

# The Effect of Political Competition on Spoiled Ballots in Mexico: An Econometric Model of Determinants

*El efecto de la competencia política sobre los votos nulos en México: un modelo econométrico de sus determinantes*

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Fecha de recepción: 12/02/2018 Fecha de aceptación: 18/05/2018

This paper analyzes the determinants of spoiled ballots at Mexican municipal elections. We use a local elections data base from 2006-2008 to estimate an electoral behavior model in which local economic variables are included in quadratic form, so that non-linear effects can be considered. We found that an increase in the electoral margin is associated with an increase in the proportion of spoiled ballots Mexican local elections, the effect is highly statistically significant and stable across specifications.

**Keywords:** spoiled ballots, political competition, marginalization, economic conditions.

*En este trabajo se analizan los determinantes de los votos nulos en las elecciones municipales mexicanas. Utilizamos una base de datos de elecciones locales de 2006-2008 para estimar un modelo de comportamiento electoral en el que las variables económicas locales se incluyen en forma cuadrática, de modo que se puedan tener en cuenta los efectos no lineales. Descubrimos que un aumento en el margen electoral está asociado con un aumento en la proporción de votos nulos en elecciones locales mexicanas; el efecto es estadísticamente significativo y estable a través de las especificaciones.*

**Palabras clave:** votos nulos, competencia política, marginación, condiciones económicas.

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## INTRODUCTION

An indispensable condition of democratic regimes is the promotion of free and competitive elections. The consolidation of democracy, however, requires the participation of its citizens in the election of his or her representatives. Participation at elections is crucial for well-functioning political systems (De Paola and Scoppa, 2012). This process not only represents the most common way of political participation, but also legitimizes and strengthens the political system. On the other hand, not all citizens choose to participate, some of them prefer to abstain and others prefer to spoil their ballot, whether intentional or not.

According to Power y Garand (2007), despite the large number of studies addressing the issue of voting, most of the attention has been dedicated on voter turnout. Understanding the reasons that lead people to vote in large elections is of major interest both for political scientists and for economists. However, little attention has been given to invalid ballots. In fact, the casting of blank or spoiled ballots remains a gaping lacuna in the literature on comparative political behavior.

Voter abstention and spoiled ballots are part of a system where elections send signals to the political system (Damore, Waters and Bowler, 2011). However, those signals are not clear because they may arise from motivations varying from a way of protest to even apathy and confusion. More precisely, authors like Steifbold (1965), Power and Garand (2007), Ugglá (2008), Galatas (2008), Obradovic-Wochnik and Wochnik (2014) point out that unmarked and spoiled ballots can be read as increasing citizen apathy towards formal politics, also it can be understood as new forms of political participation, especially in political contexts characterized by low public trust in key institutions, disappointment after transitions to democracy and lack of formal political participation.

Scholars interpret blank and spoiled ballots as resulting from some combination of voter incapacity, where citizens lack the requisite skills or information to cast a valid ballot, and political motivations, when voters deliberately signal their malcontent (Driscoll and Nelson, 2014).

Steifbold (1965) point out that some voters submit an invalid ballot for reasons of ignorance, ambivalence, or apathy when people involuntary spoil his/her ballot. While some others deliberately invalidate the ballot as an act of political protest generated by possible mistrust in the political institutions, dissatisfaction with the regime, incumbents, or the electoral process in general.

Spoiled ballots usually represent a small share of total ballots, but their importance is increasing over time and an analysis of this performance in the electoral behavior seems relevant because they are probably not random events. Power and Garand (2007), Ugglá (2008) and Driscoll and

Nelson (2014) observed that is common to find elections where many ballots are returned spoiled in Latin America. They see to Latin America as an ideal setting for a comparative study of invalid voting; some countries have spoiled ballots in the range of 2 to 3 %, while others have averages that are ten times higher. Also, spoiled and blank votes have exceeded 15 % of total votes cast in a third of the elections since 2000.

