments.

The main objective of this study is to investigate the role of the three types of determinants on the choice of cash, check and debit card using the method of diary. In doing so, we exploit a unique and original data set on transactions realized by a representative sample of 1,447 French individuals. Our study contributes to the growing empirical literature on payment instruments on several dimensions. First, we simultaneously assess the impact of the three main determinants of the choice of payment instruments using the method of diary. Second, we estimate the choice of a growing competitor to cash and check in the most developed economies, namely the debit card. In Mot and Cramer (1992) for instance, debit cards did not yet exist and credit card payments numbered less than 1% of the sample. Third, the study of the debit card allows to capture the impact of new characteristics of the payment instruments such as for instance the rewards which are mainly associated to card payments. Now, neither Mot and Cramer (1992) nor Boeschoten (1998) have studied and controlled for the characteristics of payment instruments. Four, we control for supply-side constraints by using a sample of transactions in which the choices of payment instruments are not limited by merchants. Now, in most empirical studies, supply-side constraints are ignored and merchants are assumed to accept all the payment instruments. However, a merchant does not necessarily accept all the payment instruments for pricing (payment card) or security concerns (check) and, as a result, even if a consumer holds all the payment instruments, he is not free to use all of them.

Globally, the estimation results show that *i.* the characteristics of transactions play a major role in the choice between cash and alternative payment instruments compared to the characteristics of payment instruments and to the characteristics of individuals; *ii.* the addition of individual characteristics in the regression does not have a significant incidence on the quality of the estimations; *iii.* the characteristics of transactions strongly influence the effects of the characteristics of the payment instruments and, hence, the choices of the payment instruments.

The remainder of the paper is structured as follows. First, we describe the methodology

of the survey and the data set. Second, we present the econometric analysis and third we comment on the estimation results. Finally, we conclude and discuss the results.

2 Survey design, payment patterns and data set

This part intends to present the methodology of the survey used to collect payment data and to give an overview of the payment patterns using descriptive statistics. However, prior to describe the data set, we give a brief overview of the French payment instrument market.

2.1 The French payment instrument market

A first remark is that 99% of the French population in 2005 have a bank account according to the statistics provided by the French Central Bank (Banque de France). These bank accounts are exclusively non interest-bearing accounts.

An other major fact is that checks remain free of charge to account holders. As a result, checks are the first payment instrument hold in France (89%). Besides checks, 85% of the population holds a payment card (Fédération Bancaire Française). Among the range of available cards issued by banks, the debit card is the most popular (85%)³ The low fraction of credit cards in France is related to a strict regulation of credit for consumption.

A further important element is that a very large majority of individuals has only one debit card. The main reason is that there is in France a total compatibility in payments and withdrawals. Indeed, all the issuers of debit cards have created an institution named the Groupement des Cartes Bancaires "CB". This latter defines the technical norms as well the contractual rules between banks, retailers and cardholders. Each bank is free to set prices to retailers and cardholders. The Groupement is not a bank and hence cannot manage bank accounts and issue debit cards. The result of this total compatibility is that a debit cardholder can use his card near the whole retailers in France whatever the merchant's bank. Likewise, a cardholder can withdraw cash on the whole ATMs in France whatever the ATM's owner.

³Only 5% of the French population claim to have a banking credit card and 10% a card with only a withdrawal function.

2.2 Survey design

To study payment patterns, we use the method of diary which relies on two steps. First, we administrated a survey from March to May 2005 on a representative sample of 1,447 French individuals of 18 years and older⁴. Second, we asked each respondent to keep a diary in which they reported all information related to purchases on a daily basis, for eight days⁵. The respondent should report his personal spendings and did not record household-level financial decisions. More precisely, for each purchase, six information have to be reported: the amount to be paid (size of transaction), the type of good or service purchased, the type of store in which the good has been purchased, the type of contact (face-to-face, Internet, telephone, etc.), the choice or not of the payment instrument and, finally, the payment instrument used. Out of 1,447 respondents, 1,392 individuals completed the diary. Overall, we have 16,692 transactions available containing all information on transaction characteristics. The total value of transactions amounts to 541,583 euros.

2.3 Payment patterns

A first outlook of the transactions shows that the majority of the purchases are under 15 euros (56% of all transactions). Purchases for under 5 and 1 euro respectively account for 34% and 9% of all transactions. We also note that 97% of the 16,692 transactions were paid using cash, debit card or check⁶. Given the importance of these three payment instruments, we decide to focus us on them.

