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Prize Effect: an analysis of the Nota Fortaleza program

Efeito Prêmio: uma análise do programa Nota Fortaleza

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Abstract: The purpose of this article is to analyze whether the Nota Fortaleza program fulfills its role in terms of the continuous engagement of consumers in the inspection process, since they are awarded. For this, we use a panel data model, considering different intercepts in order to control effects not observed in cross-section units. The estimated coefficients for the main indicators were statistically higher than those observed for the lagging indicators for all levels of awards, associated with a hypothesis that the contemplation in the draw affects their behavior in a future analysis window.

Keywords: Behavioural Economy; Nota Fortaleza; Event Studies.
JEL Classification: H30.

Resumo: O objetivo deste artigo é analisar se o Programa Nota Fortaleza cumpre seu papel no que tange o engajamento contínuo dos consumidores sobre o processo de fiscalização, uma vez que estes são premiados. Para isso, utilizamos um modelo de dados em painel, considerando diferentes interceptos de maneira a controlar efeitos não observados em unidades de *cross-section*. Os coeficientes estimados para os indicadores *leading* foram estatisticamente superiores aos observados para os indicadores *lagging* para todos os níveis de premiação, apontando para a hipótese de que, uma vez contemplado no sorteio, o comportamento do indivíduo é afetado em uma janela de análise futura.

Palavras-chave: Economia Comportamental; Nota Fortaleza; Event Studies.
Classificação JEL: H30.

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1. Introduction

Increasing municipal revenue is a topic that municipal administrators are constantly investigating. Mattos, Rocha and Toporcov (2013) highlight the difficulty of taxing the tertiary sector of the economy. To the extent that the total number of transactions directly affects the government's ability to audit, the authors point out that self-employed agents in the service sector have greater incentives to evade taxes, given the lower probability of audit. The tax evasion mechanism is reinforced by the lack of incentives for the consumer to act as an "inspection agent" by requesting the invoice for the product or service demanded, given the perception that their behavior, reflected in the decision to request the invoice or not, does not affect the tax base as a whole.

In this arrangement, the state has alternatives for dealing with the current tax evasion environment: i) investment in tax audit programs and greater rigidity in the punishment process, thus increasing the perceived risk of tax evasion, and ii) the adoption of incentive schemes that induce consumers to act as inspection agents in day-to-day transactions.

Thus, due to the need to encourage and make citizens aware of the socio-economic importance of taxes and the right to demand service invoices, programs such as Nota Fortaleza were created. What we see in common between this program and others in Brazilian states is the aim of stimulating citizens and influencing their behavior based on a system of rewards, in which monetary gains are added to the citizen's cooperative behavior, tending to enhance it.

If the design of the program's mechanism is well established, it is expected that once consumers have been drawn, they will change their behavior, continually increasing the number of requests for service invoices. In addition to evaluating this hypothesis, the empirical strategy adopted in this study also allows us to infer the existence of a dosage effect on consumer behavior, indicating whether the degree of change in the agent's attitude towards requesting invoices is also a function of the value of the premium received.

That said, the aim of this article is to investigate the effectiveness of the Nota Fortaleza Program in encouraging fiscal citizenship through a bonus (a cash prize draw). In this way, we will see if individuals change their behavior once they are raffled, and if this varies according to the value of the prize. In other words, whether people are more likely to demand their Individual Taxpayer Registration Number (CPF) on service invoices when they are raffled, and whether the value of the prize is relevant to this behavioral change. To achieve the proposed objective, we will use the methodology known as Event Studies, where individuals are treated in different periods (throughout the time series, 2014 to 2019), and the model used will be the two way fixed effect (individual and time). It is worth noting that our model is similar to that of David Autor (2003 - table 7) in that, in addition to the use of instrumental variables, it places the two fixed effects (time and unit) as dummies, while in our model the fixed effect of the unit is in the format of a panel model (demeaning), and only the time dummies are placed directly, in addition to the fact that no instrumental variables have been used, since our treatment is randomized. Finally, the

coefficients are tested for differences in the lags and leads indicators, in order to investigate any change in the individual's behavior from the moment they are drawn.

Taken together, the results are consistent with the objective of analyzing the effect of the Nota Fortaleza program on the population, in terms of bringing them closer to the tax authorities. More specifically, our findings show an increase in the average scores recorded for the individuals drawn, which reinforces recent studies on the same program (Moura, 2018; Lessa, 2019). Another important result is the dosage effect found. This effect also corroborates studies in which the size (level) of the prize (treatment) is shown to be relevant in modifying the behavior of the winners in a more consistent way, as in the work of Shapira (1992) and Guryan (2008).

The article is divided into five sections: the next section (Section 2) provides a brief literature review on the Theory of Behavioral Economics and the Nota Fortaleza Program. Section 3 presents the methodology used. This is followed in section 4 by the results obtained and finally in section 5 by the final considerations.

2. Literature Review

2.1 Behavioral Economics

The assumptions of classical economic theory make it easier to understand the mathematics of economic decisions in the market, but some variables need to be taken into account, such as human behavior and its subjective issues. This is where public policies come in, as they need to adjust the budget to the population's wishes and needs. Therefore, in order to achieve the objectives in favor of the population, the government, at its various levels, must design its public policies in such a way that the appropriate incentives are created to achieve the desired results. Therefore, the success of government action depends on how economic decisions influence consumer behavior, which in many cases does not act in a rational and predictable way.

And it is this link between rationality, cost-benefit and subjective characteristics that lies at the heart of the theory called Behavioral Economics. Although it is not as well known as other branches of economics, it became popular after the book *Prospect Theory: An Analysis Of Decision Under Risk* (Kanheman and Tversky, 1979), in which the authors use cognitive psychology to point out inconsistencies in the theory of economic decision-making, which comes from neoclassical theory. The Theory, then, is a field of research that integrates Psychology with Economic Theory and, more recently, contributions from Neuroscience.

Having said that, we see Behavioral Economics' concern with the rationality of economic agents, in which its objective is to use empirical results in psychology literature to improve the description of individuals' behavior and choices. In other words, they seek to understand and model individual and market decisions from the most realistic and least rational alternative view.

In 2017, economist Richard Thaler was awarded the Nobel Prize in Economic Sciences for his contributions to behavioral economics and for his pioneering work in establishing that people are predictably irrational in ways that defy classical economic theory. In 2008, he had already published one of his most important works, Nudge, in which he explains the concept and applications of the term that gives the work its name. The term Nudge, something like "push" or "trigger" (in free translations), is a mechanism used to influence the consumer's decision. Thus, the desired change in behavior can be achieved with the correct application of nudges, which would alter people's behavior in a predictable way, without creating prohibitions or altering economic incentives.

The possibility of receiving a cash prize in the form of an incentive, aimed at directing an attitude desired by the population, is identified as an inherent factor in the behavior of economic agents, because it takes into account aspects such as psychological, conscious and even inconsistent influences that affect the choices of the agents themselves. Some studies on consumer behavior in the face of an unexpected and transitory shock to their income demonstrate these behavioral changes.