In Mexico, the evolution of spoiled ballots in federal elections follows a well-defined pattern; first, it is observed a decrease in rates of spoiled ballots since 1970 to 2000, then shows an increasing trend maintained through the first decade of the present century. According to Cisneros-Yescas (2013), spoiled ballots in Mexico has become an important indicator of discontent and smear perceived by citizens of political institutions and democracy. The 2009 federal election was characterized by the emergence of a citizen protest in different parts of the country that called to the electors to cast a null vote to show their discontent with political parties and their representatives.

In the 2009 intermediate federal elections, spoiled ballots represented a number greater than votes obtained by the PT, Convergencia, Nueva Alianza and PSD (political parties). The number of spoiled ballots in municipalities are higher than the total votes received by some political parties, too. In local elections of 2008 in Huichipan, Hidalgo, for example, the rate of spoiled ballots reached 14 % of total votes cast. This percentage is higher than the percentage of votes received by 8 of the 10 parties or coalitions that competed in that election. Even the heterogeneity is greater among municipalities.

Galatas (2008) argue that some blank and spoiled ballots result from systemic factors and predictable patterns associated with the context of the election. Thus, spoiled ballots, although rare, are not unimportant; studying spoiled ballots provides a richer understanding of electoral behavior (Galatas, 2008).

Moreover, Scholars claim that the percentage of spoiled ballots seem to be related to socio-economic and institutional factors, such as education, income and voting systems. For this reason, it is important to identify and evaluate the different factors that influence this electoral behavior. We will focus our analysis on municipal elections because of the higher variation in rates of spoiled ballots at the municipal level. In this context, we ask what are the determinants of electoral behavior in Mexico? Even further, what factors influence differences in spoiled ballots in municipal elections?

Paola and Scoppa (2012) explain that political competition may also affect this type of voter choices, but the relationship could be either positive or negative. On one hand, political competition has a positive effect on voter turnout. As the chances of casting the deciding vote are higher in more competitive elections, some authors point out that the

likelihood of casting a blank ballot should be lower. Endersby, Galatas, and Rackaway (2002) and Aldashev and Mastrobuoni (2013) argued that spoiled ballots may decrease because of the higher expected benefits deriving from closeness, related both to the higher probability of being pivotal and to the higher costs of expressing discontent through a voluntary invalid ballot.

On the other hand, De Paola and Scoppa (2012) mention that a positive relationship may be possible when political competition increases social pressure, leading to a higher cost of not going to the polls, but electors may still escape from supporting the candidates by casting a blank or invalid ballot.

In this paper, we propose an econometric model to study how the closeness relates to the fraction of spoiled ballots in Mexico. We examine electoral information in 2013 municipalities that took place between 2006-2008. Few studies have tried to identify the factors that explain the fraction of spoiled ballots in Mexico. Most studies focus on describing individual electoral behavior through opinion surveys, or through historical, territorial and conceptual analysis. Even more, while there are some works analyzing the effect of electoral competition on turnout, only few empirical studies have looked at the spoiled ballots. However, we must recognize important limitations of this paper. Results are only hypothetical, due that, the vote is secret, and it is impossible to identify the real determinants of the spoiled ballot.<sup>1</sup>

The present article includes six additional sections: in the first section, we discuss theoretical significance of spoiled ballots and their effects on quality of democracy; in the second section, we present a theoretical framework to help us explain the differentiated behavior observed in spoiled ballots. In the third section, the background and context spoiled ballots in Mexico is presented. The econometric model, as well as the technique that is used to estimate it, is represented on the fourth section. The empirical analysis is done on the fifth section and we show the main conclusions of the study on last section.

#### THEORETICAL SIGNIFICANCE OF SPOILED BALLOTS AND THEIR EFFECTS ON QUALITY OF DEMOCRACY

Why should we care about spoiled ballots in Latin American democracies? Casting a ballot constitutes an essential element of democracies, given that it represents the most common medium of political participation, as well it legitimates and strengthens the political system.

<sup>1</sup> We appreciate the contribution of an anonymous reviewer who noted this point.