Table 1 shows that cash is the first payment instrument used at point of sale (64%) and that the average value of a cash payment (10.8) is by far lower than that of a debit card payment or a check payment.

A more detailed analysis of the number of payments according to the size of transaction shows that cash payments decrease as the transaction size increases. For example, the cash market share for transactions of under 5 euros is about 90%; this market share amounts to approximately 8% and 2% for debit card and check. But the cash market share quickly decreases: when the transaction size is around 23 euros, cash and debit card market shares

⁴Respondents were never participated to any survey before.

⁵Professional expenses and bill payments were excluded from diaries.

⁶The rest of the payments were paid using electronic purse, credit cards, etc.

Table 1: Descriptive statistics on transactions.

	Cash	Debit Card	Check	Total
Nb. of transactions	10,420	3,475	2,301	16,692
Percentage	64.3%	21.5%	14.2%	100%
Average value	10.8	51.3	93.5	31.3
Min - Max	0.1 - 1,100	0.7 - 2,352	0.8 - 20,603	-

are equal (35%). Beyond that, debit card use increases up to values located around 60 euros, and significantly decreases for values higher than 150 euros. Beyond 150 euros, check payments are dominant.

2.4 Data set

The study of cash, debit card and check payments leads us to reduce the initial data set. To begin with, we have to exclude people who do not hold a debit card and/or a check. Likewise, since we are exclusively interested in point of sale payments, we have to drop all transactions realized on the Internet, telephone, etc. Moreover, since consumers have to be free to choose one of the three payment instruments at every point of sale⁷, we have to disregard all transactions for which merchants do not accept at least one of the three payment instruments. Finally, due to their unusual size, we decide to exclude twenty-six transactions of over 1,000 euros.

Globally, we have a total of 9,839 observations. Table 2 and 3 shows that the use of the three payment instruments greatly differs according to the types of store and the types of good and service.

Therefore, a multivariate setting is needed to analyze the partial effects of the size of the transaction, the type of good and service and the type of store.

3 Econometric method

This part aims at introducing the method we use to estimate the impact of the three types of characteristics on the choice of payment instruments as well as the explanatory

⁷In the diary, for each transaction, the agent had to report whether he was free to choose his preferred payment instrument at point of sale. We used this information to control for supply-side constraints.

Table 2: Distribution of payment instruments according to types of store and types of good and service

	Cash Number (%)	Check Number (%)	Debit card Number (%)	Overall Number (%)
Types of store:				
Small stores	4,764 (80.45)	397 (6.70)	761 (12.85)	5,922 (100)
Supermarket and department stores	793 (27.97)	540 (19.05)	1,502 (52.98)	2,835 (100)
Other stores	435 (40.20)	395 (36.51)	252 (23.29)	1,082 (100)
Total	5,992 (60.90)	1,332 (13.54)	2,515 (25.56)	9,839 (100)
Types of good and service:				
Food and beverages	3,648 (69.90)	435 (8.33)	1,136 (21.77)	5,219 (100)
Other types of good and service	2,344 (50.74)	897 (19.42)	1,379 (29.85)	4,620 (100)
Total	5,992 (60.90)	1,332 (13.54)	2,515 (25.56)	9,839 (100)

Table 3: Transaction value according to payment instruments, types of store and types of good and service

	Cash Mean (sd)	Check Mean (sd)	Debit card Mean (sd)	Overall Mean (sd)
Types of store:				
Small stores	5.99 (11.38)	45.75 (70.67)	37.00 (34.72)	12.64 (27.89)
Supermarket and department stores	21.09 (28.39)	60.72 (71.73)	54.58 (52.05)	46.38 (53.78)
Other stores	13.87 (16.34)	69.94 (112.80)	45.49 (72.40)	41.70 (81.04)
Types of good and service:				
Food and beverages	7.10 (14.02)	55.46 (52.39)	52.40 (48.22)	20.99 (36.34)
Other types of good and service	10.84 (18.49)	60.70 (98.44)	45.01 (52.40)	30.72 (57.52)

variables used in the regression.

