HOW EFFECTIVE ARE REWARDS PROGRAMS IN PROMOTING PAYMENT CARD USAGE? EMPIRICAL EVIDENCE

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1. Introduction

- Some recent studies have highlighted the cost and convenience benefits of using retail electronic payments and, in particular, card payment instruments:
  - Humphrey et al. (2001,.2003) estimate that "if a country moves from a wholly paper-based payment system to close to an all electronic system, it may save 1% or more of its annual GDP once transaction costs are absorbed".
  - Similar benefits have been estimated for Spain in Carbó *et al.* (2003).
- However, cash and other paper-based payment instruments are still being largely used by consumers in most developed countries.

- Card issuers have incurred substantial costs to launch incentive programs to stimulate payments with debit and credit cards, presumably assuming that these rewards would significantly increase the use of these cards based on standard comparisons. However, they are facing a great uncertainty on how to allocate the resources to make the incentive programs as effective as desired.

- Little is known on how to encourage consumers to increase the use of debit and credit cards. This limited knowledge is, at least partially, due to the lack of comprehensive microeconomic data on consumers' preferences towards payment instruments and on the related role of incentive-related mechanisms.

- The main goal of this paper is to empirically examine both the effects of incentive programs on payment preferences and the impact on the substitution of cash by cards. The contributions of this study are twofold:
  - i) This is the **first empirical study considering different types of rewards** to estimate the relative impact of these rewards on the preferences for cards relative to cash.
  - ii) It **offers an estimation of the aggregate economic impact of reward programs** on the use of cards across merchant activities.
- In order to address these goals, this paper uses unique survey data.

2. Background and hypotheses

- Most studies on the role of rewards programs for general purchases (not specifically for card purchases) have been undertaken from a behavioral perspective and have shown significantly large and positive effects of incentive programs.

- Among these behavioral studies, there is only few (Feinberg, 1986; Soman, 2001) dealing with preferences towards cards, although none of them particularly examine the role of incentive programs in card payments. They compare the spending of consumers who paid with credit cards with those who used cash or checks, and they find that the former spend more.

- In the banking literature, however, although some studies have examined preferences towards payment cards, most of them have not referred to rewards programs.
  - Gross and Souleles (2002a and 2002b) have shown that consumers' preferences towards cards vary considerably when contractual conditions (such interest rates, repayment schemes or rewards programs) change.
  - In the case of credit cards, these changes in contractual conditions may well explain the stickiness of the use of credit cards to interest rates (Ausubel, 1991; Calem and Mester, 1995, Brito and Hartley, 1995).
  - Carow and Staten (1999 and Kennickell and Kwast (1997) find that consumer-level variables such as schooling or financial wealth increase the likelihood of electronic payment instrument usage.

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- Other recent empirical studies have also explored consumer preferences towards payment instruments using surveys on household finances (Hayashi and Klee, 2003; Mester, 2003; Klee, 2006; Rysman, 2007 and Zinman, 2008).

- To our knowledge, only Ching and Hayashi (2008) identify some general effects of rewards on consumer choice of payment instruments. They find that consumers with credit card rewards use credit cards more intensively than those without rewards.

- Unlike Ching and Hayashi (2008) we provide information on the type of rewards, the relative impact of these rewards on the preferences for cards relative to paper-based instruments and the aggregate economic impact of the effects of reward programs across merchant activities.

3. An econometric model of rational consumer choice

- In order to place our hypotheses, the general empirical framework is based on hedonic models of demand in markets with differentiated products (Lancaster, 1971 and McFadden, 1974).

- These models allow for heterogeneous preferences for card usage relative to other payment instruments based on their comparative attributes.

- Consumers have two options for payment:
  - i) paper-based payment instruments (cash).
  - ii) electronic-based payment instruments (e.g. credit or debit card).

  - Our behavioral model of consumers' choice incorporates cards' incentive programs to the standard consumer characteristics and consumer perceptions.

- Considering this set of variables, the model assumes that cardholders will use at the checkout the payment instrument (cash or cards) with a higher utility:

$$V_{ijk} = \gamma X_i + \beta Z_{ij} + \phi C_{ij} + \delta G_k \quad (1)$$

$$\forall i = 1, \ldots, m$$

$$\forall j = 1, \ldots, n$$

$$\forall k = 1, \ldots, r$$

Consumer *i's utility of using the payment instrument j considering a set of k variables showing consumer's perceptions.*

A vector which includes a set of cardholders characteristics

A vector of attributes of the payment instrument j that can be observed by consumer i.

