Macrothink Institute™

Business and Economic Research
ISSN 2162-4860
2023, Vol. 13, No. 1

Exploring Attitude toward Virtual Bank Cards Using Nudge Theory and Experimental Analysis

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Received: December 17, 2022 Accepted: January 19, 2023 Published: January 27, 2023

doi:10.5296/ber.v13i1.20703 URL: https://doi.org/10.5296/ber.v13i1.20703

Abstract

Purpose: The study aimed to investigate Greek consumers' attitudes and actual behavior toward virtual bank cards and to show whether Experimental Economics can incentivize these banking products.

Methodology: For data collection, a specially designed experiment was conducted among Greek consumer samples according to Experimental Economics and Nudging Theory principles. Econometric analysis was conducted through Multi-level Models and Bivariate statistical tests.

Results: Results suggest that demographic characteristics such as age combined with personalization and consumer risk perception play an important role in virtual bank card adoption. The youngest consumers are optimistic about their use, while the oldest are negative. Furthermore, Experimental Economics and Nudging Theory could identify behavioral changes.

Novelty: The study's novelty and uniqueness are based on investigating Greek consumers' attitudes and behavior towards new and innovative banking products, which still need to be well known. The research methodology is also a groundbreaking feature of the study, as Experimental Economics is the most appropriate method to study human behavior and its unconscious influencing factors that cannot be studied in other ways.

Keywords: Virtual bank cards, Auction, Experiment, Nudge, Multi-level Models

1. Introduction

Nowadays, innovative transaction channels, including the banking system, are necessary. Payment method choice depends on the characteristics of the transaction, such as the payment

amount or the store where the transaction is conducted, on the characteristics of the payment method, such as its acceptance and transparency, and even on the individual's factors (Soman, 2003; Arango et al., 2011; Runnemark et al., 2015). These personal factors refer to behavioral elements such as culture, compulsive behavior, and materialism, sense of ownership, mostly in purchases with cash, and could even influence the type of goods purchased (Medina et al., 1996; Chatterjee & Rose, 2012; Kamleitner & Erki, 2013; Anysiadou, 2022). If the payment method ensures contactless transactions, which is nowadays an imperative necessity to manage our finances, it can be very effective and make consumers' lives easier. Despite the liquidity constraints during Covid 19 period, Greek consumers still widely use cash as a payment method over other alternative methods such as bank cards and electronic banking services (Anysiadou, 2021), which shows that the familiarity with these banking services is low and that it is crucial further to investigate people's perceptions towards innovative banking products. Consequently, integrating virtual banking into Greeks' lives in the form of using electronic banking services could be a solution to this problem and lead to a cashless society in the short term (Worthington, 1995; Liao et al., 1999; Oezcan et al., 2013; Fabris, 2019). Therefore, it is necessary to investigate Greek consumers' attitudes towards these services, particularly virtual bank cards, and to uncover the factors that promote or discourage their use. Since products such as virtual bank cards are very new and almost unknown to consumers, the research methodology that ensures the best results by studying human behavior and its unconscious influencing factors in depth, especially among Greek consumers unfamiliar with innovative banking services, is Experimental Economics. This methodology focuses on human behavior, combining information and promotions with Nudging Theory. The last is a method in which individuals are unconsciously nudged in a specific direction through specially designed experiments to achieve a general collective and later individual benefit (Kagel & Roth, 1995; Thaler & Sunstein, 2008; Thaler et al., 2012). Therefore, the present study aims to identify Greek consumers' attitudes towards virtual bank cards and, in a second step, to promote their use through Experimental Economics and specially designed experiments. The first unit contains the introduction, and the second is the literature review—the third, fourth and fifth comprise research hypotheses and methodology with descriptive and econometric results. The sixth, seventh and eighth units include the research's discussion, conclusions, limitations, and implications. The bibliography is listed at the end.

2. Literature Review

Virtual banking, with its services and products, is increasingly established globally, providing consumers and merchants benefits of better, faster, less costly, and more productive transactions, even in cases where cash is the most preferred way of paying (Li & Zhong, 2005; Jonker, 2007; Polasik et al., 2013; Niranjanamurthy, 2014; Arifovic et al., 2017).

Demographics, and especially an individual's age, have been ultimately important factors in investigating how people choose to pay worldwide. It has also proven to be one of the leading indicators of adopting new technological banking applications and services and separating them from traditional means of payment. The youngest bank clients, such as generation Y, aged 18 to 35, choose innovative banking services and products over traditional ones,