Gómez-Tagle (2009) points out that electoral participation has to do with the political meaning of the vote, which to a certain extent is politically and culturally constructed. In an authoritarian regime, for example, helps justify the exercise of power and blow off opposing elite forces, the null participation is the public expression of an opposition and is subject to legal and social sanctions. According to Nohlen (2004), abstention can express a form of protest against a certain aspect of the political system or could also be a symptom of apathy. Most of the times it is interpreted as a way of expressing discomfort against politics in general, this way gaining political meaning in a strict sense.

In the democratic context, the levels of abstention vary notably between countries, according to information from the International Institute for Democracy and Electoral Assistance (International IDEA), the electoral turnout in Latin America goes from a range of 44 percent as in the presidential election of Colombia in 2010, up to 94.5 % in the presidential elections of Bolivia in 2010.<sup>2</sup> In this sense, abstention represents a form of expressing discontent with the performance of democracy and the little trust in political parties when elections do not seem to be represented by the candidates.

To avoid this, voter abstention has been object of different arrangements. For example, some countries have tried to resolve it through the “compulsory voting”, applying economic sanctions to those who do not use their right to vote. In Australia, for example, the abstention fines have achieved a lower than 10 % rate of abstention in the last years. In Luxemburg, unjustified abstention is sanctioned with a fine of 100 euros, which can go up to 1000 euros if it re-occurs. In Belgium, the sanctions are between 25 to 30 euros, according to its electoral legislation, but this has maintained abstention rate under 10 %.

Compulsory voting is also used in Latin America, in countries such as Argentina, Bolivia, Brazil, Costa Rica, Ecuador and Peru, among others. However, when a citizen goes to the voting booth he has the option to null his vote, more over than having to choose a candidate or a specific party. Several studies have documented that compulsory voting electoral systems are very effective to increase electoral turnout, but when protest situations arise, the votes are translated into an increase in blank and spoiled ballots.

Power and Garand (2007) argued in countries where mandatory voting is strictly enforced, citizens who would normally abstain under voluntary voting conditions may turn out to the polls only to cast a blank or spoiled ballot. Using an aggregate-level panel-data analysis from legislative elections held in 18 democracies in Latin American between 1980 and

2 We took the electoral turnout of the last presidential election of every country that took place between 2004 and 2011 from the data base of International IDEA, leaving a data base with 104 countries.

2000, Power and Garand (2007) found that compulsory voting increases the number of blank and spoiled ballots.

Invalid ballots can represent an act of political protest generated by possible mistrust in the political institutions, dissatisfaction with the available options or as an alternative to delegitimize the political doing without the necessity of reaching the extreme abstention (Lutz, 2005). According to Power and Garand (2007), the casting of spoiled ballots has serious implications for citizen support of the electoral process and, by extension, democratic legitimacy writ large.

#### LITERATURE REVIEW

This section presents a theoretical framework to help us explain the differentiated behavior observed in the previous section. Existing literature identifies a list of variables that affect electoral turnout and in consequence affects voter abstention. However, only a few studies have empirically analyzed the phenomenon of spoiled ballots. A small academic literature assesses this phenomenon in comparative perspective, systematically considering blank and spoiled voting in countries around the world.

Some scholars have studied the effect of some institutional, political environments and socio-economic conditions on spoiled ballots (Power and Garand, 2007). From the institutional approach, academics identify institutional designs, complexity of the electoral system and ballot structure. This approach draws attention to the legal and formal structures that make voting desirable versus undesirable, or simple versus difficult (Power and Garand, 2007). McAllister and Makkai (1993) noted that blank and spoiled ballots are more common in the Senate contests owing to the relatively complicated single-transferable vote procedure. Also, Power and Roberts (1995) reported that Brazilian Senate, which uses the simple single-member district plurality method, has fewer invalid ballots than the Chamber of Deputies that uses under open-list proportional representation. They concluded that vote invalidation is more common in open list proportional representation systems in which many candidates are listed on the ballot, creating a comparatively noisy electoral environment.