A vector which controls if the payment instrument j used by the consumer i incorporates any type of incentive program

A vector which includes variables showing consumer's perceptions that could affect payment behavior at the checkout.

- The random utility theory (McFadden, 1974; Domencich and McFadden, 1975 and Louviere et al., 2000) assumes that one part of the utility function is deterministic in each of the individual utility functions. This portion of the utility function is known with certainty by the consumer who takes a decision.

- A second part of the utility function embodies a random component that groups measurement errors and non-observable attributes of the consumers' decisions.

- With these ingredients, the specification of consumer utility is:

$$U_{ijk} = V_{ijk} + \varepsilon_{ijk} = \gamma X_i + \beta Z_{ij} + \phi C_{ij} + \delta G_k + \varepsilon_{ijk} \qquad (2)$$

- A latent dichotomous variable is also added and takes the value "1" if the cardholder *i* uses the payment instrument *j* (cards) given a set of k variables showing consumer's perceptions, and zero otherwise. Hence, the probability that an individual chooses a certain payment alternative *j* is the probability that this alternative offers higher utility to the cardholder:

$$U_{ijk}(y_{ijk}=1, X_i, Z_{ij}, C_{ij}, G_k) \geq U_{iwk}(y_{iwk}=0, X_i, Z_{iw}, C_{iw}, G_k) \quad (3)$$
$$\forall j \neq w$$

- The estimation method is a logit model with the following specification:

$$y_{ijk} = f(X_i, Z_{ij}, C_{ij}, G_k) + \varepsilon_{ijk} \qquad (4)$$

- In equation (4) consumers choose the payment instrument that they prefer for every type of transaction and that offers them the higher utility, given a set of preferences and the role of incentive programs. We assume that consumers have access to all payment options.

4. Data and estimation methodology

4.1. LOGIT METHODOLOGY:

- In order to analyze consumers' preferences for payment instruments and the role of incentive programs, equation (4) is estimated as a binary mixed logit model.

- A mixed logit regression analysis isolates the effects of the individual characteristics and incentive programs on the use of payment instruments (cards versus cash), when other factors are held constant.

- The dependent (binomial) variable shows whether a consumer uses a payment card or cash at different types of merchant outlets. In the case of payment cards we also control whether cardholders enjoy any type of rewards. Equation (4) is also estimated for different merchant activities and for each payment instrument separately.

- Our specification includes two main sets of explanatory variables.
  - The first set corresponds to **consumer characteristics**: income, age, education, sex, members of the household that financially contribute to household expenditures, frequency of the use of a car, travel frequency and population of the territorial area where the consumer lives.
  - The second set includes **card-specific attributes**: the availability of debit and/or credit rewards programs; the type of rewards (discounts, points, gifts and cash-back) and the attributes of the payment instruments that determine consumer preferences towards these instruments (convenience8, habits, control of domestic expenditure,…). A critical control in the second group is the easiness and availability of cash withdrawal delivery channels (ATMs) as well as the acceptance of the card at the point of sale (POS) by merchants.
  - We also include regional dummies as controls for the geographical location of the cardholders.

4.2. DATA AND MAIN VARIABLES:

- We rely on **survey evidence obtained from a set responses to a 2005 national survey of 2,961 individuals using cards**.

- The individuals were asked 150 questions on the use of three payment instruments: debit cards, credit cards and cash. The survey includes information on consumers' demographic characteristics, payment behavior, self-reported payment preferences, attitudes towards incentive programs, and frequency of use of the different payment methods by merchant sector and perceptions on comparable attributes of the different payment methods (comfort, convenience, speed, safety, etc.).

- Figure 1 and Table 2 show, respectively, the variability in the share of payment instruments used at merchant outlets and in the different types of rewards that cardholders enjoy.