extensively use virtual banking services over visiting a physical bank branch, but also choose to pay using bank cards instead of cash in their various transactions, compared to the oldest, who remain attached to the use of traditional banking ways (Howcroft et al., 2002; Kolodinsky et al., 2004; Laforet & Li, 2005; Kosse & Jansen, 2013; Cohen & Rysman, 2013; Essselink & Hernandez, 2017; Jonker et al., 2018). Individuals' technological and educational backgrounds and ages are particularly noteworthy. The youngest who prefer electronic banking services are also highly aware of technology (Szopinski, 2016; Berger & Gensler, 2007; Chau & Ngai, 2010; Borzekowski et al., 2008). Electronic banking services' awareness, combined with consumers' appropriate information, mainly when provided by the bank's promotional and informative actions, can also shape positive perceptions regarding their usability and ease of use, concluding in a positive attitude and adoption of those bank products. (Ali & Kaur, 2015; Mohammadi, 2015). Specifically, when the user receives immediate, accurate, and exciting information regarding his transactions from the banking applications, there is an increase in satisfaction and belief that he is achieving profitable financial transactions. (Tam & Oliviera, 2016). On the contrary, incorrect information, lack of transparency, and the perception that banking products and services have some financial, security, and privacy risk, especially in online transactions and in the oldest clients, could dramatically reduce using electronic banking services and bank cards. (Fragata et al., 2018; Mohammad, 2012; Arif et al., 2020; Dixit & Datta, 2010; Zheng et al., 2012; Khalid et al., 2013). Wang & Lin (2019) found that in contactless bank cards, individuals' security and privacy risk during use reduces their use and trust in these products. Consumer's trust in the bank, referring to the reliability of its products and services, the fulfillment of requirements, and customer transactions' security, is an essential indicator of forming a positive attitude and enhancing usage (Mwiya et al., 2017; Aboobucker & Bao, 2018). An important promoting factor that increases the client's satisfaction and loyalty to the bank could also be the personalization of those banking products, i.e., banking services and products' adaptation according to the client's particular needs, giving him the possibility of managing them on his own (Altobishi et al., 2018; Agrawal et al., 2017). At young ages, perceived social image derived from innovative banking products use, such as mobile banking and bank cards, is also a driving force that strongly influences the adoption (Bidar et al., 2014; Khare et al. al., 2012; Khan et al., 2015). Furthermore, feeling that they belong to a more sophisticated class, enchasing the feeling of prestige, increases the product' usability, make them more trusted, and consequently recommends them in their social environment (Mamunur-Rashid & Islam, 2019; Mohammadi, 2015; Malaquias & Hwang, 2016; Abbas et al., 2018). It is worth mentioning that when the recommendation and, therefore, the positive or negative impressions of specific banking products are made through social media, as happened nowadays, the importance of investigating those perceptions is of exceptional value (Laukkanen, 2016; Mehrad & Mohammadi, 2017).

3. Hypothesis Development

The use of new bank cards, such as contactless and virtual bank cards, are the latest innovative products in the banking system, which provide countless benefits for both the consumer and the merchant, significantly increasing the intention to consume. Choosing a

payment method is a personal process, with compatibility and perceived risk being critical drivers of adoption and avoidance (Trütsch, 2014; Trütsch, 2020; Wang & Lin, 2019; Waraporn et al., 2009). Existing users of bank cards are willing to replace their use with new and innovative products such as online bank cards. (Trütsch, 2020) therefore the following research questions are worthy of investigation:

Research questions:

H1: What is the general attitude of Greek consumers (youngest and oldest) toward virtual bank cards?

H2: Is there any difference in their attitude (for youngest and oldest) toward either a simple or a personalized virtual card?

H3: Could a change in their behavior (either in the youngest or oldest sample) toward virtual bank cards be achieved?

4. Research Methodology

4.1 Experiment's Description

The specific study sample consisted of 36 people of different ages, with half being the sample of the youngest (25 to 40 years old) and the remaining 18 being the sample of the oldest, aged 41 to 60 years. The experiment's duration was three months (January to March 2021), and the econometric program STATA 16 was used to conduct the analysis. The experiment consisted of three parts. In the first stage, the participants attempt to answer questions from a specially designed questionnaire regarding their perceptions and attitudes towards bank cards and virtual bank cards and the latter's use. Then, the second stage followed, where we created the two groups that played a private value sealed first-price auction game related to virtual bank cards. In the third stage, all the participants answered again to a specially designed questionnaire about their intention to use virtual bank cards in the future.

4.2 The Auction Game

The research methodology was based on the symmetric model of independent private value, sealed bid first price (Kagel, 1995; Krishna, 2010), with the payoff function of each player being (Krishna, 2010):

$$\Pi_i = \begin{cases} \chi_i - b_i, & \text{εάν } b_i > \max_{j \neq i} b_j \\ 0, & \text{εάν } b_i < \max_{j \neq i} b_j \end{cases}$$

Payoff function of each player

Where ***Πi*** is the payoff function of each player, xi is the auctioned good's value shown to the subject, and each xi is independently and identically distributed over an interval [0, ω]. ***bi*** is the subject's bid during the auction process, and max ***j≠i bj*** is the other's bid. Through this