Furaker (2009), for example, analyzes the relationship that lottery winners have with their current jobs. Their results show that the size of the bonus had a substantial impact on people's decisions to take unpaid full-time leave or reduce their working hours. Another important result refers to the age of the winners, in which the older ones had a relatively high chance of stopping work, i.e. the age of the winner has a relevant impact on their decision-making.

Guryan (2008), using sales data from the Texas Lottery Commission from 2000 to 2002, showed that the sale of a winning ticket led to a 38% increase in demand for tickets at the winning point of sale the following week and remained high for up to 40 weeks, controlling for contemporaneous sales and week fixed effects. One possible explanation for the increase in ticket sales to the same retailer is that consumers think that the store that sold a winning ticket is, at least temporarily, "lucky". This theory of the store effect is known in the literature as the Lucky Store Effect, one of the main characteristics of which is that consumers irrationally update their estimates, attributing the probability of winning to the retailer and not to the game.

Also noteworthy was the confirmation of a positive neighborhood effect, i.e. a kind of imitative behavior, in which there was an increase in sales at lotteries with the same postal code or which were located within 1.6 km of each other. Possible factors were shown to boost this increase, such as: the value of the prize and lotteries located in economically disadvantaged neighborhoods.

Kuhn (2011) studies the specific and social effects of an unexpected and transitory income shock on household consumption behavior. Each week, the PCL (Dutch Postcode Lottery) draws a zip code and awards the winners with cash prizes (12,500 euros) and cars (BMW). Kuhn's study is based on the verification of these shocks on the winners and their neighbors, which for the sake of experimentation is seen as a transitory shock on the income of, on average, 8 months of work. According to their results, in addition to a shock to the winner's consumer behavior, there is also a significant shock to the behavior of his closest

neighbors, who have increased their consumption of cars (perhaps because the neighbor's new BMW is a prize that is more exposed, compared to the money received). This result is in line with the hypothesis of the Happiness Theory put forward by Easterlin (1974), which shows that positive shocks to a family's income tend to negatively affect the happiness of nearby neighbors, impacting on their behavior.

The literature has insisted on three variables that are present in many of these studies on the demand for lottery tickets: the cost of participation (value of the ticket), the probability of being drawn and the size of the prize. Shapira (1992) analyzed these three factors by studying the Israeli Lotto lottery system over a 60-month period. His findings show that the level of treatment (prize size) is the main factor driving demand for tickets.

2.1 Nota Fortaleza Program

Considering the need to encourage and make citizens aware of the socio-economic importance of taxes and the right to demand a Service Invoice, the Executive Branch, based on Law No. 10,107, instituted on October 17, 2013, the Program to Encourage the Issuance of Electronic Service Invoices (NFS-e), and regulated on February 12, 2014, by Decree No. 13,300, in which the Municipality of Fortaleza, through the Municipal Finance Secretariat (SEFIN), launched the Nota Fortaleza program.

Nota Fortaleza is a program created with the aim of strengthening the municipal tax authorities by encouraging the citizens of Fortaleza to demand the Nota Fiscal when paying companies that provide services, with the possibility of receiving cash prizes. Thus, Fortaleza taxpayers can take part in draws ranging from R$100 to R$40,000, ultimately totaling R$150,000 a month (R$1.8 million a year) in prizes.

Participation in the program is done by registering on the Nota Fortaleza portal, using your Individual Taxpayer Registration number (CPF). Once registered, the holder will receive an electronic ticket to take part in the monthly prize draw, for every R$ 30 in accumulated invoices from the previous month. This will help ensure that the Tax on Services of Any Kind (ISS) is properly passed on to the municipal tax authorities and therefore used to support health, education and investments in infrastructure.

One of the programs that has served as a reference is Nota Fiscal Paulista, which is the forerunner of these types of tax strategies in Brazil. In force since 2008, the São Paulo program also works to encourage citizens to request their CPF number on electronic invoices and thus redeem money as a bonus, but it differs in terms of the target tax, which in this case is the Tax on the Circulation of Goods and Services (ICMS), as it is a state program, while Nota Fortaleza is a municipal program.

Mattos (2013), when analyzing the São Paulo program, found a limited effect on ICMS tax collection in the state of São Paulo. Although his results do not show differentiated effects between the sectors (primary, secondary and tertiary), when comparing only the increase in the tertiary sector with the estimate of the prizes awarded, there is an increase of up to 2% in the average collection of the tertiary sector for São Paulo. The author highlights two possible causes for his results: tax evasion and the fact that

people have stopped requesting the CPF on their banknotes due to more subjective issues, such as embarrassment, stigma and some level of fear of data cross-checking. It should also be noted that the scarcity of available data made it impossible to carry out a more disaggregated analysis in order to identify more precisely the effects of the program by sector separately. However, Dos Santos (2015), using the Difference in Difference model, analyzes the program and confirms its effectiveness through a positive and significant impact on ICMS tax collection. This impact amounted to R$ 600 million for the state of São Paulo between 2003 and 2014.

In Fortaleza, another noteworthy program is "Sua Nota Vale Dinheiro" (Your Invoice is Worth Money). Created in 2004, the program offered taxpayers who registered their invoices in the Sefaz-CE system a financial return of 0.5% of the value of the invoice (which could be redeemed when the value reached R$ 30), bringing tax authorities and taxpayers closer together. Bezerra et al. (2018) used the Differences in Differences model to investigate the impact of the program on ICMS tax collection in the state. Its results show a positive impact of approximately 278 million reais (2005 to 2017) on tax collection. It concludes that the cost-benefit of the program is valid as a tax incentive policy, given the significant increase in ICMS tax collection, in which for every real applied by the program, there was an increase of R$1.30 in state tax collection (measured by net present value).

Lessa (2019) states that the Nota Fortaleza program fulfills its objective in terms of encouraging service users to demand the NFS-e, representing an average increase of 52% in invoices issued to individuals, in which the granting of prizes by the program proves to be a motivating variable for society's participation in demanding the tax document. To this end, the authors used the Difference in Difference methodology, in which they carried out a study of information on 225,525 individuals, 43% of the sample being CPF's registered with the program (treatment group) and 57% CPF's not registered, for the period from 2013 to 2019. Still on the same program, Moura (2018) notes that there was an increase in the number of service invoices for Individuals of around 285%, comparing the period of implementation of the Nota Fortaleza Program, 2014, with 2017.

3. Data

3.1. Econometric strategy

We will now describe the method known as Event Studies, in which individuals are treated in different periods, and the model used will be the two way fixed effect. It is worth noting that our model is similar to that of David Autor (2003 - table 7) in that, in addition to the use of instrumental variables, it places the two fixed effects (time and unit) as dummies, while in our model the fixed effect of the unit is in the format of a panel model (demeaning), and only the time dummies are placed directly, in addition to the fact that no instrumental variables have been used, since our treatment is randomized.

First, consider a random sample of N units observed over $T + 1$ periods of time, where T and N are fixed. Specifically, for each$i \in \{0, \ldots, N\}$ e $t \in \{0,1, \ldots, T\}$ we observe the outcome $Y_{i,t}$ and treatment status $D_{i,t} \in \{0,1\}$: $D_{i,t} = 1$ if i is treated in period t and $D_{i,t} = 0$ if i is not treated in period t. Over time, we assume that the observations $\{Y_{i,t}, D_{i,t}\}_{t=0}^{T}$ are independente and identically distributed (i.i.d.).