Figure 1: Share of payment instruments by merchants

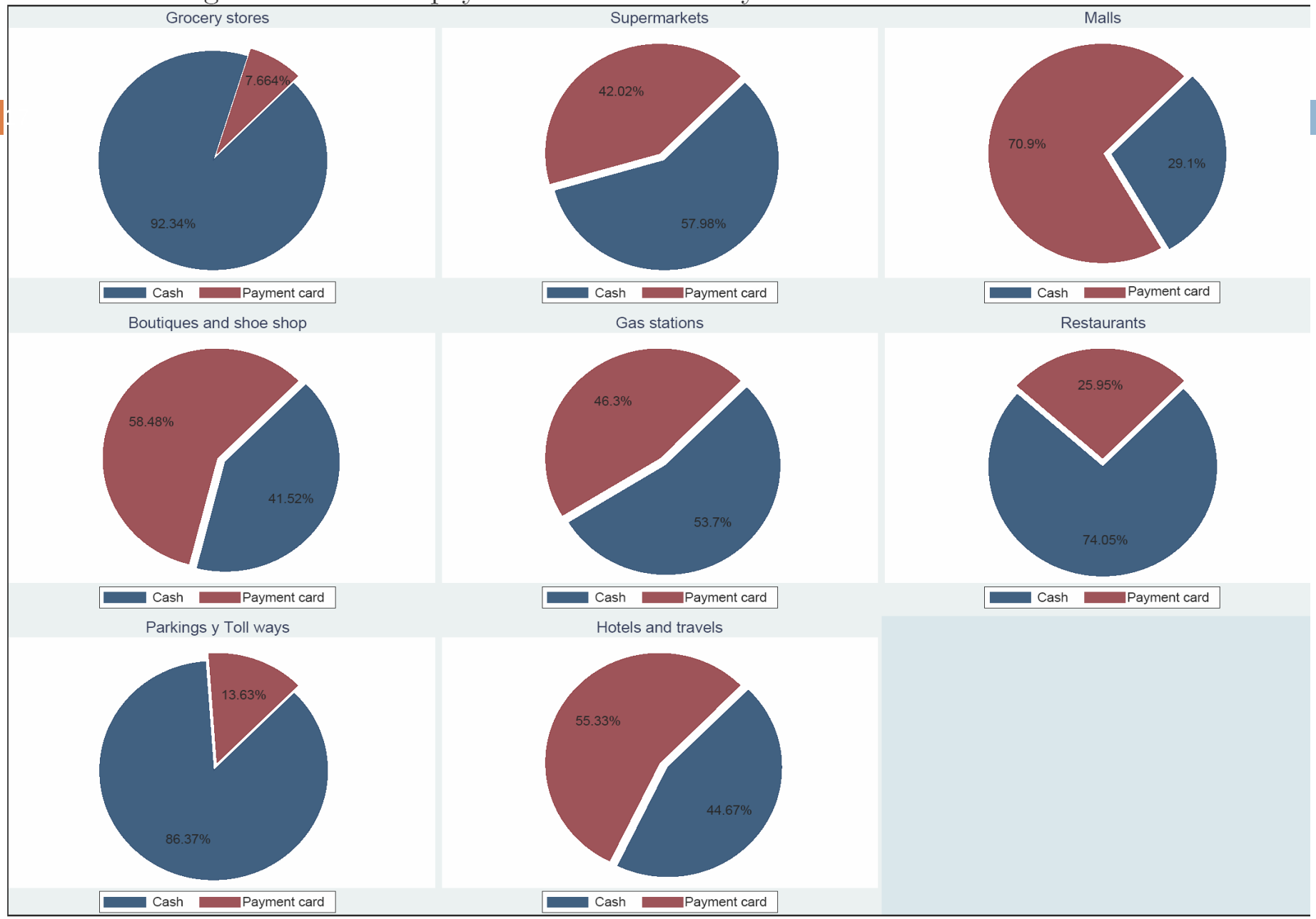

Table 2. Sample distribution of incentive programs

		Debit cardholders (1,342 obs.)	% of Debit cardholders	% of the sample	Credit cardholders (1,619 obs.)	% of Credit cardholders	% of the sample	All cardholders (2,961 obs.)	% of the sample
Discounts	No	1,002	74.7	33.8	1,053	65.0	35.6	2,055	69.4
	Yes	340	25.3	11.5	566	35.0	19.1	906	30.6
Points	No	865	64.5	29.2	839	51.8	28.3	1,704	57.5
	Yes	477	35.5	16.1	780	48.2	26.3	1,257	42.5
Gifts	No	1,268	94.5	42.8	1,479	91.4	49.9	2,747	92.8
	Yes	74	5.5	2.5	140	8.6	4.7	214	7.2
Cash-back	No	1,223	91.1	41.3	1,423	87.9	48.1	2,646	89.4
	Yes	119	8.9	4.0	196	12.1	6.6	315	10.6
Any type of rewards	No	639	47.6	21.6	522	32.2	17.6	1,161	39.2
	Yes	703	52.4	23.7	1097	67.8	37.0	1,800	60.8

5. Incentive programs and consumer payment preferences: Logit results

- There are two set of logit results:
  - The first refers to the estimations for all sectors and the effects of rewards programs overall (without distinguishing the type or reward or the merchant activity).
  - The second set of results summarizes the main coefficients of the rewards parameters when the estimations are undertaken for different type of merchant activities and/or different type of rewards program.