process, the subject's motivations are revealed; since each chooses the offer, he will submit for the acquisition of a good without knowing others' decisions and finally pay the price of the bid he submitted if he wins. More specifically, players are divided into groups and get at their disposal some experimental money each (worth 10 euros in each round). Then they were invited to declare simultaneously for each round, and a total of nine rounds concerning the value of the good that was automatically shown to them if they wished to acquire a hypothetical good being auctioned (bank cards). The round winner would be the one who would offer the maximum, with a profit displayed good's value minus the offer. The other subjects were the losers for that round with a profit of 0 euros. The subject which won most of the time in all three rounds was assigned the hypothetical good. Subjects at the end of each round were informed about the possibility of being winners. Also, they knew their profit and the total money collected until that round. The first three rounds constituted the control period, followed by the subsequent two periods, where treatment variables (Different variables per three rounds) were entered, in the form of hypothetical scenarios and good, to examine individuals' behavior. Every three rounds, the hypothetical good and, thus, the treatment variable were announced verbally and through a picture combined with a hypothetical scenario. Subjects stated their bid relative to their desire to obtain it. Subjects received the previous day's written instructions, which were also explained orally, in combination with solving questions before the start of the game, ensuring that all participants knew how to play the game. No communication between the participants before and during the experiment was allowed, and the game duration was an average of 80 minutes. Subjects took a 2 euro show-up fee reward for participating in the experiment. At the same time, the winner's winnings were calculated through the random incentive lottery mechanism, referring to a single round for subjects to play under natural conditions and to reveal their actual behavior.

4.3 Control-Treatment Periods

The first three rounds constituted the control period, where subjects presented a hypothetical scenario and a picture of a hypothetical simple debit card. They knew that this particular bank card had the same features as their other bank cards, with some additional facilities for electrical items. The first treatment variable was introduced from the fourth to the sixth round. Thus, a new good was auctioned, a simple virtual bank card whose usage and characteristics were verbally and visually communicated. From the seventh to ninth round, a new auction item appeared, which constituted the second treatment variable; where in this period, it was a personalized virtual bank card, having the same characteristics as the previous one, with the additional possibility of personal settings such as the indication of ownership or some more personalized settings (personalization). All the cards are illustrated in Figure 1.

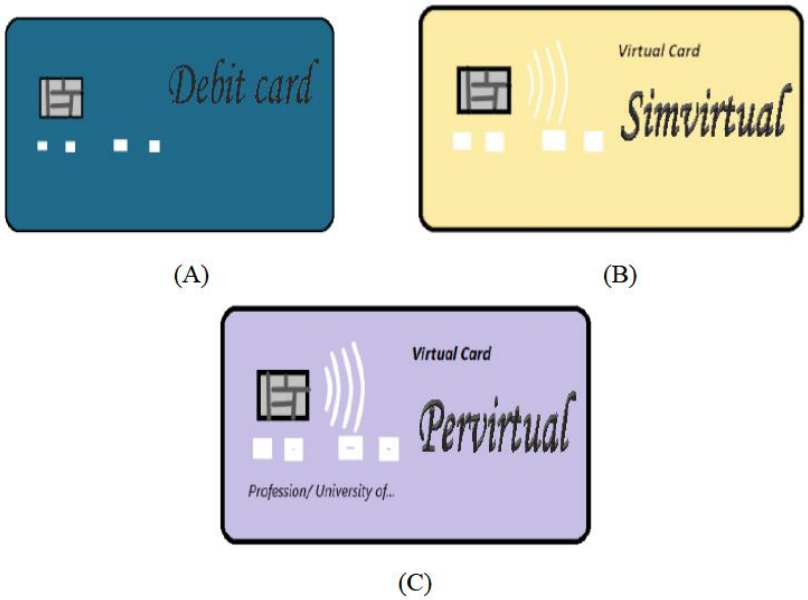

Figure 1. (A) Debit Card for control period, (B) Simvirtual= Simple Virtual Card and (C) Pervirtual= Personalized Virtual Card; treatment variables

5. Data Analysis and Results

5.1 Initial Attitude toward Bank Cards (First Stage)

Table 1 shows the descriptive statistics results from the first part of the experiment, revealing subjects' awareness of using virtual bank cards and their attitude towards those products compared to cash usage during their transactions. It is worth noting that in both samples, bank card use' awareness was relatively high. At the same time, most of the youngest declared a positive attitude toward using bank cards and a negative or neutral attitude toward virtual bank cards. In the oldest sample, most have a positive attitude toward bank cards and virtual bank cards.

Table 1. Subjects' perceptions toward bank cards and virtual bank cards

Age group:	**25-40**	**41-60**
Awareness toward bank cards		
Yes	72%	72%
No	28%	28%
Attitude toward bank cards		
Positive	72%	83%
Negative/Neutral	28%	17%
Attitude toward Virtual bank cards		
Positive	44%	78%
Negative/Neutral	56%	22%

5.2 Attitude toward Virtual Bank Cards (Second Stage)

5.2.1 Descriptive Statistics

Figure 2 and 3 describe subjects' behavior through the game. Figure 2 shows the average bid per period (control-Treatment) and age group, while Figure 3 pictures the average bids per round and age group. It is evident in both graphs that as the rounds pass and move from the control period to the treatment periods, there is a change in bids for both samples. Specifically, in Figure 2, after the control period, when the first virtual bank card (simple virtual) was introduced (treatment period), the average of the youngest bids increased from 0.81 to 0.92. In contrast, the oldest ones decreased from 0.80 to 0.79. Additionally, in the second treatment period, where the personalized virtual bank card was introduced, the average of the youngest bids increased from 0.92 to 0.96. At the same time, the oldest decreased even more from 0.79 to 0.68.