3.1 Specification

Let assume that the utility (U) drawn from the choice of a payment instrument j made by an individual i during a transaction k can be explained by observable characteristics (V_{ik}^j) and by unobservable characteristics (ϵ_{ik}^j) such that $U_{ik}^j = V_{ik}^j + \epsilon_{ik}^j$.

Three observable characteristics can be differentiated: the characteristics of the transaction (X_k), the characteristics of the payment instrument j held by an individual i (Y_i^j) and, finally, the characteristics of the individual (Z_i). As a result, the utility can be rewrote as following: $U_{ik}^j = V_{ik}^j + \epsilon_{ik}^j = \alpha X_k + \beta Y_i^j + \chi Z_i + \epsilon_{ik}^j$. Let us precise that we do not directly observe the utility of an individual i . We just observe the choice of a payment instrument j made by an individual i during a transaction k . We can therefore estimate the probability that an individual i chooses a payment instrument j instead l during a transaction k , *i.e.*: $Pr(I_{ik}^j) = Pr(U_{ik}^j > U_{ik}^l)$ with $j \neq l$.

To estimate the choice of a payment instrument, we use a nested multinomial logit model rather than a standard multinomial logit model. Indeed, the multinomial logit specification is rather restrictive since it suffers from the independence of irrelevant alternatives property. In other words, odds of paying cash over paying with a check is independent of the presence and characteristics of the debit card. Now, a violation is likely when individuals view the check and the debit card as equivalent and therefore, modeling the choice of a payment instrument using a simple multinomial logit model would not be very realistic. The nested multinomial logit model is more flexible since the error terms of alternatives (debit card and check for instance) within a nest are correlated with each other whereas the error terms of alternatives in different nests (cash vs. alternative payment instruments) are uncorrelated. In the sequel, we assume that the consumer decides whether to pay cash or to pay with an alternative payment instrument (debit card and check). This first-level decision limits their second-level decision to the alternatives available within the payment instruments (debit card or check).

Finally, prior to describe the explanatory variables, a last comment has to be made on the specification. In our original sample, the number of transactions per individual varies. Since we are working at the transaction level, counting all observations for each individual

without weighing them would artificially increase the effect of the individual characteristics in the results. To overcome this limit, we decided to weigh the observations insofar as each individual has the same weight in the sample.

3.2 Explanatory variables

Three sets of explanatory variables related to the characteristics of the individuals, the characteristics of the payment instruments and the characteristics of the transactions are used in the regression.

Payment instruments are characterized by six variables that influence the choice between the three payment instruments (and not only the choice between cash and alternative payment instruments). The first variable, REWARDS, indicates if the debit card is associated to a reward program. In our sample, out of 991 people, 46 benefit of such a program. We expect to find that the beneficiaries of such rewards use more their debit card than the others (Ching and Hayashi, 2007). The second variable, RISK, is captured by a subjective evaluation⁸. We asked each respondent to assess, using a scale ranging from 1 (less risky) to 5 (more risky), the risks related to the three payment instruments. We observe that the average of the evaluation are very close (2.4 for cash, 2.5 for check and 2.6 for the debit card). The next three variables deal with the perception of the payment instruments. Respondents could use at the maximum three over nine characteristics to describe payment instruments such as "simple and convenient", "anonymity", "control of spendings", "gives rebates or advantages", "bulky", "produce red tape", "complex to use", "too much longer", "unsecure". We set up a first variable, CONVENIENCE, that takes the value 1 if the respondent chooses the expression "simple and convenient", -1 if he chooses "complex to use", and 0 otherwise. We also set up two further variables that capture the positive or the negative dimensions of the propositions. We gathered "anonymity", "control of spendings" and "gives rebates or advantages" in a positive dimension and "bulky", "produce red tape", "complex to use", "too much longer", "unsecure" in a negative one. The second and the third variables (POSITIVE and NEGATIVE) count the number of positive (negative) terms selected by the respondent. Finally, the last variable, TIME, grasps the time length

⁸We use the answers to the following question: "If you should evaluate the risks (fraud, loss, theft, etc.) related to the holding and use of cash [resp. debit card and check] on a scale ranging from 1 to 5 (with 1 is the less risky and 5 the riskier), what would it be?"

of the purchase that varies according to the payment technologies (the start time minus the end time of the transaction). To capture this dimension, we exploit the results of a survey realized on a sample of merchants in Paris⁹. We observe as Klee (2008) that cash payments are the fastest (22 seconds) followed by debit card payments (32 seconds) and check payments (58 seconds). As a result, we use an ordered variable in the regression: *1* for cash, *2* for debit card and *3* for check.