- **Table 3** shows the results for all sectors and distinguishing between all cardholders, credit and debit cardholders. These results show the effects of enjoying rewards programs no matter the type of reward. Marginal effects for unit increase in *x are shown as "m.e" in the tables.*

- All coefficients related to the role of incentive programs are positive and significant and exhibit one of the highest marginal effects on the probability of using a card instead of cash for consumption purposes. In particular, cardholders enjoying rewards programs may increase the probability of using cards (relative to cash) by 3.8%. This marginal effect, however, is found to be larger for debit cardholders (5.0%) that for credit cardholders (2.1%).

Table 3. Logit results. All sectors (a)

		All cardholders	
			m.e
Rewards		0.7*** (6.15)	0.038
Income		0.18 (0.9)	0.010
Age		-0.07*** (-2.9)	-0.003
Log(Age²)		1.38*** (3.1)	0.069
Elementary school		0.25 (0.84)	0.012
High School		0.55* (1.71)	0.024
Technical education		0.82** (2.26)	0.031
Pre-university school		0.95** (2.43)	0.034
Some university studies		0.69* (1.97)	0.027
University studies		1.21*** (3.37)	0.043
Sex		-0.12 (-0.99)	-0.006
Family members		0.11 (1.57)	0.005
Use of cars		0.28** (2.14)	0.015
Frequency of travels		0.09* (1.8)	0.005
10.001 to 50.000 inh.		-0.28* (-1.87)	-0.015
50.001 to 200.000 inh.		-0.18 (-1.13)	-0.009
> 200.000 inh.		0.03 (0.15)	0.001
Madrid and Barcelona		0.55* (1.78)	0.022
Perceptions towards payment cards	P1_E	-0.27 (-0.82)	-0.014
	P2_E	0.53 (1.6)	0.026
	P3_E	0.25 (0.88)	0.013
	P4_E	0.37 (1.44)	0.018
	P5_E	-0.14 (-0.59)	-0.007
	P6_E	-0.32 (-1.12)	-0.016
	P7_E	0.21 (0.75)	0.011
Perceptions towards cash payments	P1_T	-0.06 (-1.08)	-0.003
	P2_T	-0.13** (-2.12)	-0.006
	P3_T	-0.01 (-0.29)	-0.001
	P4_T	-0.27*** (-4.99)	-0.014
	P5_T	-0.08* (-1.69)	-0.004
	P6_T	0.09* (1.99)	0.004
	P7_T	0.08 (1.56)	0.004
Regional Dummy		0.01 (0.68)	0.000
Log likelihood		-962.32544	
LR Chi- square		716.02***	
Pseudo-R2		0.2712	
Nº of observations		2934	

Table 3. Logit results. All sectors (b)

		Debit cardholders	
			m.e
Rewards		0.69*** (4.34)	0.050
Income		0.08 (0.29)	0.006
Age		-0.1*** (-3.03)	-0.007
Log(Age²)		1.82*** (3.01)	0.127
Elementary school		0.59 (1.47)	0.039
High School		0.89* (2)	0.050
Technical education		0.8* (1.67)	0.044
Pre-university school		1.53*** (2.93)	0.064
Some university studies		0.81* (1.67)	0.044
University studies		1.19** (2.46)	0.059
Sex		-0.19 (-1.13)	-0.014
Family members		-0.05 (-0.62)	-0.004
Use of cars		0.24 (1.31)	0.017
Frequency of travels		0.11 (1.57)	0.007
10.001 to 50.000 inh.		-0.28 (-1.35)	-0.021
50.001 to 200.000 inh.		-0.3 (-1.46)	-0.022
> 200.000 inh.		-0.02 (-0.07)	-0.001
Madrid and Barcelona		0.77 (1.53)	0.040
Perceptions towards payment cards	P1_E	0.17 (0.38)	0.012
	P2_E	0.4 (0.79)	0.028
	P3_E	-0.15 (-0.3)	-0.011
	P4_E	0.76** (2.01)	0.053
	P5_E	-0.56 (-1.56)	-0.039
	P6_E	-0.49 (-1.17)	-0.035
	P7_E	0.38 (1.08)	0.026
Perceptions towards cash payments	P1_T	-0.06 (-0.79)	-0.004
	P2_T	-0.2** (-2.43)	-0.014
	P3_T	0.03 (0.39)	0.002
	P4_T	-0.36*** (-4.41)	-0.025
	P5_T	-0.03 (-0.5)	-0.002
	P6_T	0.04 (0.61)	0.003
	P7_T	0.06 (0.88)	0.004
Regional Dummy		0.01 (0.65)	0.001
Log likelihood		-502.24043	
LR Chi- square		392.54***	
Pseudo-R2		0.281	
Nº of observations		1329	