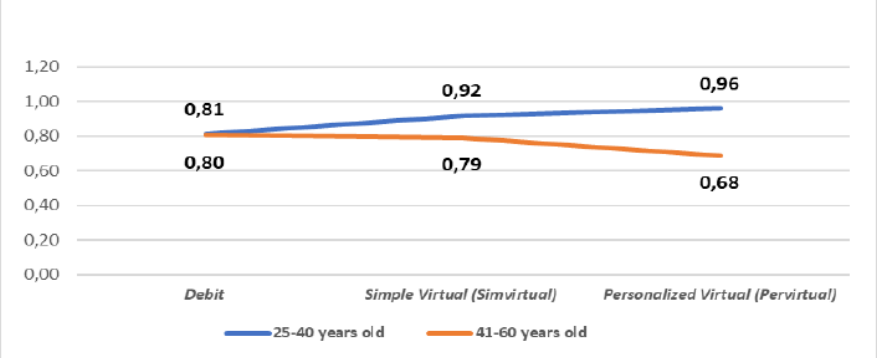

Figure 2. Subjects' behavior per periods for the two samples (Control and treatment periods)

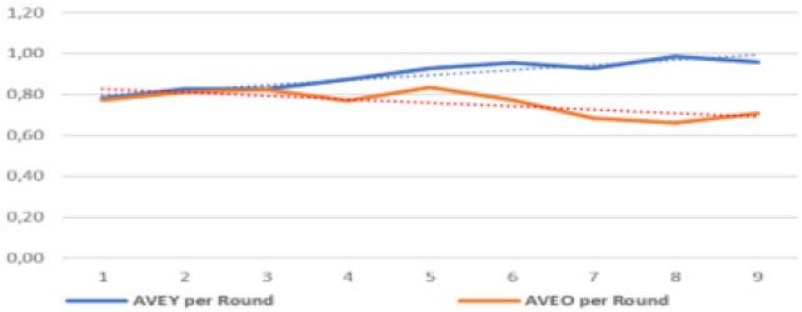

Figure 3. Subjects' behavior per group and per round

5.2.2 Econometrical Analysis

In order to answer the H1 research question and therefore inductively ascertain subjects' attitudes toward virtual bank cards, we conduct the Tobit regression models with fixed and random effects (Panel Data Estimators) for both the youngest and the oldest, based on the general estimation model in experimental data (Moffat, 2016) ds:

$$y_{it} = \alpha + \beta' \chi_{it} + \gamma' z_i + u_i + \varepsilon_{ijt}$$

$$i = 1\dots, n \qquad t = 1\dots, T$$

$$Var(u_i) = \sigma^2_u$$

$$Var(\varepsilon_{it}) = \sigma^2_\varepsilon$$

Where y_{it} is the dependent variable (outcome) for individual i in round t, the vector $\beta' \chi_{it}$ consists of explanatory variables that vary per individual but also over time. The vector $\gamma' z_i$ consists of explanatory variables that differ only between individuals and not over time. ε_{it} is the error of the equation, while u_i is the random effect of the individual.

After conducting a Hausman test, the most suitable model for determining subjects' attitudes toward virtual bank cards for the two samples was the Tobit regression of dynamic stratified data with random effects. The econometric model estimated was:

$$BidFac_{it} = \alpha + \beta_0 \, Virtualcards + u_i + \varepsilon_{it},$$

$BidFac_{it}$ is the model's dependent variable and expresses the average bid factor for each individual per period (Control-Treatment) for each age group. The ***Virtualcards*** variable is the independent dummy variable of the model. It expresses an individual's attitude when the treatment variables are entered (together). It takes the value 1 when the individual is in the treatment period and the value 0 when the individuals are in the control period. ui and εit are the individual's random effects and the equation's error, respectively. According to results shown in Table 2, it is found that introducing virtual bank cards and consequently moving to treatment periods from the control period, in the youngest group, the average bid factor increased (β=6,9 α=0.05), while in the oldest' decreased (β= -8.33, α=0.01). Therefore, it is concluded that when the treatment variables entered, the youngest people increased their bids showing a positive attitude towards those products, while the oldest reduced them, demonstrating a negative attitude.

The bid factor estimated equations for each group are as follows:

$$[1] BidFacy_{it} = 13.52^{***} + 6.9^{**} \, Virtualcards + u_i + \varepsilon_{ijt}$$

$$[2] BidFace_{it} = 24.98^{***} - 8.33^{***} \, Virtualcards + u_i + \varepsilon_{it}$$

[1] Bid factor equation for the youngest' sample, with dependent variable ***BidFacyit***
[2] Bid factor equation for the oldest' sample, with dependent variable $BidFace_{it}$

Table 2. Tobit Models for the average bid of each sample

Tobit Models	***Sample: Youngest***			***Sample: Oldest***		
	(25 to 40 years old)			***(41 to 60 years old)***		
Independent Variables	**Estimated Coefficients**	SE	Z	**Estimated Coefficients**	SE	Z
Intercept	13.52***	2.82	4.78	24.98***	4.96	5.03
VirtualCards	6.9**	3.33	2.07	-8.33***	3.10	-2.69
Variance components						
Between-subject (sigma_u_i)	3.98	3.05	1.30	8.03**	3.19	2.51
Within-Subject (sigma_ε_{it})	6.75***	2.23	3.02	3.46***	1.08	3.21
Wald Chi2	4.28***			7.23***		
Loglikelihood	-44.25			-39.53		
Prob Chi2	0.03			0.00		

***, ** and * indicate the significance level of 1, 5 and 10% respectively

5.3 Attitude toward a Simple Virtual and a Personalized Virtual Bank Card (Second Stage)

5.3.1 Descriptive Statistics

Previous findings about subjects' attitudes toward virtual bank cards were confirmed and further strengthened by Figure 4 and 5, which depict subjects' behavior per round and period for every treatment variable separately. Expressly, it is confirmed that for the youngest, when both the variables of virtual bank cards (Simple virtual and personalized virtual bank cards) entered, the youngest increased their average bid, while the oldest decreased their bids.