Political-protest approach claims that spoiled ballots is an indicator of voter discontent that may reflect rejection of incumbents, condemnation of the existing political regime (i.e. an anti-system orientation), or some combination of all of these factors (Power and Garand, 2007; Galatas 2008; Driscoll and Nelson, 2014).<sup>3</sup> Steifbold (1965) rejected blank and spoiled ballots were simply a result of voter error, reporting that blank and spoiled

<sup>3</sup> These authors mention that unmarked and spoiled voting is a signal of protest, especially in systems where voting is compulsory

ballots increased following the prohibition of the Communist party in West Germany suggesting the options presented on the ballot were insufficient.

Uggla (2008) assess the extent to which voters spoil or annul their ballots in elections at Western Europe, Australia, New Zealand, and the Americas in the 1980-2000 period. He concluded that voting is a conscious act related to the political choices available through the election. Precisely, he found that variation in the fraction of invalid ballots reflect the voters' reaction to the perceived absence of political choice.

Obradovic-Wochnik and Wochnik (2014) analyzed Serbia's 2012 elections. Demonstrating a deep dissatisfaction with political parties and their functionaries who embody and enact democratic practices, they argued that some instances of ballot invalidation can be understood as a reaction to the broader "crises of democracy". They point out ballot-invalidating voters in Serbia are not only dissatisfied with these actors' alleged corruption and ineffectiveness, but are also deeply discontented with the electoral system, which encourages a lack of transparency and clientelism.

Political competition may also affect the percentage of invalid votes, but the relationship is uncertain. Galatas (2008) argued that casting blank ballots seems initially irrational from a rational choice perspective: a voter who shows up on Election Day to cast a blank or intentionally spoiled ballot incurs the cost of voting, yet receives no benefit. However, since Riker and Ordeshook (1968) included civic duty to the Downsian equation,<sup>4</sup> Galatas explained that a voter receives a net benefit from casting a ballot in terms of having performed a civic duty, even if no additional benefit occurs from having cast the deciding ballot for a specific party or candidate, so voters derive benefits from casting a blank or unmarked ballot. Even more, a positive relationship may be possible when political competition increases social pressure, leading to a higher cost of not going to the polls, but electors may still escape from supporting the candidates by casting a blank or invalid ballot (De Paola and Scoppa, 2012).

Galatas (2008) found that unmarked ballots are reduced in the most competitive elections. Closeness increases the likelihood of influencing the outcome of the election and raises the opportunity cost of express discontent through voluntary invalidation of the ballot; the incentive to cast a blank ballot should be lower. Therefore, a negative relationship is expected to exist between party competition and blank ballots.

Using a dataset from the Italian parliamentary elections in 1994-2001, Aldashev and Mastrobuoni (2013) focus instead on the relationship between the closeness and the number of invalid ballots. They found a strong negative relationship between the margin of victory of the leading

4 Civic duty provides positive feedback that one contributes to the democratic process and enters the equation as a net benefit to the voter, apart from other benefits like helping a preferred candidate or party be elected.

candidate over the nearest rival and the share of invalid ballots. These authors explain that this relationship holds when election officers are unbiased because they increase their effort to detect higher rates of invalid ballots in response to the higher closeness of the electoral race. Officers with bias towards any of the candidates are less likely to invalidate ballots favoring its preferred candidate, while it would be more likely to invalidate ballots against their candidate, in this case the ambiguous serious effect.

De Paola and Scoppa (2012) used data from Italian municipal elections from 1993 to 2011 to investigate whether political competition affects valid, blank and invalid ballot, controlling for municipalities' and candidates' characteristics and for municipal fixed effects. They found that electoral margin produces a positive highly statistically significant effect on the percentage of blank ballots, that is, when the race is closer individuals are less induced to cast a blank ballot. They mentioned that their findings support the idea that the behavior of electors casting blank ballots is not very different from the behavior of electors who abstain from going to the polls, so they react in the same way when the electoral race becomes closer: i.e. that the expected benefits of voting increase in closer competitions. Invalid ballots also show a similar pattern, but the effects are statistically insignificant.