In general, at each period t there are two possible treatment statuses $\{D_{i,t}\}_{t=0}^{T}$ that can take 2^{T+1} on possible values. Specifically, for the Event Studies, we will focus on an absorbing treatment, so that the treatment status over time is a non-decreasing sequence, $D_{i,s} \leq D_{i,t}$ for s > t. Thus, we can uniquely characterize a treatment path by the period of the initial treatment, denoted as $E_i = min\{t: D_{i,t} = 1\}$. If unit i is untreated $D_{i,t} = 0$ for all t, we will have $E_i = \infty$. And, based on when the treatment is received, there is also the possibility of uniquely categorizing the units into disjoint cohorts e por $e \in \{0, \ldots, T, \infty\}$, where the units in the cohort e are treated first and at the same time $\{i: E_j = e\}$.

Unlike some methodologies, where units are treated first in time or not at all t_0 or they are not treated, so that $E_i \in \{t_0, \infty\}$, the event study takes a staggered adoption format E_i assumes more than one value of $\{0, \ldots, T\}$, and there may or may not be units never treated with $E_i = \infty$.

We will define $Y_{i,t}^{e}$ as the potential result in the period t when the unit i is treated for the first time in the period e. We defined it, too, $Y_{i,t}^{\infty}$ as the potential result if the unit i never received treatment, which is known as the "baseline outcome". As the moment of initial treatment exclusively characterizes the treatment path, we can represent the observed result for the unit i as

$$Y_{i,t} = Y_{i,t}^{E_t} = Y_{i,t}^{\infty} + \sum_{0 \leq e \leq T} (Y_{i,t}^{e} - Y_{i,t}^{\infty}) \cdot 1\{E_i = e\}. \quad (1)$$

3.1. Two-Way Fixed Effect Linear Regression (FE) Estimators

The two-way fixed effects model considers that the intercept may vary between cross-sectional units (individuals) and between periods. The regression to be considered is a two-way fixed effects (FE) regression (unit and time) where, estimated on a panel of $i = 1, \ldots, N$ units for $t = 0, \ldots, T$ periods:

$$Y_{i,t} = \alpha_i + \lambda_t + \sum_{g \in G} \mu_g 1\{t - E_i \in g\} + v_{i,t} \quad (2)$$

Where $Y_{i,t}$ is the result of interest for the unit i in the period t, E_i is the initial absorption time of the binary treatment variable for unit i, and α_i e λ_t are the unit and time fixed effects. The elements g e G are disjoint sets of relative periods. And we denote it by μ_g the coefficients of the relative regression period (2), i.e. the population regression coefficients. Their corresponding MQO estimators are indicated by $\widehat{\mu_g}$ and we will be interested in the properties of μ_g when there are variations in the initial treatment time, and there may or may not be units that have never been treated.

3.2 Characterization of the sample

The Nota Fortaleza program was created with the aim of strengthening the municipal tax authorities by offering Fortaleza citizens the chance to win cash prizes if they demand an invoice when paying the company that provides the service. Taxpayers can enter draws ranging from R$100 to R$40,000.

The database used was obtained from the Municipal Finance Department (SEFIN) of the Fortaleza City Hall (PMF), through a request for information, based on the Access to Information Act. Our sample, consisting only of the winners of the draws, was constructed based on the Event Studies literature, allowing those drawn (cross-section unit) to receive the prize (treatment) in different periods (throughout the time series), so that observations are collected on the amount and values of the invoices requested in an interval (window) before and after receiving the prize (event). In total, 89,890 individuals registered for at least six months will be assessed for the period 2014-2019.

The database contains data on the number of banknotes issued and their value, as well as the age of the taxpayer on the date of the award. In order to adapt the base to the econometric strategy, some filters were applied to the initial sample: (i) only taxpayers with non-zero scores and at least six months of enrollment in the program were considered. Our variables of interest will be the number of banknotes in which the individual registered their CPF and the value of each banknote. Furthermore, our treatment variable will be the premium received. Since the prizes drawn each month follow a discrete distribution, with values ranging from R$100.00 to R$40,000.00, we decided, following the strategy adopted by Hirano and Imbens (2004), to divide the prizes into three levels:

i) Level 1: individuals who received prizes between [R$100.00; R$800.00], with a total of 5983 drawn;

ii) Level 2: individuals who received prizes between [R$1,000.00; R$6,500.00], with a total of 967 raffle winners and;

iii) Level 3: individuals who received prizes between [R$10,000.00; R$40,000.00], out of a total of 177 drawn.

4. Results

4.1 Number of invoices

Figure 1 shows the distribution of the monthly number of marks for those drawn in the window of events under analysis $[t-6; t+6]$, according to pre-established premium levels, t. As can be seen below, the peak in recorded invoice distributions occurs in the period $t-1$ in relation to the date on which the individuals are drawn at all three levels analyzed, and there is an increasing relationship between the average score recorded and the value of the prize received.

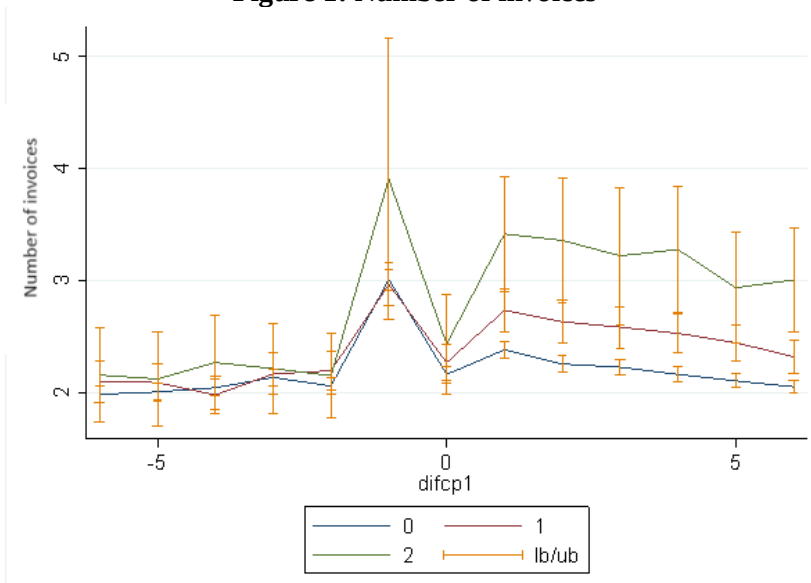
With reference to the first finding, the peak in the month before the individual won the draw, it is important to note that the grades recorded by the individuals even in the interval between the final half of the month $t-2$ and the first half of the month $t-1$ are the ones that determine their participation in the draw that took place in the month, and given that the base only includes individuals who won the draw in the period t, The upward movement is natural, given that the greater number of grades recorded, *ceteris paribus*, increases the chances of individuals being drawn.

With regard to the second observation, the increasing relationship between the average number of notes and the level of the prize received, it should be remembered that each participant receives one ticket for every R$ 30.00 in services taken and registered, so that the higher the total number of notes registered, the greater the chances of winning a prize, as well as being awarded a larger prize.