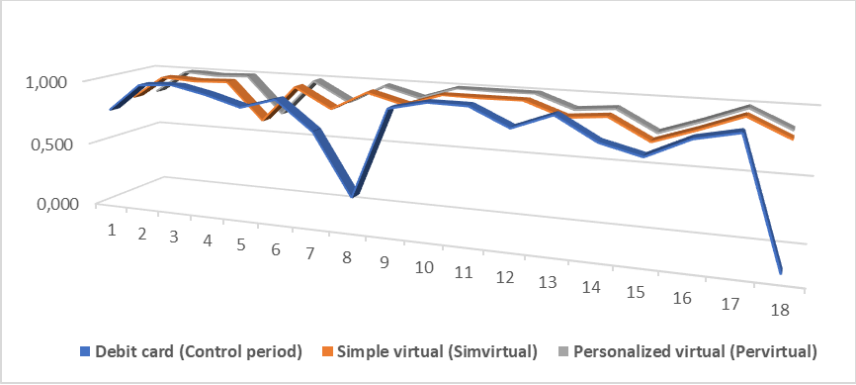

Figure 4. Subjects' behavior toward different bank cards, per round for the youngest

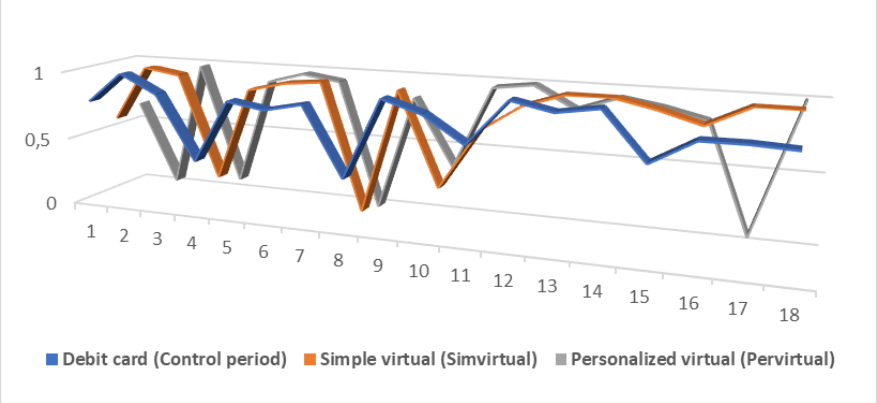

Figure 5. Subjects' behavior toward different bank cards, per round for the oldest

5.3.2 Econometrical Analysis

Again, to investigate econometrically the results of descriptive statistics, a set of Multi-level Tobit regression models were carried out for each group separately, which can prevent any dependence or censoring problem of the experimental data. The dependent variable was the individual's bid per round, while treatment variables were the independent variables in combination with other significant variables.

Econometric models based on a Two-level Tobit regression model clustering at the subject's level and a Three-level Tobit regression model, clustering at the subject's and group level, which is as follows (Moffatt, 2016):

$$Bid_{ijt} = \alpha + \beta' \chi_{it} + \gamma' z_i + u_i + \upsilon_j + \varepsilon_{ijt}$$
$$i = 1\dots, n \qquad j = 1\dots, J \qquad t = 1\dots, T$$
$$Var(u_i) = \sigma^2_u$$
$$Var(\upsilon_j) = \sigma^2_\upsilon$$
$$Var(\varepsilon_{it}) = \sigma^2_\varepsilon$$

$\boldsymbol{Bid_{ijt}}$ is the dependent variable expressing the subject's offer $\boldsymbol{i}$ in group $\boldsymbol{j}$ and round $\boldsymbol{t}$. Vector $\boldsymbol{\beta' \chi_{it}}$ consists of explanatory variables that vary per subject but also over time, and the vector $\boldsymbol{\gamma' z_i}$ consists of explanatory variables that differ only between subjects and not over time. $\boldsymbol{\varepsilon_{ijt}}$ is the error of the equation, while $\boldsymbol{u_i}$ is the individual random effect, and $\boldsymbol{\upsilon_j}$ is the group random effect.