In this case, the arguments of Aldashev and Mastrobuoni (2013) about a potential higher effort provided by unbiased election officers in checking ballots in response to closeness, which would lead to a negative correlation between invalid ballots and the electoral margin does not seem to be sufficient to counterbalance the effects deriving from electors' behavior (De Paola and Scoppa, 2012).

Finally, some empirical studies have found evidence of the effect of urbanization, income inequality and education on the percentage of invalid votes. Power and Garand (2007) mentioned that socioeconomic development and urbanization favor wider circulation of and more democratic access to the political information necessary to complete a ballot in national elections. Education and literacy contribute to the political skill levels of individual voters. Empirical research verifies this assumption, reporting that blank and deliberately nullified ballots are more common in districts where illiteracy is high.

Knack and Kropf (2003), McAllister and Makkai (1993) and Sinclair and Alvarez (2004) found that invalid voting occurred most frequently in precincts where ballot comprehension is limited due to linguistic or ethnic diversity. Power and Garand (2007) observed large numbers of voters in Latin America remain illiterate or semi-literate, making it difficult for them to complete a ballot paper.

Galatas (2008) noted that spoiled votes tend to be positively associated with low levels of education in provincial elections in Ontario. He argued that less educated voters, lacking requisite knowledge of politics, political

issues, parties, and candidates, may be more likely to cast a spoiled ballot or leave a ballot unmarked. However, he said that education may increase spoiled ballots when it represents a form of protest that rejects the existing parties and candidates in contention.

In the 2009 federal elections, Cisneros-Yescas (2013) found a positive effect of education on spoiled ballots in Mexican municipalities: the highest levels of municipal schooling, the highest percentage of spoiled ballots. This finding contradicted the common pattern presented in previous federal elections. Furthermore, the presence of mobilization in favor of invalid vote caused that the positive magnitude between schooling and invalid vote was stronger.

### *Spoiled ballots in Mexico: Background and context*

The Federal Code of Electoral Institutions and Procedures certainly mentions the null vote, when you cannot credibly assert for whom he or she is voting on the ballot and this causes invalid or null vote. There are no reliable studies in Mexico that distinguish voters that deliberately spoiled their ballot from those that make a mistake while marking the electoral ballot. Officially, in Mexico spoiled ballots correspond to ballots marked incorrectly, since there is no real distinction between voting null and blank votes, as if there is in other countries.

The evolution of aggregated spoiled ballots rate in federal elections follows a well-defined pattern; first, the average rate of spoiled ballots in presidential elections is 2.3 % below the intermediate legislative elections. Second, an increase in spoiled ballots at the beginning of the 2000s maintained through to present day. In Table 1, we can see the states with highest and lowest spoiled ballots rates in federal elections from 1991 to 2015. We observe that the maximum spoiled ballots is, at least, twice the minimum spoiled ballots rate for each election.

TABLE 1. STATES WITH HIGHER OR LOWER SPOILED BALLOTS IN FEDERAL ELECTIONS (NOTE 1)

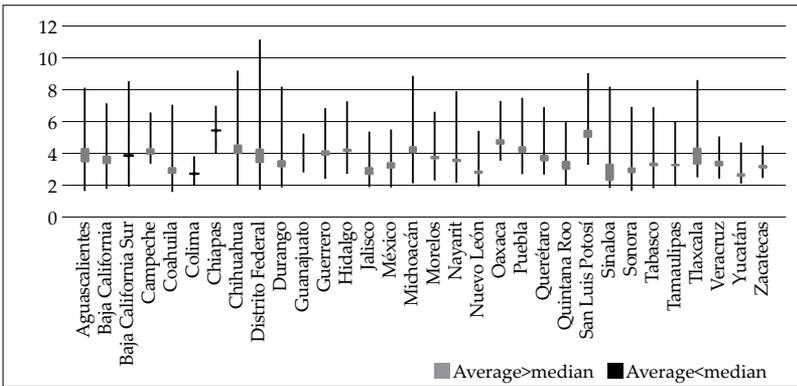
Year	Maximum spoiled ballots		Minimum spoiled ballots	
	State	%	State	%
1991	Tabasco	6.80	Tlaxcala	3.33
1994	Chiapas	5.68	Baja California Sur	3.92
1997	Chiapas	5.70	Coahuila	1.68
2000	Chiapas	4.49	Sonora	1.72
2003	Campeche	5.02	Sinaloa	2.27
2006	San Luis Potosí	4.95	Distrito Federal	1.78
2009	Distrito Federal	10.87	Colima	2.87
2012	Chihuahua	9.01	Baja California	2.45
2015	Distrito Federal	7.34	Yucatán	2.50