To the extent that the participant is drawn in the period t, the effect of the individual having won the prize on their behavior as a "supervisory agent" will only be observed in the grade record from the period onwards $t+1$, given the time lag between the request for banknotes and their registration for participation in the respective draws.

Therefore, comparing the behavior of the winners in the window $[t-6; t-2]$ against the window $[t+2; t+6]$, it is clear that there is an upward effect on the average number of invoices requested from the period before to the period after obtaining the prize, with this difference increasing in line with the level of prize received, from a visual point of view.

Figure 1: Number of invoices



Own elaboration.
Lb: lower limit; ub: upper limit

Considering the average monthly value of invoices registered by participants in the draw as an analysis variable, the pattern of a peak in the period is confirmed $t-1$, values which are responsible for the total number of tickets that individuals will obtain for the draw they have been entered into. However, the upward pattern when comparing a distance window between two and six months, more or less, is no longer so clear.

In this case, it should be noted that this figure is more sensitive to discrepant observations, as individuals make non-recurring purchases of goods and services over time, which have no effect on the total number of banknotes recorded, but can directly affect the total monetary value of the banknotes, given that these non-recurring purchases generally involve more expensive monetary transactions than those made periodically.

Table 1 reports the results of two panel model regressions. In the first specification, different intercepts are considered for each participant and period (two way fixed effects regress), in order to control for unobserved effects in cross-section units, as well as specific confounders over the periods. In this first approach, the level of prize received is disregarded, assessing whether the treatment (prize received) alters the behavior of the individuals drawn in general, neglecting the potential dosage effect, in which the value. In the second specification, binary interaction variables are added between the window of events and the levels of rewards obtained. The aim of this specification is to test the existence of a heterogeneous effect, according to the amount received, on the behavior of the participants drawn from the incentive programs for requesting invoices carried out by the state of Ceará. In this sense, the aim is to infer whether the value of the prize received in the lottery directly affects the level of engagement of the winners.

Table 1 - Treatment and quantity of invoices

Year	1st Regression	2nd Regression
	0,274	0,274
2015	(0,475)***	(0,475)***
	0,276	0,276
2016	(0,067)***	(0,067)***
	0,059	0,059
2017	(0,734)	(0,734)
	-0,157	-0,157
2018	(0,877)*	(0,877)*
	-0,291	-0,291
2019	(0,102)**	(0,102)**
Age	0,042	0,042
	(0,881)	(0,881)
$(\boldsymbol{Age})^2$	0,001	0,001
	(0,0006)**	(0,0006)**
Prize Draw$_{\boldsymbol{t-4}}$	0,041	0,041

	(0,347)	(0,347)
Prize Draw$_{t-3}$	0,155	0,155
	(0,371)***	(0,371)***
Prize Draw$_{t-2}$	0,107	0,107
	(0,401)**	(0,401)**
Prize Draw$_{t-1}$	1,072	1,072
	(0,436)***	(0,436)***
Prize Draw$_{t0}$	0,247	0,247
	(0,474)***	(0,474)***
Prize Draw$_{t+1}$	0,542	
	(0,517)***	
Prize Draw$_{t+2}$	0,435	
	(0,561)***	
Prize Draw$_{t+3}$	0,410	
	(0,608)***	
Prize Draw$_{t+4}$	0,362	
	(0,065)***	
Prize Draw$_{t>4}$	0,306	
	(0,781)***	
Prize Draw$_{(t+1)T_1}$		0.490
		(0,53)***
Prize Draw$_{(t+1)T_2}$		0.702
		(0,081)***
Prize Draw$_{(t+1)T_3}$		1.236
		(0,163)***
Prize Draw$_{(t+2)T_1}$		0.381
		(0,573)***
Prize Draw$_{(t+2)T_2}$		0.585
		(0,842)***
Prize Draw$_{(t+2)T_3}$		1.253
		(0,164)***
Prize Draw$_{(t+3)T_1}$		0.368
		(0,061)***
Prize Draw$_{(t+3)T_2}$		0.524
		(0,086)***
Prize Draw$_{(t+3)T_3}$		1.052
		(0,163)***
Prize Draw$_{(t+4)T_1}$		0.316
		(0,664)***
Prize Draw$_{(t+4)T_2}$		0.459
		(0,089)***
Prize Draw$_{(t+4)T_3}$		1.199
		(0,163)***
Prize Draw$_{(t>4)T_1}$		0.265
		(0,078)***
Prize Draw$_{(t>4)T_2}$		0.387

		(0,086)***
Prize Draw$_{(t>4)T_3}$		1.049
		(0,117)***
Constant	-3,216	-5.998
	(3,197)	(2,983)**
N	89.890	89.890

Own elaboration
Note: * $p < 0,10$, ** $p < 0,05$, *** $p < 0,01$.

Considering the temporal trajectory of the average number of notes requested by the individuals drawn, in relation to 2014, chosen as the base year for the construction of the time dummies, there is an increase in the average number of notes recorded for those drawn throughout 2015 and 2016, and a subsequent downward trend in the average number of notes requested for those drawn between 2017 and 2019, suggesting an average reduction in the engagement of those drawn over the last few years. One of the plausible hypotheses is that the increase in the number of participants may be directly affecting their propensity to request invoices, since this proportionally reduces the relative chances of an individual being drawn.

With regard to the profile of those drawn, it can be seen that increasing age has a positive effect at increasing rates on the total number of grades recorded. This dynamic may be related both to the higher level of disposable income with advancing age, and also to the level of tax education on the part of individuals, contributing to a better understanding of the contribution of taxes to the promotion of taxpayer services. This result corroborates others that show a certain "responsibility" associated with older ages, as in Furaker (2009).

With regard to the lags and leads indicators, considering the interval in which it is possible to capture a change in the drawee's behavior (between two and four distance periods, given the structure already discussed between launching the invoice and participating in the draw), it can be seen that the estimated coefficients for the leading indicators were statistically higher than those observed for the lagging indicators (coefficient comparison tests in table 3), when the same relative time distance interval is considered ($t-2\ versus\ t+2,; t-3\ versus\ t+3, t-4\ versus\ t+4$). This evidence supports the hypothesis that being included in the draw directly affects their behavior in a future analysis window. The same analysis was carried out within groups (tables 3, 4 and 5) and corroborated the aforementioned results, which lends robustness to the general regression model.