Therefore, according to the above, the econometric model that was estimated for both age groups was:

$$\boldsymbol{Bid_{ijt} = \alpha + \beta_0\ Privatevalue + \beta_1\ Simvirtual + \beta_2\ Pervirtual + \beta_3\ N + \beta_4\ Win + \beta_5\ Cashbalance + u_i + \upsilon_j + \varepsilon_{ijt}}$$

$\boldsymbol{Bid_{ijt}}$ was the dependent variable denoting subjects' bids per round. In contrast, ***Simvirtual*** and ***Pervirtual*** variables were independent dummy variables (treatment variables) that take the value 1 when the individual is in the treatment period for simple virtual and personalized virtual bank cards, respectively, and the value 0 in any other case. ***Privatevalue*** and ***Cashbalance*** quantify the good's value and money collected each round for every participant. At the same time, N and Win were the numbers of the group and the possibility of being the round winner. $\boldsymbol{u_i}$, $\boldsymbol{\upsilon_j}$, and $\boldsymbol{\varepsilon_{ijt}}$ are the personal and random group effects.

For the youngest group (25 to 40 years old), it was found that the optimal Multi-level Tobit regression model is model III with clustering at the subject level, as can be seen from Table 3, which also contains the corresponding goodness-of-fit indices (Hox & Roberts, 2011). Specifically, when the treatment variables of virtual bank cards were entered, there was an increase in subjects' bids ($\beta_{Simvirtual}$=5.99, $\beta_{Pervirtual}$=8.20), with a significant statistical level of 1%. At the same time, a positive effect on subjects' bids was also found to have the good's value (β= 0.58, $p<0,01$) and the possibility of being the round winner (β=5.29, $p<0,05$). In contrast, group number and money collected did not affect the bids. Concluding and answering the H2 research question partially, the youngest demonstrated a positive attitude

toward simple virtual and a more positive one toward personalized virtual bank card.

The two-level Tobit regression estimation equation regarding subject's offer per round in the youngest age group is as follows:

$$Bid_{jt} = 4.42^{*} + 0.58^{***}Privatevalue + 5.99^{***} Simvirtual + 8.20^{***} Pervirtual + 5.29^{***}N + u_i + \varepsilon_{it}$$

According to the oldest sample (41 to 60 years old), it was found that the optimal Multi-level Tobit regression model is the IV model with clustering at subject and group levels, as illustrated in the results of Table 4.

Again, there is a clear indication regarding the oldest's attitude toward every virtual bank card separately when the first treatment variable (Simvirtual) entered, subjects bid lower ($\beta_{Simvirtual}$= -3.24, p<0,10), and when the second treatment variable appeared (Pervirtual), bids decreased even more ($\beta_{Pervirtual}$= -10.16, p<0,01).

So, the oldest had a negative attitude toward simple virtual and a more negative one toward the personalized virtual bank card, which answered the H2 research question. Regarding the rest of the independents, it found that the good's value, the possibility of being a round winner, and cash balance positively influenced the bids ($\beta_{Privatevalue}$=0.32, βWin=10.16, $\beta_{Cashbalance}$= 0.39).

The Three-Level Tobit regression estimation equation for the oldest is as follows:

$$Bid_{ijt} = 10.02^{***} + 0.32^{***} Privatevalue - 3.24^{*} Simvirtual - 10.16^{***} Pervirtual + 10.16^{***} Win + 0.39^{***} Cashbalance + u_i + v_j + \varepsilon_{ijt}$$

Table 3. Multi-level Tobit Models for the youngest (25 to 40 years old)

	Model I (One-Level Model)			Models II and III (Two-Level Models)					
Independent Variables	**Estimated Coefficients**	**SE**	**Z**	**Estimated Coefficients**	**SE**	**Z**	**Estimated Coefficients**	**SE**	**Z**
Fixed Effects									
Intercept	5.58**	2.72	2.08	5.34*	3.10	1.72	4.42*	2.32	1.91
Privatevalue	0.57***	0.02	23.10	0.58***	0.02	24.27	0.58***	0.02	24.39
Simvirtual	6.15***	2.22	2.77	6.14***	2.08	2.95	5.99***	2.06	2.90
Pervirtual	8.38***	2.23	3.75	8.41***	2.10	4.00	8.20***	2.06	3.97
N	-0.68	1.92	-0.36	-0.79	2.73	-0.29	-	-	-
Win	7.87***	2.61	3.01	5.55**	2.65	2.09	5.29**	2.60	2.03
Cashbalance	-0.05	0.13	-0.39	-0.08	0.16	-0.50	-	-	-
Variance components									
Random intercept variance:									
Individual	-	-		17.68	10.74		17.36	10.53	
Residual Variance	131.31	14.71		114.38	13.66		114.80	13.69	
RICC:									
Individual	-	-		0.13	0.07		0.13	0.07	
Fit statistics									
Log-Likelihood	-619.380			-616.101			-616.241		
Wald chi2	876.59			954.92			951.42		
Prob chi2	0.000			0.000			0.000		
AIC; BIC (DF)	1254.761;1279.462(8)			1250.203; 1277.992 (9)			1246.483;1268.097(7)		
Likelihood ratio test				6.56			6.49		
Prob chi2				0.005			0.005		

*, **, *** indicate the significance level of 1, 5 and 10% respectively. Standard error (SE) and goodness-of-fit indices, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are also depicted.