Source: Own elaboration with data from the IFE/INE.

Note 1: In the 2009 federal elections for deputies there was a political campaign to promote the null vote.

In the 2012 elections, spoiled ballots represented 4.96 % of the total votes cast, a number greater than votes obtained by the PT, Movimiento Ciudadano and Nueva Alianza (political parties). However, this behavior is not homogenous among states because percentages varied between 2.9 and 10.9 % for 2009. In Figure 1, we see the interstate differences in the rate of null votes in the last nine federal elections (1991-2015). The differences in the longitude line demonstrate a greater variation in spoiled ballots among states in the span of time. In states, spoiled ballots range from 2 to higher than 10 % of votes cast.

FIGURE 1. PERCENTAGE OF SPOILED BALLOTS IN FEDERAL ELECTIONS OF 1991-2015



Source: Own elaboration with data from the IFE.

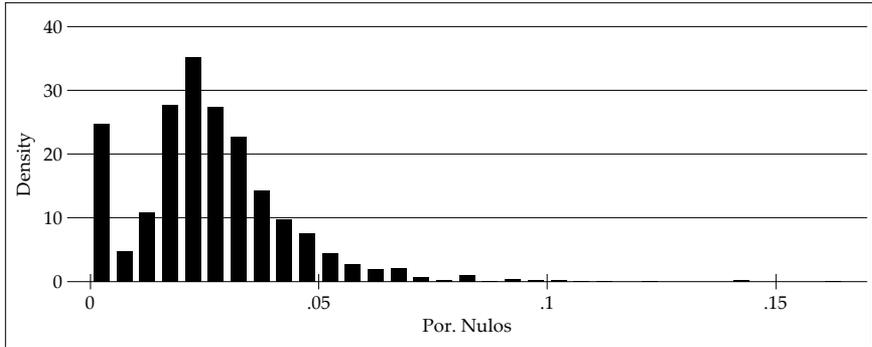
Spoiled ballots rates are usually higher in states such as Chiapas, Chihuahua, Oaxaca and San Luis Potosí. Overall, a gradual disenchantment with the electoral process is observed, the average spoiled ballots rate rose from 2.42 % in the 2000 elections to 5.76 % in the elections of 2012. In effect, some states have little variance and high averages, other states have a small average and a high variance, demonstrating the complexity and heterogeneity of the phenomenon. This volatility suggests that there is no unique pattern of behavior, showing differences in the democratic processes of the states.

Duarte and Jaramillo (2009) argue that Mexico is in a process of democratization unable to consolidate itself because of rejection and apathy by citizens towards public affairs. Particularly, in the 2009 federal elections for deputies, Cisneros-Yescas (2013) point out that emerged simultaneously and coincidentally several citizen groups that aimed to promote the annulment of the vote as a form of political protest.

In Figure 2 we present the histogram and the kernel density plot for the distribution of spoiled ballots for the 2013 municipalities for local elections.

The overall distribution is skewed heavily to the right. The percentage of spoiled ballots represent on average, 2.65 % of the votes cast in the elections for mayor in a typical municipality, the standard deviation is 1.84 %.

FIGURE 2. DISTRIBUTION OF SPOILED BALLOTS CAST IN LOCAL ELECTIONS IN MEXICAN MUNICIPALITIES, 2006-2008



Source: Own elaboration with data from local electoral institutes.