***, **. * Statistically significant at 1 %, %5 and 10% level ,respectively
z statistic in parentheses.

Table 3. Logit results. All sectors (c)

		Credit cardholders	
			m.e
Rewards		0.63*** (3.63)	0.021
Income		0.35 (1.2)	0.012
Age		-0.03 (-0.78)	-0.001
Log(Age²)		0.69 (0.92)	0.020
Elementary school		-0.58 (-1.04)	-0.019
High School		-0.34 (-0.59)	-0.011
Technical education		0.47 (0.72)	0.012
Pre-university school		-0.23 (-0.34)	-0.008
Some university studies		0.02 (0.03)	0.000
University studies		0.75 (1.17)	0.018
Sex		-0.12 (-0.64)	-0.004
Family members		0.41*** (3.26)	0.012
Use of cars		0.3 (1.45)	0.010
Frequency of travels		0.07 (0.96)	0.002
10.001 to 50.000 inh.		-0.26 (-1.18)	-0.008
50.001 to 200.000 inh.		0.11 (0.41)	0.003
> 200.000 inh.		0.09 (0.31)	0.003
Madrid and Barcelona		0.37 (0.9)	0.009
Perceptions towards payment cards	P1_E	-0.67 (-1.41)	-0.020
	P2_E	0.97* (1.82)	0.029
	P3_E	0.51 (1.2)	0.015
	P4_E	0.07 (0.19)	0.002
	P5_E	0.23 (0.65)	0.007
	P6_E	-0.19 (-0.45)	-0.006
	P7_E	-0.13 (-0.25)	-0.004
Perceptions towards cash payments	P1_T	-0.06 (-0.65)	-0.002
	P2_T	-0.06 (-0.65)	-0.002
	P3_T	-0.04 (-0.47)	-0.001
	P4_T	-0.19** (-2.52)	-0.006
	P5_T	-0.11 (-1.54)	-0.003
	P6_T	0.13** (2.02)	0.004
	P7_T	0.08 (1.1)	0.002
Regional Dummy		0 (0.14)	0.000
Log likelihood		-433.19456	
LR Chi- square		328.86***	
Pseudo-R2		0.2751	
Nº of observations		1605	

***, **. * Statistically significant at 1 %, %5 and 10% level ,respectively
z statistic in parentheses.

- Table 4 shows the logit results distinguishing different types of incentive programs and/or merchant activities.

- **PANEL A (by reward type):** Discounts, points and cash-back are generally found to have a positive and significant effect on the use of cards relative to cash while gifts are not significant. Cash-back incentives exhibit the higher marginal effect (4.1%).

- **PANEL B (by merchant type):** A high positive and significant effect of rewards of card usage in department stores (8.5%), hotels and travel (6.9%), supermarkets (6.7%), gas stations (4.5%), restaurants (3.4%) and boutiques (3.1%).

- **PANEL C (by reward and merchant type):** It confirms that cash-back appears to be the most effective incentive to foster the use of cards relative to cash. In particular, the marginal effects of cash-back are found to be positive and significant in supermarkets (6.4%), department stores (7.0%), boutiques (1.1%), gas stations (0.9%) and parking and tolls (3.7%).