Table 4. Multi-level Tobit Models for the oldest (41 to 60 years old)

	Model I (One-Level Model)			Model II (Two-Level Model)			Models III and IV (Three-Level Models)					
Independent Variables	**Estimated Coefficients**	**SE**	**Z**	**Estimated Coefficients**	**SE**	**Z**	**Estimated Coefficients**	**SE**	**Z**	**Estimated Coefficients**	**SE**	**Z**
Fixed Effects												
Intercept	10.31***	2.61	3.95	9.55***	3.55	2.69	9.88**	4.26	2.32	10.02***	3.06	3.27
Privatevalue	0.30***	0.02	12.54	0.32***	0.020	16.10	0.32***	0.02	16.11	0.32***	0.02	16.13
Simvirtual	-2.84	2.21	-1.29	-3.11*	1.77	-1.76	-3.24*	1.77	-1.83	-3.24*	1.77	-1.83
Pervirtual	-9.62***	2.30	-4.17	-9.95***	1.96	-5.08	-10.15***	1.96	-5.17	-10.16***	1.96	-5.18
N	0.25	0.44	0.57	-0.22	0.90	0.25	0.05	1.09	0.05	-	-	-
Win	1.32***	2.47	5.33	10.27***	2.06	4.98	10.17***	2.06	4.93	10.16***	2.06	4.93
Cashbalance	0.29***	0.08	3.58	0.36***	0.11	3.19	0.39***	0.11	3.36	0.39***	0.11	3.40
Variance components/ Random intercept variance:												
Session	-	-		-	-		13.78	18.55		13.91	18.35	
Individual	-	-		52.43	20.34		39.00	19.28		38.93	19.16	
Residual Variance	125.67	14.13		73.66	8.79		73.63	8.79		73.63	8.79	
RICC:												
Session	-	-		-	-		0.10	0.13		0.11	0.13	
Individual	-	-		0.41	0.09		0.41	0.10		0.41	0.10	
Fit statistics												
Log-Likelihood	-612.882			-588.217			-587.803			-587.804		
Wald chi2	481.11			651.92			653.99			654.06		
Prob chi2	0.000			0.000			0.000			0.000		
AIC; BIC (DF)	1241.765;1266.466(8)			1194.436; 1222.224 (9)			1195.607;1226.483(10)			1193.609; 1221.397(9)		
Likelihood ratio test				49.33			50.16			50.48		
Prob chi2				0.000			0.000			0.000		

*, **, *** indicate the significance level of 1, 5 and 10% respectively. Standard error (SE) and goodness-of-fit indices, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are also depicted.

5.4 Behavioral Change toward Virtual Bank Cards (Third Stage)

5.4.1 Descriptive Statistics

The specific part investigated whether a behavioral change could be achieved through a Nudge in the form of information via the auction game. To the Nudge Theory, the way services and products are presented can influence consumers' behavior and their management, even when it comes to banking products (Hasting & Tejeda-Asthon, 2008; Carroll et al., 2009). In simple information, advertising, or even labeling/reminding, nudging interventions can increase innovative banking products' demand (Bertrand et al., 2010; Cadena & Schoar, 2011; Beatty et al., 2014; Gutmann et al., 2015). In addition, the subject's education and motivation in a specific direction could be achieved and further strengthen specific methods' importance (Biliary et al., 2017; Grunewald et al., 2017)

Figure 6, 7, and Table 5 illustrate the results of this part. Graphs show the use of virtual bank cards descriptively before and after the game, where the majority of both groups stated that they did not use them, in contrast to their answers after the game, where the majority found to have the intention to use them in a potential purchase.

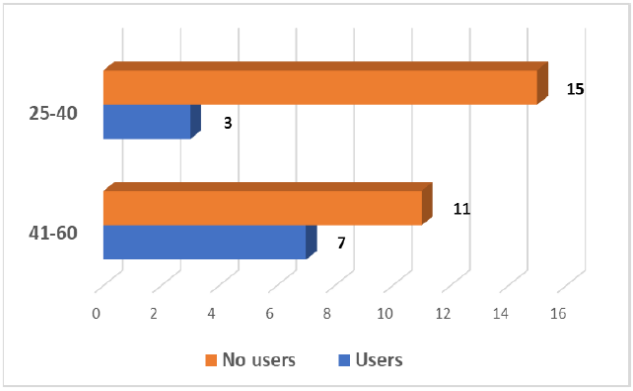

Figure 6. Virtual cards' usage for the two samples (before the game)

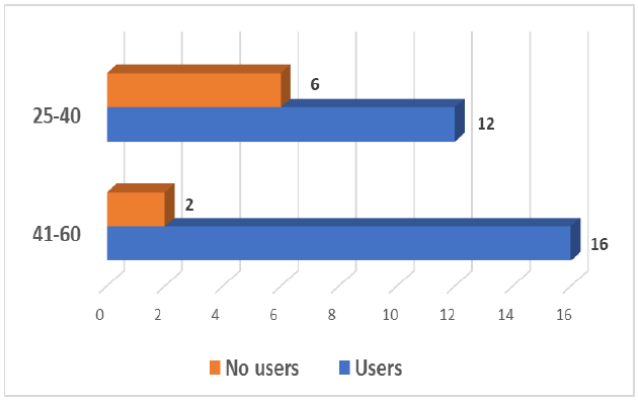

Figure 7. Virtual cards' usage for the two samples (after the game)

5.4.2 Econometrical Analysis

In order to confirm the descriptive results, Binomial statistical tests (McNemar test) were conducted, which were considered the most appropriate methods to investigate whether a behavioral change occurred through experiments and whether the treatment variables finally worked (Moffat, 2016). The results of Table 5 indicate that a change indeed occurs via the game, answering the H3 research question positively. Expressly, in both samples, the P-Value confirms that the null hypothesis is rejected; therefore, treatment variables affected subjects' attitudes toward virtual bank cards (the youngest McNemar p- value= 0.012<0.05- the oldest (McNemap-value=0.004<0.05).