Table 2 - Coefficient comparison test (test *t*)

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{t+2}$	89.890	0,435	0,00018	0,056	0,434	0,435
Prize Draw$_{t-2}$	89.890	0,107	0,00013	0,040	0,107	0,108
Combined	179.780	0,271	0,0004	0.220	0,270	0,272
Diff		0,327	0,00023		0,327	0,327

$Diff = mean(\text{Prize Draw}_{t+2}) - mean(\text{Prize Draw}_{t-2})$					t = 1,4e+03 GL = 179778	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw_{t+3}	89,890	0,410	0,0002	0, 060	0, 410	0,411
Prize Draw_{t-3}	89,890	0,155	0,0001	0,0371	0,1555	0,1560
Combined	179,780	0,283	0,0003	0,1371	0,2827	0,2839
Diff		0,255	0,0002		0,2546	0,2555
$Diff = mean(\text{Prize Draw}_{t+3}) - mean(\text{Prize Draw}_{t-3})$					t = 1,1e+30 GL = 179778	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw_{t+4}	89,890	0,362	0,0002	0,655	0,3616	0,3625
Prize Draw_{t-4}	89,890	0,041	0,0001	0,0347	0,0416	0,0421
Combined	179,780	0,202	0,0003	0,168	0,2012	0,2027
Diff		0,320	0,0002		0,3197	0,3206
$Diff = mean(\text{Prize Draw}_{t+4}) - mean(\text{Prize Draw}_{t-4})$					t = 1,3e+03 GL = 179778	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
$\text{Prize Draw}_{t>4}$	89,890	0,306	0,00026	0,078	0,3054	0,3065
Prize Draw_{t-2}	89,890	0,1078	0,00013	0,040	0,1075	0,1080
Combined	179,780	0,2069	0,00027	0,116	0,2063	0,2074
Diff		0,1982	0,00029		0,1976	0,1987
$Diff = mean(\text{Prize Draw}_{t>4}) - mean(\text{Prize Draw}_{t-2})$					t = 676,8 GL = 179778	
$H_0: Diff = 0$						
$H_A: Diff < 0$		$H_A: Diff \neq 0$			$H_A: Diff > 0$	
$Pr(T < t) = 1.000$		$Pr(\lvert T \rvert > \lvert t \rvert) = 0.000$			$Pr(T > t) = 0.000$	

Own elaboration.

Table 3 - Intra-group results (Level 1)

Quantity	Coefficient	Standard Deviation	*t*	[95% Confidence Interval]	N = 74,739
Year					
2015	0.256***	0.049	5.21	0.160	0.352
2016	0.257***	0.064	4.02	0.131	0.382

2017	0.021	0.078	0.28	- 0.131	0.175
2018	- 0.184**	0.09	-1.96	- 0.369	0.00005
2019	- 0.323***	0.110	-2.92	- 0.541	0.106
Age	0.180**	0.074	2.43	0.035	0.326
Prize Draw$_{t-4}$	0.059	0.037	1.56	- 0.015	0.133
Prize Draw$_{t-3}$	0.159***	0.040	3.95	0.080	0.239
Prize Draw$_{t-2}$	0.095**	0.043	2.19	0.009	0.180
Prize Draw$_{t-1}$	10.718***	0.047	22.62	0.978	1.164
Prize Draw$_{t0}$	0.244***	0.051	4.74	0.143	0.345
Prize Draw$_{t+1}$	0.490***	0.056	8.74	0.380	0.600
Prize Draw$_{t+2}$	0.380***	0.060	6.25	0.261	0.500
Prize Draw$_{t+3}$	0.368***	0.065	5.59	0.239	0.497
Prize Draw$_{t+4}$	0.316***	0.071	4.45	0.176	0.455
Prize Draw$_{t>4}$	0.265***	0.084	3.14	0.099	0.431
Constant	-6.145.335	3.225.238	-1.91	-124.668	0.176

Own elaboration.
Note: * $p < 0,10$, ** $p < 0,05$, *** $p < 0,01$.

Table 4 - Intra-group results (Level 2)

Quantity	Coefficient	Standard Deviation	t	[95% Confidence Interval]	N = 12.762
Year					
2015	0.472***	0.171	2.75	0.135	0.809
2016	0.571***	0.196	2.91	0.186	0.956
2017	0.421*	0.221	1.90	- 0.013	0.856
2018	0.137	0.252	0.55	- 0.357	0.632
2019	- 0.054	0.286	-0.19	- 0.616	0.507
Age	0.206	0.176	1.17	- 0.139	0.552
Prize Draw$_{t-4}$	- 0.048	0.086	-0.56	- 0.218	0.122
Prize Draw$_{t-3}$	0.160*	0.093	1.71	- 0.023	0.343
Prize Draw$_{t-2}$	0.196**	0.101	1.94	- 0.002	0.395
Prize Draw$_{t-1}$	0.949***	0.111	8.55	0.731	1.166
Prize Draw$_{t0}$	0.239**	0.121	1.97	0.001	0.476
Prize Draw$_{t+1}$	0.677***	0.132	5.11	0.417	0.937
Prize Draw$_{t+2}$	0.559***	0.144	3.87	0.276	0.842

Prize Draw$_{t+3}$	0.496***	0.156	3.17	0.189	0.802
Prize Draw$_{t+4}$	0.428**	0.169	2.54	0.097	0.760
Prize Draw$_{t>4}$	0.343*	0.201	1.71	- 0.050	0.738
Constant	-7.506.002	7.765.956	-0.97	-2.272.856	7.716.557

Own elaboration.
Note: * $p < 0,10$, ** $p < 0,05$, *** $p < 0,01$.

Table 5 - Intra-group results (Level 3)

Quantity	Coefficient	Standard Deviation	*t*	[95% Confidence Interval]	
Year					
2015	0.797	0.551	1.45	-0.284	1.878
2016	0.296	0.649	0.46	-0.977	1.569
2017	0.299	0.736	0.41	-11.441	1.743
2018	0.021	0.839	0.03	-1.623	1.666
2019	0.290	0.953	0.30	-1.580	2.160
Age	-0.085	0.607	-0.14	-1.276	1.105
Prize Draw$_{t-4}$	0.049	0.294	0.17	-0.526	0.626
Prize Draw$_{t-3}$	0.017	0.317	0.06	-0.605	0.640
Prize Draw$_{t-2}$	-0.011	0.345	-0.03	-0.688	0.665
Prize Draw$_{t-1}$	1.748***	0.376	4.65	1.011	2.486
Prize Draw$_{t0}$	0.387	0.409	0.95	-0.415	1.190
Prize Draw$_{t+1}$	1.378***	0.450	3.06	0.495	2.260
Prize Draw$_{t+2}$	1.403***	0.491	2.86	0.440	2.366
Prize Draw$_{t+3}$	1.221**	0.532	2.29	0.176	2.265
Prize Draw$_{t+4}$	1.382**	0.574	2.40	0.255	2.509
Prize Draw$_{t>4}$	1.281**	0.685	1.87	-0.063	2.625
Constant	5.517.088	2.683	0.21	-4.711	5.814

Own elaboration.
Note: * $p < 0,10$, ** $p < 0,05$, *** $p < 0,01$.

In the second specification, with interaction between the event window and the levels of awards received (Table 1), the estimated coefficients for the leading indicators were statistically higher than those observed for the lagging indicators for all three award levels. This evidence supports the idea that the perception of a return given to the contribution to mitigating tax evasion has a positive effect on consumers' "taxing" behavior in their demand for goods and services.

As far as the time and age variables are concerned, the coefficients reported give robustness to the results discussed in the previous specification. With regard to the magnitude of the estimated coefficients according to the levels of the award, it is interesting to note that individuals who receive a level 3 award both change their behavior more intensely and also show a smaller deceleration in their level of engagement as the distance from the award is reduced.