Transactions are described by three characteristics. Our model assumes that these variables have a more relevant impact on the choice between cash and alternative payment instruments rather than on the choice between the three payment instruments. The first variable is the size of the transaction. Following the previous descriptive statistics, the impact of the transaction size is assumed to be relevant between cash and the two other payment instruments since cash seems to be replaced by check or debit card as prices are going up. This assumption is in line with the results of previous studies (notably Boeschoten, 1992). The second variable is the type of good or service purchased. Two types are distinguished: "food and beverages" and "other goods and services". The third and last variable is the type of store in which the purchase occurred. Again, two types of stores are taken into account: "small stores" and "other stores". We capture these characteristics using dummy variables. The expected effects of these variables are unknown even if we anticipate a specialization of the use of payment instruments according to the types of store. Indeed, some retailers encourage (or discourage) consumers to use some payment instruments. For instance, department stores and supermarkets in France have equipped their point of sale with devices to foster debit card payments. Conversely, in small stores, there is often a single cash register where people queue to be served. Consequently, even if a small store accepts the debit card, people do not necessarily use them as they prefer to avoid complaints from people waiting in the queue. This organization of the payment process within the store obviously modifies the different costs of using alternative payment instruments. In line with Whitesell (1989) who claimed that a fixed transaction cost could consist of "extra time spent in a credit or check payment queue versus a currency-only

⁹We use a sample of 258 transactions analyzed at four different retail locations in Paris, that is, a supermarket and a department store and two small stores on various days in July and August 2006. For each transaction, we registered the payment instrument used by consumers at the checkout counter and the time length of the payment.

queue", we anticipate a specialization effect due to a (in)decrease of the fixed costs per transaction.

Finally, we use several characteristics as control variables to describe individuals. These variables have either an influence on the choice between the three payment instruments or between cash and the alternative payment instruments. We use more precisely Age, Income (monthly income in three categories) and Education (also in three categories)¹⁰. In addition to these variables, three other individual characteristics are introduced. The latter are supposed to influence the trade-off between cash and alternative payment instruments. The living area of the respondent (in three categories) accounts for the access to cash through ATMs since the number of ATMs is lower in rural areas. Likewise, the occupational status of the respondent (active versus inactive) can influence cash withdrawals since active people have a higher cost of opportunity to withdraw cash at ATMs than inactives. Finally, we introduce a dummy variable to account for "cash profession". The dummy takes the value 1, if the individual perceives a part (or the totality) of his income in cash (merchants, doctors, craftsmen, etc.), otherwise zero. We expect to find that people who are paid in cash are more likely to pay cash.

A final comment has to be done before examining the estimation results. Due to the structure of the decisions (two nests and only one payment instrument in the cash group), we have to cross the characteristics of the individuals and the payment instruments. To do so, we make some assumptions. First, we assume that the use of check is related to the gender of the individual. Indeed, the statistical description of the use of the payment instruments indicates that men use less check than women. Second and following the empirical literature, we argue that the use of bank card is related to the education level and to the income.

4 Estimation results

This part aims at presenting the estimation results. In a first part, we run two regressions: the first does not account for individual characteristics whereas the second does. In a second part, we extend these regressions on different sub-samples of stores and goods

¹⁰The detailed categories are presented in the tables of the estimation results.

and services to test the robustness of the findings.

4.1 Estimation results: overall transactions

The estimation results of both models are given in Table 4.

To begin with, we note that only two variables, time and convenience, among the characteristics of the payment instruments have a statistically significant impact. On the one hand, as the time length decreases, consumers are likely to use debit card. On the other hand, respondents who find convenient to use a payment instrument tend to use it more. By contrast, the results do not show any significant impact of the risk and the reward variables; indeed, we note that neither the risk nor the reward influence the choice of a payment instrument.