Panel A. Effect of rewards by type of rewards program: all cardholders, debit cardholders and credit cardholders

	All cardholders	m.e	Debit cardholders	m.e	Credit cardholders	m.e
Discounts	0.33** (2.33)	0.015	0.55** (2.59)	0.034	0.07 (0.34)	0.002
Points	0.49*** (4)	0.023	0.38** (2.17)	0.025	0.54*** (2.99)	0.015
Gifts	0.72 (1.43)	0.027	0.47 (1.11)	0.027	1.05 (1.28)	0.020
Cash-back	0.52** (2.08)	0.041	0.49** (2.38)	0.039	0.66* (1.79)	0.035
Log likelihood	-695.8		-1249.8		-1119.1	
LR Chi- square	451.8***		329.7***		918.8***	
Pseudo-R2	0.21		0.22		0.23	
N° of observations	2934		1329		1605	

Panel B. Effect of rewards program by merchant activity

	Grocery Stores	m.e	Supermarkets	m.e	Department stores	m.e	Boutiques	m.e
Rewards	-0.16 (-0.96)	-0.006	0.28*** (2.93)	0.067	0.53*** (5.27)	0.085	0.13** (.37)	0.031
Log likelihood	-698.1		-1437.5		-1089.2		-1698.6	
LR Chi- square	297.8***		998.7***		846.1***		1157.0***	
Pseudo-R2	0.16		0.26		0.27		0.28	
N° of observations	2691		2825		2778		2794	

	Gas stations	m.e	Restaurants	m.e	Parking and tolls	m.e	Hotels and travel	m.e
Rewards	0.51*** (5.4)	0.045	0.21* (1.99)	0.034	0.17 (1.23)	0.016	0.28*** (2.85)	0.069
Log likelihood	-1911.8		-1321.2		-847.7		-1321.6	
LR Chi- square	577.8***		566.16***		166.6***		547.9***	
Pseudo-R2	0.16		0.17		0.10		0.18	
N° of observations	2502		2674		2282		2316	

Panel C. Effect of rewards program by merchant activity and type of reward

	Grocery Stores	m.e	Supermarkets	m.e	Department stores	m.e	Boutiques	m.e
Discounts	0.04 (0.23)	0.001	0.16*** (2.84)	0.039	0.32*** (2.70)	0.05	-0.02 (-0.14)	-0.004
Points	-0.34** (-2.14)	-0.012	0.12 (1.24)	0.028	0.24** (2.32)	0.04	0.12 (1.27)	0.029
Gifts	-0.18 (-0.59)	-0.006	0.02 (0.1)	0.004	0.35 (1.59)	0.05	0.1 (0.52)	0.022
Cash-back	0.19 (0.84)	0.008	0.26*** (3.73)	0.064	0.49** (2.54)	0.07	0.52*** (3.16)	0.113
Log likelihood	-606.4		-1459.6		-1235.1		-1394.3	
LR Chi- square	251.6***		924.7***		879.4***		1005.1***	
Pseudo-R2	0.17		0.2406		0.26		0.26	
Nº of observations	2691		2825		2778		2794	

	Gas stations	m.e	Restaurants	m.e	Parking and tolls	m.e	Hotels and travel	m.e
Discounts	0.46*** (4.49)	0.114	0.04 (0.35)	0.006	0.06 (0.41)	0.006	0.26** (2.37)	0.062
Points	0.25*** (2.69)	0.062	0.22** (2.13)	0.036	0.18 (1.40)	0.018	0.08 (0.85)	0.021
Gifts	0.22 (1.26)	0.054	0.15 (0.86)	0.026	0.21 (0.86)	0.019	0.07 (0.36)	0.017
Cash-back	0.38** (2.53)	0.095	-0.11 (-0.68)	-0.017	0.34* (1.80)	0.037	0.07** (2.45)	0.018
Log likelihood	-1453.9		-1244.9		-822.3		-1318.9	
LR Chi- square	546.7***		574.3***		172.6***		546.9***	
Pseudo-R2	0.15		0.18		0.09		0.17	
Nº of observations	2502		2674		2282		2316	

6. Economic impact of the incentive programs

6.1. Methodology

- We investigate **the economic impact of incentive programs on the use of payment instruments comparing the use of cards (relative to cash) between cardholders enjoying any type or rewards and those without rewards.**

- In order to perform this analysis, the main ingredients are the predicted usage shares assigned to cards relative to cash from previous logit estimations.

- The main aim of this empirical analysis is to extrapolate the sample estimations of the impact of rewards on cards vs. card usage to
  - i) All cardholders, debit cardholders and credit cardholders.
  - ii) Eight different merchant sectors.

- We then need to compute the average shares for each one of these groups using a representative weighting factor across these groups in Spain.