Note that the estimated coefficient for the period $t + 4$ (1.049) shows a reduction of approximately 17% in relation to the estimated coefficient for $t + 2$ (1.253), while the average reduction is around 34% for winners of level 2 prizes (0.387 in $t + 4$ versus 0.585 in $t + 2$) and 28% for individuals who won level 1 awards (0.265 in $t + 4$ versus 0.368 in $t + 2$) and comparisons between the cross-coefficients can be seen in tables 6, 7 and 8.

Table 6 - Comparison of Coefficients - by Level (1)

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+2)T_1}$	89.890	0,381	0,00019	0,057	0,380	0,381
Prize Draw$_{(t+3)T_1}$	89.890	0,368	0,00020	0,061	0,368	0,368
Combined	179.780	0,374	0,00014	0,059	0,374	0,375
Diff		0,1274	0,00028		0,012	0,013
$Diff = coef(\text{Prize Draw}_{(t+2)T_1}) - coef(\text{Prize Draw}_{(t+3)T_1})$					t = 45,2983	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+2)T_1}$	89,890	0,381	0,0002	0, 057	0,380	0,381
Prize Draw$_{(t+4)T_1}$	89,890	0,316	0,0022	0,0664	0,315	0,316
Combined	179,780	0,348	0,00016	0,07	0,348	0,348
Diff		0,065	0,0002		0,064	0,065
$Diff = coef(\text{Prize Draw}_{(t+2)T_1}) - coef(\text{Prize Draw}_{(t+4)T_1})$					t = 222,3922	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+2)T_1}$	89,890	0,381	0,00019	0,573	0,380	0,381
Prize Draw$_{(t>4)T_1}$	89,890	0,265	0,00026	0,078	0,264	0,265
Combined	179,780	0,323	0,00021	0,898	0,322	0,323
Diff		0,116	0,00032		0,115	0,116
$Diff = coef(\text{Prize Draw}_{(t+2)T_1}) - coef(\text{Prize Draw}_{(t>4)T_1})$					t = 358,07	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+3)T_1}$	89,890	0,368	0,0002	0,0618	0,368	0,368
Prize Draw$_{(t+4)T_1}$	89,890	0,316	0,00022	0,0664	0,315	0,316
Combined	179,780	0,342	0,00016	0,069	0,341	0,342
Diff		0,052	0,0003		0,051	0,530
$Diff = coef(\text{Prize Draw}_{(t+3)T_1}) - coef(\text{Prize Draw}_{(t+4)T_1})$					t = 173,103	

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw$_{(t+3)T_1}$	89,890	0,368	0,00020	0,618	0,368	0,368
Prize Draw$_{(t>4)T_1}$	89,890	0,265	0,00026	0,078	0,264	0,265
Combined	179,780	0,316	0,0002	0,087	0,316	0,317
Diff		0,103	0,0003		0,102	0,103
$Diff = coef(\text{Prize Draw}_{(t+3)T_1}) - coef(\text{Prize Draw}_{(t>4)T_1})$					t = 310,19	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw$_{(t+4)T_1}$	89,890	0,316	0,0002	0,066	0,3156	0,316
Prize Draw$_{(t>4)T_1}$	89,890	0,265	0,0002	0,078	0,264	0,265
Combined	179,780	0,290	0,0001	0,770	0,290	0,290
Diff		0,050	0,0003		0,050	0,051
$Diff = coef(\text{Prize Draw}_{(t+4)T_1}) - coef(\text{Prize Draw}_{(t>4)T_1})$					t = 148,48	
$H_0: Diff = 0$					GL = 179778	
$H_A: Diff < 0$		$H_A: Diff \neq 0$			$H_A: Diff > 0$	
$Pr(T < t) = 1.000$		$Pr(\lvert T \rvert > \lvert t \rvert) = 0.000$			$Pr(T > t) = 0.000$	

Own elaboration.

Table 7 - Comparison between Coefficients - by Level (2)

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw$_{(t+2)T_2}$	89.890	0,585	0,0002	0,084	0,585	0,586
Prize Draw$_{(t+3)T_2}$	89.890	0,524	0,0002	0,086	0,524	0,525
Combined	179.780	0,555	0,0002	0,090	0,554	0,555
Diff		0,060	0,0004		0,059	0,061
$Diff = coef(\text{Prize Draw}_{(t+2)T_2}) - coef(\text{Prize Draw}_{(t+3)T_2})$					t = 150,2	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
$Sorteio_{(t+2)T_2}$	89,890	0,585	0,0002	0,842	0,585	0,586
$Sorteio_{(t+4)T_2}$	89,890	0,459	0,0002	0,089	0,459	0,460
Combined	179,780	0,522	0,0002	0,107	0,522	0,523
Diff		0,125	0,0004		0,124	0,126
$Diff = coef(\text{Prize Draw}_{(t+2)T_2}) - coef(\text{Prize Draw}_{(t+4)T_2})$					t = 306,02	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw$_{(t+2)T_2}$	89,890	0,585	0,0002	0,084	0,585	0,586
Prize Draw$_{(t>4)T_2}$	89,890	0,387	0,0002	0,086	0,387	0,388
Combined	179,780	0,486	0,0003	0,130	0,486	0,487
Diff		0,197	0,0004		0,196	0,198
$Diff = coef(\text{Prize Draw}_{(t+2)T_2}) - coef(\text{Prize Draw}_{(t>4)T_2})$					t = 491,7	
Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw$_{(t+3)T_2}$	89,890	0,524	0,0002	0,086	0,524	0,525

Prize Draw$_{(t+4)T_2}$	89,890	0,459	0,0002	0,089	0,459	0,460
Combined	179,780	0,492	0,0002	0,094	0,491	0,492
Diff		0,064	0,0004		0,064	0,065
$Diff = coef(\text{Prize Draw}_{(t+3)T_2}) - coef(\text{Prize Draw}_{(t+4)T_2})$					t = 155,8	

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+3)T_2}$	89,890	0,524	0,0002	0,869	0,524	0,525
Prize Draw$_{(t>4)T_2}$	89,890	0,387	0,0002	0,860	0,387	0,388
Combined	179,780	0,456	0,0002	0,110	0,455	0,456
Diff		0,136	0,0004		0,136	0,137
$Diff = coef(\text{Prize Draw}_{(t+3)T_2}) - coef(\text{Prize Draw}_{(t>4)T_2})$					t = 335,4	

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+4)T_2}$	89,890	0,459	0,0002	0,089	0,459	0,460
Prize Draw$_{(t>4)T_2}$	89,890	0,387	0,0002	0,086	0,387	0,388
Combined	179,780	0,423	0,0002	0,949	0,423	0,424
Diff		0,071	0,0004		0,071	0,072
$Diff = coef(\text{Prize Draw}_{(t+4)T_2}) - coef(\text{Prize Draw}_{(t>4)T_2})$					t = 173,5	

$H_0: Diff = 0$		GL = 179778
$H_A: Diff < 0$	$H_A: Diff \neq 0$	$H_A: Diff > 0$
$Pr(T < t) = 1.000$	$Pr(\lvert T\rvert > \lvert t\rvert) = 0.000$	$Pr(T > t) = 0.000$

Own elaboration.