Continuing to explore the estimation results, we observe that all the coefficients associated to the transaction characteristics are statistically different from zero. First, we confirm the result of Mot and Cramer (1992), Boeschoten (1998) and Hayashi and Klee (2003) according to which the transaction size has a very strong impact on the choice of payment instruments. In other words, the use of cash decreases with the size of the transaction. Second, the type of good has a significant effect on the probability of using a payment instrument. It is important to outline that this effect is independent of the transaction size and the type of store and that the simultaneous introduction of the types of good and store that could induce multicollinearity between both independent variables are not verified¹¹. The exclusion of one set of categories does not alter the results. Moreover, the matrix of correlations reveals low levels of correlation and therefore implies a fairly robust effect of the types of good and store on the probability of using payment instruments. Globally, we find that the probability of using cash for purchases related to "food and beverages" is higher than that of debit card or check. Conversely, the probability of using debit card or check for all other types of good is higher. Third, we confirm the expected specialization effect of the payment instruments according to the type of store: the probability of using cash is higher in "small stores" compared to check and debit card. These findings support the formal results of Whitesell (1989) according to which the organization of the payment process within the spending place modifies the fixed costs of transacting and in turn affects

¹¹The correlation matrix between transaction characteristics is available upon request.

the choice of the payment instruments: the lower is the fixed cost the more the cash will be replaced.

As far as the individual characteristics are concerned, the more salient result is the lack of effects. First, the estimation results indicate two significant impacts on the trade-off between the three payment instruments: males use less check than females and low-income respondents use less debit card than the others. Second, the probability to use cash rather than an alternative payment instrument is only influenced by the size of the living area: the probability to use cash in small cities is lower than in the Paris area, probably due to the low number of ATMs in rural areas. In addition, we do not find, as in previous studies (Boeschoten, 1998), a statistically significant effect of age on the probability to use cash. In the same way, the levels of education have no incidence on the trade-off between the three payment instruments. This latter finding is also in contradiction with Boeschoten (1998), Carrow and Staten (1999) and Stavins (2001) for whom highly-skilled people have a higher probability to use electronic payment instruments.

DIRE PQ : That can be explained by the high level of debit card holding in France (around 85% of the entire population).

Finally, we do not verify our expected effect on cash profession: people paid cash do not have a higher propensity to pay cash.

To conclude this first part, we can argue that the characteristics of the transactions play a major role in the choice between cash and alternative payment instruments. Moreover, the addition of individual characteristics in the regression does not have a significant incidence on the quality of the estimations. The Akaike's information criterion (AIC) which measures the goodness of fit of the estimated models confirms that the second model brings a limited advantage compared to the first one (the AIC amounts to 1,392 for Model 1 and 1,388 for Model 2). An interesting extension of this first estimation could consist in analyzing the robustness of the effects of the transaction characteristics on different sub-samples of types of goods and services and different types of stores. Are the findings robust across different sub-samples of goods and stores?

4.2 The effect of transaction characteristics on the other explanatory variables

To answer this question, we run the same regressions as before across three sub-samples of stores ("small stores", "supermarkets and department stores", and "other types of store") and two sub-samples of goods and services ("food and beverages" and "other types of good and service"). Since the types of store and the types of good and service are exogenous from the choice of the payment instrument, this distinction does not especially raise econometric issues.

The results of the estimations are given in Table 6 and Table 5. We note that the characteristics of individuals still do not have a significant incidence on the choice of payment instruments. By contrast, the remaining characteristics of the transactions (transaction size and type of good and service) have still a large impact whatever the types of store and the types of good and service. More precisely, the impact is negative on the probability to use cash for large value transactions and positive for the type of good (except in "other stores"). However, we observe that the effects of the characteristics of the payment instruments, especially convenience and time, vary according to the types of store and the types of good and service. More precisely, the variable convenience has a significant and positive effect for purchases realized in "supermarkets and department stores" but has no impact on the probability to choose a payment instrument in "small stores" and "other stores". Likewise, we observe that the effect of the time length varies across the types of stores, meaning that non pricing strategies adopted by merchants (*e.g.* investments in electronic cashiers, etc.) can directly influence the trade-off of consumers. This result is all the more important since the role of merchants in most empirical studies on payment instruments has been ignored. This last result calls upon new empirical studies to better understand the role of merchants in consumer payment patterns.

5 Conclusion

This paper aimed at estimating the respective contribution of the three main determinants of the choice of the payment instruments realized by consumers at points of sale.

Usually, most empirical studies use survey data or scanner data to analyze the impacts

of the characteristics of individuals, the characteristics of payments instruments and the characteristics of transactions on the use of payment instruments. Now, survey data are not really suited to study the characteristics of transactions and, similarly, scanner data are not optimal to estimate the effects of the characteristics of individuals since they are not identified at the check out. These shortcomings may lead to overestimate the coefficients of those variables.