- According to logit estimations **age seems to be an appropriate discriminating factor** and it is the only continuous variable within the set of explanatory factors. To compute this average, we first compute the share of card usage (relative to cash) for consumers of different ages year by year from 17 to 70 years old. Secondly, we compare the (age) weighted average for reward receivers and non-reward receivers.

- Estimating card usage shares for both groups reveals to what extent reward receivers use their payment cards relative to non-reward receivers.

- To analyze differences between both types of consumers, the quantitative indicator Reward Impact (RI) is then computed as:

$$RI = \left(\sum_{m=17}^{n=70} \text{weighted card share(with incentives)}_{ij}\right) - \left(\sum_{m'=17}^{n'=70} \text{weighted card share(without incentives)}_{ij}\right)$$

- Only if RI>0, the incentive programs will be useful tool to change the preferences of consumers to increase payment cards usage relative to cash.

- Then, We examine the total impact by merchant sectors (RIS):

$$RIS_j = \sum_{i=1}^{4} (RI_{ij} * \text{share of reward } i \text{ in our sample across sectors } j)$$

$$\forall j = 1,....8 \text{ (commercial sectors)}$$

$$\forall i = 1,....4 \text{ (incentive programs)}$$

- The RIS is also estimated for different types of rewards across merchant sectors (RIR). It analyzes the impact of both the type of rewards and the type of card for all sectors considered jointly.

$$RIR_j = \sum_{j=1}^{8} (RIS_{ij} * GDP \text{ of merchant activity } j \text{ over aggregate GDP})$$

$$\forall j = 1,...,8 \text{ (commercial sectors)}$$

$$\forall i = 1,...,4 \text{ (incentive programs)}$$

Finally, we will estimate the macroeconomic effect (total impact) across sectors and individuals as the sum of all the previous effects.

6.2 The effect of the incentive programs on cash substitution by merchant sector (RIS)

- **Table 5** shows the predicted share of card usage relative to cash across merchant sectors for three different categories of cardholders (all cardholders, debit cardholders and credit cardholders).

- As expected, **the average use of cards relative to cash appears to be larger for cardholders holding cards with incentive programs**. Debit and credit cardholders buying at department stores that may benefit from points, gifts and cash-back exhibit a significantly higher use of cards, with the RI indicator being 3.7%, 4.9% and 6.8%, respectively. Mean-difference tests reveal that differences across type of rewards are statistically significant at 5% level.

- Other groups showing a high economic impact of rewards on cards vs. cash are cardholders buying at gas stations where they can benefit from discounts and cash-back (11.2% and 9.3%) as well as debit cardholders paying at gas stations where they can potentially benefit from cash-back options (13.5%).

- Table 5 also shows that the effect of rewards on the use of cards also varies depending on the type of rewards and depending on the type of card employed. As for the aggregate effect of rewards by sector (RIS) and type of card, the positive effect of rewards on the usage of cards relative to cash is found for all merchant activities and for debit and credit cardholders with the only exceptions of both debit and credit cardholders buying at grocery stores and supermarkets.

Table 5. Rewards' Impact (RI & RIS) by reward type and merchant sectors

Merchant sectors	Type of cardholder	RI				RIS
		DISCOUNTS	POINTS	GIFTS	CASH-BACK	REWARDS
Grocery Stores	All cardholders	0.001	-0.012	-0.006	0.008	-0.006
Supermarkets	All cardholders	0.037	0.027	0.004	0.061	0.064
Department stores, superstores, etc.	All cardholders	0.048	0.037	0.050	0.068	0.086
Boutiques and clothing stores and footwear	All cardholders	-0.004	0.028	0.022	0.113	0.031
Gas stations	All cardholders	0.112	0.061	0.053	0.094	0.123
Restaurants	All cardholders	0.006	0.036	0.026	-0.017	0.034
Parking and tolls	All cardholders	0.006	0.018	-0.019	0.037	0.016
Hotels and travel	All cardholders	0.062	0.020	0.016	0.018	0.069
Grocery Stores	Debit cardholders	0.000	-0.006	-0.003	0.006	-0.001
Supermarkets	Debit cardholders	0.029	0.051	-0.017	0.062	0.057
Department stores, superstores, etc.	Debit cardholders	0.084	0.043	0.082	0.069	0.111
Boutiques and clothing stores and footwear	Debit cardholders	0.056	-0.023	-0.074	0.123	0.035
Gas stations	Debit cardholders	0.058	0.057	0.145	0.135	0.091
Restaurants	Debit cardholders	-0.008	0.054	0.007	0.005	0.056
Parking and tolls	Debit cardholders	-0.011	0.039	-0.021	0.014	0.016
Hotels and travel	Debit cardholders	0.067	-0.011	-0.033	0.030	0.058
Grocery Stores	Credit cardholders	0.001	-0.012	-0.007	0.008	-0.008
Supermarkets	Credit cardholders	0.036	0.011	0.012	0.061	0.069
Department stores, superstores, etc.	Credit cardholders	0.019	0.028	0.025	0.066	0.060
Boutiques and clothing stores and footwear	Credit cardholders	-0.038	0.063	0.066	0.118	0.026
Gas stations	Credit cardholders	0.133	0.053	0.017	0.058	0.128
Restaurants	Credit cardholders	0.014	0.018	0.025	-0.038	-0.001
Parking and tolls	Credit cardholders	0.021	-0.003	-0.014	0.038	0.011
Hotels and travel	Credit cardholders	0.063	0.039	0.031	0.018	0.076