Table 8 - Comparison of Coefficients - by Level (3)

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+2)T_3}$	89.890	1,253	0,0005	0,163	1,252	1,254
Prize Draw$_{(t+3)T_3}$	89.890	1,052	0,0005	0,163	1,051	1,053
Combined	179.780	1,153	0,0004	0,192	1,152	1,154
Diff		0,201	0,0007		1,199	2,026
$Diff = coef(\text{Prize Draw}_{(t+2)T_3}) - coef(\text{Prize Draw}_{(t+3)T_3})$					t = 260,12	

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+2)T_3}$	89,890	1,253	0,0005	0,163	1,252	1,254
Prize Draw$_{(t+4)T_3}$	89,890	1,199	0,0005	0,163	1,198	1,200
Combined	179,780	1,226	0,0003	0,165	1,226	1,227
Diff		0,053	0,0007		0,052	0,055
$Diff = coef(\text{Prize Draw}_{(t+2)T_3}) - coef(\text{Prize Draw}_{(t+4)T_3})$					t = 69,936	

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf.	Interval]
Prize Draw$_{(t+2)T_3}$	89,890	1,253	0,0005	0,163	1,252	1,254
Prize Draw$_{(t>4)T_3}$	89,890	1,049	0,0003	0117	1,049	1,050
Combined	179,780	1,151	0,0004	0,175	1,151	1,152
Diff		0,203	0,0006		0,202	0,205
$Diff = coef(\text{Prize Draw}_{(t+2)T_3}) - coef(\text{Prize Draw}_{(t>4)T_3})$					t = 302,9	

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw$_{(t+3)T_3}$	89,890	1,052	0,0005	0,163	1,051	1,053
Prize Draw$_{(t+4)T_3}$	89,890	1,199	0,0005	0,163	1,198	1,200
Combined	179,780	1,126	0,0004	0,179	1,125	1,127
Diff		- 0,147	0,0007		- 0,148	- 0,145
$Diff = coef(\text{Prize Draw}_{(t+3)T_3}) - coef(\text{Prize Draw}_{(t+4)T_3})$					t = -1,9e+02	

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw$_{(t+3)T_3}$	89,890	1,052	0,0005	0,163	1,051	1,053
Prize Draw$_{(t>4)T_3}$	89,890	1,049	0,0003	0,117	1,049	1,050
Combined	179,780	1,051	0,0003	0,142	1,050	1,051
Diff		0,002	0,0006		0,001	0,004
$Diff = coef(\text{Prize Draw}_{(t+3)T_3}) - coef(\text{Prize Draw}_{(t>4)T_3})$					t = 4,124	

Variable	Obs	Coef.	Standard error	Standard Deviation	[95% Conf. Interval]	
Prize Draw$_{(t+4)T_3}$	89,890	1,199	0,0005	0,163	1,198	1,200
Prize Draw$_{(t>4)T_3}$	89,890	1,049	0,0003	0,117	1,049	1,050
Combined	179,780	1,124	0,0003	0,160	1,124	1,125
Diff		0,149	0,0006		0,148	0,151
$Diff = coef(\text{Prize Draw}_{(t+4)T_3}) - coef(\text{Prize Draw}_{(t>4)T_3})$					t = 223,37 GL = 179778	
$H_0: Diff = 0$						
$H_A: Diff < 0$		$H_A: Diff \neq 0$			$H_A: Diff > 0$	
$Pr(T < t) = 1.000$		$Pr(\lvert T \rvert > \lvert t \rvert) = 0.000$			$Pr(T > t) = 0.000$	

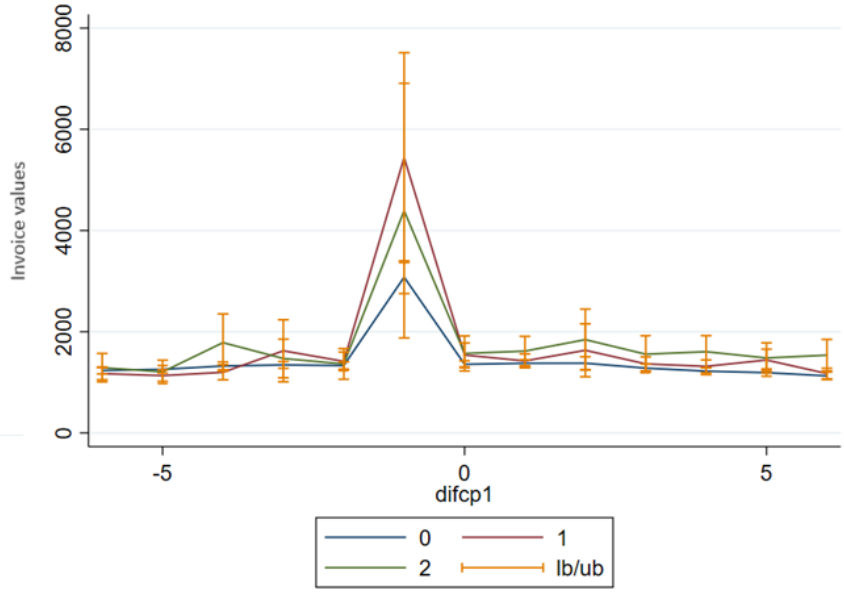
Own elaboration.

When comparing the group with level 1 premiums and the group with level 2 premiums, there is no evidence of a statistically significant difference between the estimated coefficients. Thus, the results indicate that there is a heterogeneous effect, which only occurs after a certain level of treatment, starting at R$10,000.00. This prize level effect reinforces some studies that look at the value of the prize as a conditioning factor in increasing the demand for lottery tickets. Friedman and Savage (1948), for example, proposed a utility function with successive segments of decreasing, increasing and decreasing marginal utilities. According to the theory presented, although the classic economic assumptions presuppose risk aversion on the part of individuals, they would be reluctant to enter the lottery if the size of the prize (level) they are competing for has a small or medium impact on their income. In turn, premiums high enough to change their economic status are a substantially relevant fact.

4.2 Value of invoices

Figure 2 shows the distribution of the accumulated invoice values for the same event window used in the previous results, $[t-6; t+6]$. Again, we can see the peak in the distributions occurring in the period $t-1$ in relation to the date on which the individuals are drawn, reinforcing the growing relationship analyzed in relation to the quantities of banknotes registered, but now in relation to the values of the banknotes. However, this spike may be caused by unusual expenses, such as cell phones, notebooks, refrigerators, etc., where invoices are required by default, either by the consumer or by the seller.

Figure 2 - Invoice values



Own elaboration.
Lb: lower limit; ub: upper limit

Table 2 also reports the results of two panel model regressions. We will use the time trajectory of the average number of banknotes registered by the individuals drawn, where we will have different intercepts for each participant and period. In the first regression, we will analyze the effect of the treatment on the score values and then add the binary interaction variables between the events in order to obtain a treatment level effect. Therefore, we will follow the same specifications as the models analyzed above, with the difference in the response variable analyzed.

With regard to the lags and leads indicators, the only statistically significant coefficients were the events in $(t-3), (t-1), (t_0), (t+1)$ e $(t+2)$, which makes it difficult to identify any kind of behavioral pattern influenced by the treatment. One possible explanation could be the fact that the value of the banknotes is more closely related to recurrent spending, whereby the individual would not increase their consumption exclusively in order to obtain more banknotes and, consequently, increase the likelihood of being drawn.