Using the alternative method of diary, we exploited a unique and original data set based on transactions. Beyond the well-known effect of the transaction size, our results shed new lights on the effects of the type of store and the type of good and service on the use of payment instruments, especially in a context of a rapid growth of the debit card. In particular, estimation results showed that the characteristics of transactions played a major role in the choice between cash and alternative payment instruments compared to the characteristics of payment instruments and to the characteristics of individuals. Moreover, we found that the addition of individual characteristics in the regression did not have a significant incidence on the quality of the estimations. To finish, we concluded that the characteristics of transactions (through the type of good and service and the type of store) strongly influenced the effects of the characteristics of the payment instruments and hence the choices of payment instruments. These latter results are interesting since they underline the fact that merchants can also use non pricing strategies in order to affect the choices of payment instruments. By investing in the organization of the payment process at point of sale, they alleviate consumer's fixed costs of transacting through debit card and reduce, therefore, cash and check payments at point of sale. This strategy can be particularly efficient for merchants in countries or in payment card networks where the no-surcharge rule is effective.

A Estimation results

Table 4: Estimation results

Variables	Model 1 coef. (s.e.)	Model 2 coef. (s.e.)
Cash Vs. Debit card Vs. Check		
Characteristics of the payment instruments:		
Rewards	0.466 (0.681)	0.359 (0.718)
Risk	-0.064 (0.050)	-0.049 (0.060)
Time	-0.605 (0.085)***	-0.908 (0.268)***
Subjective evaluation:		
Convenience	0.345 (0.154)***	0.503 (0.203)**
Positive evaluation	0.138 (0.115)	0.242 (0.143)
Negative evaluation	-0.079 (0.144)	-0.083 (0.160)
Characteristics of the individual:		
Male and Check	-	-0.385 (0.210)*
Income and debit card ("do not know" and "refuse" excluded):		
Less than 2,000 €	-	-0.604 (0.296)**
Between 2,000 and 4,000 €	-	-0.429 (0.290)
More than 4,000 €	-	-0.193 (0.361)
Level of education and debit card ("no diploma" excluded):		
Education 2	-	-0.368 (0.261)
Education 3	-	0.122 (0.279)
Cash versus noncash		
Characteristics of the transaction:		
Size	-0.065 (0.006)***	-0.067 (0.006)***
Type of good: food and beverages	0.823 (0.177)***	0.749 (0.718)***
Type of store: small stores	1.310 (0.182)***	1.270 (0.180)***
Characteristics of the individuals:		
Age	-	0.008 (0.006)
Cash profession	-	-0.241 (0.684)
Living area ("Paris Area" excluded):		
Less than 20,000 inhab.	-	-0.722 (0.298)**
Between 20 and 100,000 inhab.	-	-0.416 (0.294)
Professional status ("Inactive" excluded):		
Unemployed	-	0.097 (0.372)
Employed	-	-0.142 (0.214)
Inclusive value parameters		
Cash	0.671 (0.427)	0.612 (0.304)**
Noncash	1.344 (0.493)***	0.782 (0.316)**
N	9,819	9,819
Log LH	-685.33	-670.99
Akaike information criterion	1392.67	1387.99
Schwarz Bayesian information criterion	1483.87	1578.67

*** means that the coefficient is statistically significant at the 1 percent level,
** at the 5 percent level and * at the 10 percent level.