Table 5. Behavioral change in using virtual bank cards for the youngest and the oldest

		After the game			
		The youngest		The oldest	
Before the game		*No use*	*Use*	*No use*	*Use*
	No use	5	10	2	9
	Use	1	2	0	7
	McNemar Test	p=0.012 < 0.05		p=0.004 < 0.05	

6. Discussion

Greek consumers' attitude towards innovative and not widely known banking products, such as bank cards, is a complex field to explore, with the results of this research being of particular interest. According to initial results, both the youngest and the oldest stated that they are aware of using bank cards and have a positive attitude toward using bank cards and virtual bank cards over cash use during their transactions. In the youngest' sample, the majority had negative or neutral attitudes about using virtual bank cards instead of cash.

In a depth investigation of actual behavior through an auction game, where individuals are asked to declare their actual intentions to adopt virtual bank cards, the results differ from the questionnaire's initial statements, pointing out that age affects individuals' behavior towards virtual bank cards. In particular, the youngest found to desire the acquisition of any virtual bank card, in contrast to the oldest who maintained the exact opposite behavior, i.e., they did not wish to acquire such banking product, which proves the negative effect of age on the adoption of new technological banking products. (Howcroft et al., 2002; Jin & DeVaney, 2005)

Moving on to a more in-depth analysis of subjects' behavior, it found that virtual bank card type and characteristics can change behavioral intention to adopt such banking products, positively when elements of prestige and image are projected through the use and negatively when the consumer considers disclosure of personal information dangerous (Wang et al., 2019). The youngest are found to prefer virtual bank card and even more personalized one, demonstrating that at younger ages, a more personalized approach that highlight personal information that consumer considers vital in their social environment increases the acceptance of this payment method (Bidar et al., 2014; Khan et al., (2015). On the contrary, at the oldest, specialized products containing personal information, such as the personalized virtual bank card, were found to have the opposite effect. They were already hostile toward virtual bank cards and showed an even greater aversion to personalized virtual bank cards. The literature also confirms these findings since the fear of disclosing personal information through innovative banking products and services can prevent or reduce the use even by existing users of virtual banking (Zheng et al., 2012; Mohammad, 2012; Arif et al., 2020).

Suppose a bank wants to promote such new technological products and services. In that case, it should produce and promote specialized products that are in line with the client's desires and age, meeting the need of the youngest to demonstrate prestige in their social environment and secure transactions for the oldest. For the latest, it could also be effective to be informed about the security and protection of personal data through such innovative banking products and investigate other factors that may provide incentives for the adoption.

Finally, a behavioral change could occur through experimental economics, even in an already formed. Particularly informing individuals about virtual banking' use and benefits, familiarizing them with those bank products, create a nudge that subsequently leads to a positive intention in the adoption of previously non-users, neutral or even negative consumers. According to the literature and Nudging Theory, appropriate information could bring about a kind of familiarity that subsequently leads to new and innovative bank product usage

(Bertrand et al., 2010; Ali & Kaur, 2015; Mohammadi, 2015; Agrawal et al., 2015). To increase customer satisfaction, personalized research methodologies like experimental economics should be used to investigate individuals' actual behavior toward new and existing banking products.

7. Conclusion

This paper aimed to investigate through an experimental analysis using the nudging theory of Greek consumers' attitudes and actual behavior towards virtual bank cards. A unique econometrical analysis concluded that demographic characteristics such as age could reflect different behavior regarding these products. The youngest Greek consumers wish to use virtual bank cards, regardless of their characteristics, being influenced by their image in the social environment. On the contrary, the oldest consumers have a negative attitude towards the use, facing the fear of the unknown and interception of data. Nevertheless, through Experimental Economics, it is possible to change an individual's behavior even in already formed opinions, leading to new banking products and services.

8. Implications/ Limitations

The research's contribution is of the utmost importance since it reveals factors influencing consumers' attitudes toward virtual bank cards. Bank managers can be facilitated, promote, create or adapt their existing products according to the particular needs of their customers. Future research could isolate other elements except for consumers' age, such as the educational level, and also investigate their attitude towards other banking products that have yet to appear in the banking market to prevent any cancellation and promote their use. In addition, pessimistic, already formed consumers' attitudes toward other banking products could be changed through these processes.

Acknowledgements

This research is co-financed by Greece and the European Union (European Social Fund- ESF) through the Operational Programme «Human Resources Development, Education and Lifelong Learning» in the context of the project “Strengthening Human Resources Research Potential via Doctorate Research” (MIS-5000432), implemented by the State Scholarships Foundation (IKY)»

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