6.3 The impact of rewards programs by of type reward and sectors: controlling for merchant's acceptance

- **Table 6** analyzes the impact of both the type of rewards and the type of card for three different groups of sectors depending on merchant's acceptance:
  - Grocery stores and parking and tolls are considered in **group 1** with very low use of cards.
  - Supermarkets, boutiques and clothing, gas stations, restaurants, hotels and travel and leisure are jointly considered in **group 2.** This is potentially the benchmark group since both cash and cards are generally accepted by merchants and, therefore, preferences may play a more significant role in the choice of the payment instrument.
  - Finally, **group 3** incorporates department stores and superstores where card payments are typically far more frequent than cash, mainly as a consequence of the larger size of transactions.

- As shown in Table 6, the impact of rewards is 8.7% and 8.6% for cardholders enjoying rewards programs in groups 2 and 3, respectively. The differences between both groups are not found to be statistically significant according to mean-difference tests (not shown).

- However, as expected**, the impact is considerably lower (1.4%) in merchant sectors under group 1 and the differences with the other two groups are found to be statistically significant.** The results also show differences in the behavior of debit and credit cardholder across sectors.

- The impact of rewards seems to be considerably higher for debit cardholders.

Table 6. Aggregate rewards impact indicator by groups and type of rewards

		RIR				TOTAL IMPACT
		DISCOUNTS	POINTS	GIFTS	CASH-BACK	OF REWARDS
All cardholders	Group 1	0.006	0.015	-0.018	0.034	0.014
	Group 2	0.070	0.045	0.036	0.059	0.087
	Group 3	0.048	0.037	0.050	0.068	0.086
Debit cardholders	Group 1	-0.010	0.035	-0.019	0.013	0.014
	Group 2	0.044	0.040	0.062	0.087	0.073
	Group 3	0.084	0.043	0.082	0.069	0.111
Credit cardholders	Group 1	0.019	-0.004	-0.013	0.035	0.009
	Group 2	0.080	0.041	0.023	0.038	0.084
	Group 3	0.019	0.028	0.025	0.066	0.060

Group 1: grocery stores and parking and tolls
Group 2: supermarkets, boutiques and clothing, gas stations, restaurants, hotels and travel and leisure
Group 3: department stores and superstores

Note: The weight for each merchant sector corresponds to the percentage of this sector in the GDP (2005): grocery stores (.002%), supermarkets (0.049%), Department stores (0.445%), boutiques (0.033%), gas stations (0.265%), restaurants (0.099%), parking and tolls (0.023%), hotels and travel (0.083%). These values have been normalized by 1 in each group.

7. Conclusions

- We show that rewards programs can also significantly affect the preferences for cards relative to cash payments and that the marginal effect of these programs is the higher among the posited set of explanatory factors.

- Importantly, the effects of these rewards vary significantly among merchant sectors and the impact of rewards on card usage is higher for debit cardholders that for credit cardholders.

- Policymakers should have a closer look at the structure of incentives in the payment industry and the path of substitution of cash by card payments.

- At the same time, the large expenses that card issuers undertake on incentive programs need to be confronted with the effectiveness of the different rewards programs on card usage (relative to cash) across merchant activities.

- Finally, the monetary value of the total impact of rewards show that, debit cardholders with rewards increase the value of purchases by 326,89 Euros for every 100 transactions they make. In the case of credit cards, this value of extra sales is 531,1 Euros.