B Estimation results

Table 5: Estimations results according to the types of store

Variables	"Small stores"			"Supermarkets and department stores"			"Other stores"		
	Model 3 coef. (s.e.)	Model 4 coef. (s.e.)	Model 5 coef. (s.e.)	Model 6 coef. (s.e.)	Model 7 coef. (s.e.)	Model 8 coef. (s.e.)			
Cash Vs. Debit card Vs. Check									
Characteristics of the payment instruments:									
Rewards	-0.055 (0.160)	0.069 (1.091)	0.069 (1.703)	0.049 (1.422)	1.581 (2.947)	0.765 (1.639)			
Risk	0.016 (0.023)	0.026 (0.081)	-0.002 (0.100)	-0.012 (0.100)	-0.063 (0.136)	-0.025 (0.114)			
Time	-0.625 (0.193)***	-1.213 (0.435)***	-0.731 (0.173)***	-0.881 (0.563)	0.555 (0.293)*	1.126 (0.952)			
Subjective evaluation:									
Convenience	-0.020 (0.067)	0.242 (0.277)	0.920 (0.313)***	0.892 (0.367)**	0.311 (0.375)	0.190 (0.405)			
Positive evaluation	-0.036 (0.055)	0.172 (0.200)	0.177 (0.243)	0.194 (0.241)	0.399 (0.376)	0.259 (0.464)			
Negative evaluation	0.020 (0.066)	-0.197 (0.265)	0.019 (0.264)	0.030 (0.271)	-0.093 (0.370)	-0.026 (0.300)			
Characteristics of the individuals:									
Male and Check	-	-0.554 (0.351)	-	-0.217 (0.330)	-	-0.756 (0.546)			
Income and debit card("do not know" and "refuse" excluded):	-	-	-	-	-	-			
Less than 2,000 €	-	-0.819 (0.502)	-	-0.435 (0.521)	-	0.026 (0.819)			
Between 2,000 and 4,000 €	-	-0.791 (0.446)*	-	-0.285 (0.546)	-	0.074 (0.817)			
More than 4,000 €	-	-0.482 (0.473)	-	0.096 (0.708)	-	0.086 (0.100)			
Level of education and debit card ("No diploma" excluded):	-	-	-	-	-	-			
Education 2	-	-0.387 (0.374)	-	-0.154 (0.445)	-	0.013 (0.836)			
Education 3	-	-0.062 (0.365)	-	0.624 (0.508)	-	0.634 (0.903)			
Cash versus noncash									
Transaction characteristics:									
Size	-1.111 (0.012)***	-1.114 (0.012)***	-0.038 (0.006)***	-0.037 (0.006)***	-0.066 (0.017)***	-0.069 (0.017)***			
Type of good: food and beverages	0.930 (0.285)***	0.923 (0.290)***	0.567 (0.261)**	0.531 (0.289)*	0.644 (0.681)	0.662 (0.701)			
Individuals characteristics:									
Age	-	0.012 (0.010)	-	0.002 (0.008)	-	0.001 (0.018)			
Cash profession	-	-0.688 (0.869)	-	-0.452 (1.382)	-	1.219 (1.852)			
Living area (Paris Area excluded):	-	-	-	-	-	-			
Less than 20,000 inhab.	-	-0.936 (0.491)*	-	-0.716 (0.429)*	-	-1.216 (0.846)			
Between 20,000 and 100,000 inhab.	-	-0.692 (0.480)	-	-0.213 (0.411)	-	-0.949 (0.839)			
Professional status ("Inactive" excluded):	-	-	-	-	-	-			
Unemployed	-	0.098 (0.623)	-	0.285 (0.524)	-	-0.467 (1.028)			
Employed	-	-0.397 (0.365)	-	-0.018 (0.304)	-	-0.309 (0.601)			
Inclusive value parameters									
Cash	-4.519 (2.432)*	0.667 (0.635)	0.372 (0.345)	0.455 (0.380)	0.523 (0.785)	1.202 (2.355)			
Noncash	-0.407 (1.724)	1.339 (0.650)**	-0.078 (0.675)	0.449 (0.423)	-0.241 (0.367)	-0.141 (0.700)			
N	5,909	5,909	2,829	2,829	1,081	1,081			
Log LH	-206.68	-252.54	-288.31	-282.44	-102.46	-99.186			
Akaike information criterion	541.37	549.08	596.62	608.88	224.93	242.37			
Schwarz Bayesian information criterion	619.20	720.30	667.09	763.91	285.77	376.22			

*** means that the coefficient is statistically significant at the 1 percent level,
 ** at the 5 percent level and * at the 10 percent level.