In the model in which there is an interaction of grade value levels, we see that the only statistically significant coefficients were the events in $(t+1), (t+2)$ e $(t+3)$, all for level 1 values (up to R$800). Neither can we point to any change in the values of the bills as a result of the treatment, which perhaps reinforces the argument about recurring consumer spending. Therefore, the variable "number of notes" is more interesting when we try to analyze the impact of the treatment on a change in consumer behavior.

Table 9 - Treatment and Value of Invoices.

Year	1st Regression	2nd Regression
	136,9	136,9
2015	(115,3)	(115,3)
	308,0	308,0
2016	(147,4)**	(147,4)**
	187,7	187,7
2017	(178,2)	(178,2)
	150,2	150,2
2018	(212,9)	(212,9)
	31,39	31,39
2019	(249,9)	(249,9)
Age	30,36	30,36
	(214,0)	(214,0)
Prize Draw$_{t-4}$	94,7	94,7
	(84,3)	(84,3)
Prize Draw$_{t-3}$	182,3	182,3
	(90,1)**	(90,1)**
Prize Draw$_{t-2}$	152,2	152,2
	(97,4)	(97,4)
Prize Draw$_{t-1}$	2295	2295
	(105,9)***	(105,9)***
Prize Draw$_{t0}$	248,6	248,6
	(115,2)**	(115,2)**
Prize Draw$_{t+1}$	276,7	
	(125,6)**	
Prize Draw$_{t+2}$	340,1	
	(136,4)**	

Prize Draw$_{t+3}$	237,6	
	(147,6)	
Prize Draw$_{t+4}$	211,4	
	(159,2)	
Prize Draw$_{t>4}$	192,7	
	(189,7)	
Prize Draw$_{(t+1)T}$		338,7
		(128,9)***
Prize Draw$_{(t+1)T}$		-58,0
		(198,7)
Prize Draw$_{(t+1)T}$		214,8
		(396,4)
Prize Draw$_{(t+2)T_1}$		369,6
		(139,3)***
Prize Draw$_{(t+2)T_2}$		152,1
		(204,6)
Prize Draw$_{(t+2)T_3}$		504,4
		(399,0)
Prize Draw$_{(t+3)T_1}$		302,6
		(150,2)**
Prize Draw$_{(t+3)T_2}$		-127,2
		(211,1)
Prize Draw$_{(t+3)T_3}$		219,1
		(398,3)
Prize Draw$_{(t+4)T_1}$		273,3
		(161,4)*
Prize Draw$_{(t+4)T_2}$		-155,7
		(217,8)
Prize Draw$_{(t+4)T_3}$		295,2
		(396,6)
Prize Draw$_{(t>4)T_1}$		242,5
		(190,4)
Prize Draw$_{(t>4)T_2}$		-95,5
		(209,1)
Prize Draw$_{(t>4)T_3}$		253,0
		(286,0)
Constant	-711,0	-960
	(776,4)	(7247,5)
N	89.890	89.890

Own elaboration
Note: * $p < 0,10$, ** $p < 0,05$, *** $p < 0,01$.

5. Final considerations

The Municipality of Fortaleza, like other Brazilian municipalities, was experiencing difficulties in collecting taxes, mainly due to the population's lack of knowledge about the subject and the role of the citizen with the tax authorities. This scenario highlights the role of education and raising awareness among the population as the most efficient way to solve this problem. However, this process does not happen in a short period of time, which means that the strategies of programs such as Nota Fortaleza are aimed at changing the behavior of individuals immediately.

That said, the aim of the article was to investigate the effectiveness of the Nota Fortaleza Program in encouraging fiscal citizenship by means of a bonus. Thus, it was verified whether individuals change their behavior once they are raffled, and whether this varies according to the value of the prize, throughout the time series, 2014 to 2019.

Taken together, the results are consistent with the objective of analyzing the effect of the Nota Fortaleza program on the population, in terms of bringing them closer to the tax authorities. More specifically, our findings show an increase in the average scores recorded for the randomly selected individuals, which reinforces recent studies on the same program. Another important result is the dosage effect found. This effect also corroborates studies in which the size (level) of the prize (treatment) is shown to be relevant in modifying the behavior of the winners in a more consistent way.

References

BEZERRA, Elizângela Amaral de Moura. CORREA, Marcio Veras. CARNEIRO, Diego Rafael. **Programas de cidadania fiscal são eficazes? Uma avaliação do programa Sua Nota Vale Dinheiro**. 2018.

DOS SANTOS, Peter Felipe et al. O impacto do programa Nota Fiscal Paulista na expansão das receitas tributárias do Estado. **Revista ESPACIOS**| Vol. 36 (Nº 17) Año 2015, 2015.

EASTERLIN, Richard A. (1974). "Does Economic Growth Improve the Human Lot? Some Empirical Evidence". In Nations and Households in Economic Growth: Essays in Honor of Moses Abramowits, Paul A. David and Melvin Reder, eds. **New York: Academic Press**.

FRIEDMAN, M., & Savage, L. J. (1948). The utility analysis of choices involving risk. **Journal of Political Economy**, 56, 279-304

FURAKER, Bengt; HEDENUS, Anna. Gambling windfall decisions: Lottery winners and employment behavior. **UNLV Gaming Research & Review Journal**, v. 13, n. 2, p. 1, 2009.

GURYAN, Jonathan; KEARNEY, Melissa S. Gambling at lucky stores: Empirical evidence from state lottery sales. **American Economic Review**, v. 98, n. 1, p. 458-73, 2008.

HIRANO, K., and G. W. Imbens. 2004. The propensity score with continuous treatments. In Applied Bayesian Modeling and Causal Inference from Incomplete-Data Perspectives, ed. A. Gelman and X.-L. Meng, 73–84. West Sussex, **England: Wiley InterScience**.

KUHN, Peter et al. The effects of lottery prizes on winners and their neighbors: Evidence from the Dutch postcode lottery. **American Economic Review**, v. 101, n. 5, p. 2226-47, 2011.

LESSA, Vanessa Gomes Simonassi et al. Economia comportamental sob a ótica do programa de incentivo à cidadania fiscal do município de Fortaleza. In: **III CIDESP–CONGRESSO INTERNACIONAL DE DESEMPENHO DO SETOR PÚBLICO**. 2019.

MATTOS, Enlinson; ROCHA, Fabiana; TOPORCOV, Patricia. Programas de incentivos fiscais são eficazes?: evidência a partir da avaliação do impacto do programa nota fiscal paulista sobre a arrecadação de ICMS. **Revista Brasileira de Economia**, v. 67, n. 1, p. 97-120, 2013.

MOURA, Jamila Fernandes. Gestão de custos no setor público: um estudo de caso do Programa Nota Fortaleza–**SEFIN**. 2018.

SHAPIRA, Zur; VENEZIA, Itzhak. Size and frequency of prizes as determinants of the demand for lotteries. O**rganizational Behavior and Human Decision Processes**, v. 52, n. 2, p. 307-318, 1992.

TVERSKY, Amos; KAHNEMAN, Daniel. Prospect theory: An analysis of decision under risk**. Econometrica**, v. 47, n. 2, p. 263-291, 1979.