Table 6: Estimations results according to the type of good

Variables	"Food and beverages"			"Other types of good and service"		
	Model 9 coef. (s.e.)	Model 10 coef. (s.e.)	Model 12 coef. (s.e.)	Model 11 coef. (s.e.)	Model 12 coef. (s.e.)	Model 12 coef. (s.e.)
Cash Vs. Debit card Vs. Check						
Characteristics of payment instruments:						
Rewards	0.077 (1.448)	-0.161 (1.604)	0.584 (0.908)	0.732 (1.002)	0.732 (1.002)	0.732 (1.002)
Risk	-0.015 (0.069)	0.026 (0.099)	-0.078 (0.077)	-0.104 (0.077)	-0.104 (0.077)	-0.104 (0.077)
Time	-0.853 (0.137)***	-1.417 (0.429)***	-0.506 (0.101)***	-0.720 (0.335)**	-0.720 (0.335)**	-0.720 (0.335)**
Subjective evaluation:						
Convenience	0.520 (0.260)**	0.747 (0.358)**	0.160 (0.155)	0.363 (0.242)	0.363 (0.242)	0.363 (0.242)
Positive evaluation	0.054 (0.181)	0.133 (0.234)	0.101 (0.130)	0.263 (0.189)	0.263 (0.189)	0.263 (0.189)
Negative evaluation	-0.119 (0.252)	-0.179 (0.287)	-0.084 (0.159)	-0.065 (0.205)	-0.065 (0.205)	-0.065 (0.205)
Characteristics of individuals:						
Male and Check	-	-0.182 (0.351)	-	-0.551 (0.265)**	-0.551 (0.265)**	-0.551 (0.265)**
Income and debit card ("do not know" and "refuse" excluded):	-	-	-	-	-	-
Less than 2,000 €	-	-0.721 (0.473)	-	-0.661 (0.381)	-0.661 (0.381)	-0.661 (0.381)
Between 2,000 and 4,000 €	-	-0.510 (0.456)	-	-0.509 (0.379)	-0.509 (0.379)	-0.509 (0.379)
More than 4,000 €	-	0.068 (0.561)	-	-0.464 (0.469)	-0.464 (0.469)	-0.464 (0.469)
Level of education and debit card ("No diploma" excluded):	-	-0.572 (0.416)	-	-0.294 (0.339)	-0.294 (0.339)	-0.294 (0.339)
Education 2	-	0.115 (0.437)	-	-0.119 (0.363)	-0.119 (0.363)	-0.119 (0.363)
Education 3	-	-	-	-	-	-
Cash versus noncash						
Characteristics of the transactions:						
Size	-0.061 (0.008)***	-0.063 (0.008)***	-0.068 (0.009)***	-0.069 (0.009)***	-0.069 (0.009)***	-0.069 (0.009)***
Type of store: small stores	1.647 (0.278)***	1.704 (0.283)***	1.046 (0.241)***	0.988 (0.236)***	0.988 (0.236)***	0.988 (0.236)***
Characteristics of the individuals:						
Age	-	0.006 (0.010)	-	0.010 (0.008)	0.010 (0.008)	0.010 (0.008)
Cash profession	-	-0.985 (0.973)	-	0.244 (0.903)	0.244 (0.903)	0.244 (0.903)
Living area ("Paris Area" excluded):	-	-	-	-	-	-
Less than 20,000 inhab.	-	-0.910 (0.466)*	-	-0.628 (0.395)	-0.628 (0.395)	-0.628 (0.395)
Between 20,000 and 100,000 inhab.	-	-0.561 (0.454)	-	-0.285 (0.392)	-0.285 (0.392)	-0.285 (0.392)
Professional status ("Inactive" excluded):	-	-	-	-	-	-
Unemployed	-	0.076 (0.586)	-	0.154(0.490)	0.154(0.490)	0.154(0.490)
Employed	-	-0.218 (0.337)	-	-0.051 (0.284)	-0.051 (0.284)	-0.051 (0.284)
Inclusive value parameters						
Cash	0.444 (0.498)	0.420 (0.340)	0.812 (0.897)	0.614 (0.420)	0.614 (0.420)	0.614 (0.420)
Noncash	1.411 (0.482)***	0.796 (0.355)**	1.970 (1.276)	0.812 (0.448)*	0.812 (0.448)*	0.812 (0.448)*
N	5,208	5,208	4,611	4,611	4,611	4,611
Log LH	-290.82	-281.63	-390.52	-381.28	-381.28	-381.28
Akaike information criterion	601.64	607.25	801.05	806.55	806.55	806.55
Schwarz Bayesian information criterion	678.21	775.70	876.40	972.32	972.32	972.32

*** means that the coefficient is statistically significant at the 1 percent level,
 ** at the 5 percent level and * at the 10 percent level.

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