Most of the municipalities have percentages of spoiled ballots below 5 %; in fact, only 15 % of observations have spoiled ballot percentages of 5 % or greater, though there are a few cases in which the percentage of invalid ballots exceeds 10 %. Clearly, in some municipalities spoiled ballots are a commonplace occurrence, the number of spoiled ballots in municipalities is higher than the total votes received by some political parties. In local elections of 2008 in Huichipan, Hidalgo, for example, the percentage of spoiled ballots reached 14 % of total votes cast. This percentage is higher than the percentage of votes received by 8 of the 10 parties or coalitions that competed in the election.

## METHODOLOGY

### *Econometric model*

Given the foregoing discussion, we suggest that spoiled ballots are a function of a variety of institutional, socioeconomic, and protest-democracy variables. In this section, a model for estimation is presented, as well as the econometric approach used to establish determinants of spoiled ballots in Mexican municipal elections. We propose a cross-section analysis, using data from 2013 municipalities. Considering the previous literature reviewed and following to Soto and Cortez (2014), who studied

the determinants of turnout in Mexico, the econometric model we will estimate could be expressed as follow:

$$y_i = \beta_0 + \beta_1 MV_i + \beta_2 IM + \beta_3 IM_i^2 + \beta_4 \sigma_i^2 + \beta_5 e_i + \beta_6 pob.rural_i + \beta_7 pob.ind_i + \beta_8 DEI + c_j + v_t + \varepsilon_i$$

$$i=1, \dots, 2013$$

$y$  represents the proportion of spoiled ballots in the municipality  $i$ , that is obtained from local elections celebrated between 2006 and 2008. We control for economic adversity incorporating in the model a municipal marginalization index (IM) created by the Nation Population Council (CONAPO):  $e$  is the average of years schooling,  $pob.rural$  is the proportion of the population that lives in rural zones,  $pob.ind$  is the percentage of the population in the municipality that is indigenous,  $DEI$  is a *dummy* variable that takes a value of 1 if the local election is intermediate or zero otherwise. Finally, we include *dummy* variables to control the specifications for each state and year in which the municipal election was held, expressed as  $c_j$  and  $v_t$  in the same order ( $j=1, 2, \dots, 32$ ;  $t=2006, 2007, 2008$ ). As well,  $\varepsilon_i$  represents the term for error.

Because of the nature of the variables included in the empirical analysis, potential problems exist that should be resolved first with the object of obtaining unbiased and efficient coefficients. One of the deficiencies comes from the nature of our dependent variable, which is expressed as a proportion. Papke and Woolridge (2008) point out that when a variable that is being explained has values between zero and one, it is necessary to realize a transformation  $\log\text{-odd}$ ,  $\log[y/(1-y)]$  to be able to do an estimation using MCO. Even if this does not happen, the results are difficult to interpret once the transformation is done.

To solve this problem, the authors developed a method called "*fractional probit*". One advantage of this technique is that it allows you to have in mind the non-linear relationship of the variables. We can estimate increasing or decreasing partial effects according to the situation. This way, through estimation with quasi-maximum likelihood (QMLE), Papke and Woolridge obtain robust estimators that satisfy the properties of efficiency when the dependent variable lies between zero and one. Also, utilizing a model of robust regression benefits the unobserved heterogeneity. We express the fractional probit model in the following way:

$$E(y_i | x_i, c_i) = G(x_i \beta + c_i)$$

Where  $G(\cdot)$  represents a normal standard accumulative function of distribution, the dependent variable refers to spoiled ballot,  $c_i$  is the

unobserved effect of each municipality,  $x_i$  is the conjunction of explicatory variables considered in the previous section and  $\beta$  represents the parameters of the model that will be estimated. To know the marginal effect of some explicatory variables on invalid ballots, we calculate the partial derivative of the objective function in relation to the conditioned variance:

$$\frac{\partial E(y | x)}{\partial x_k} = \beta_k g(\beta_0 + x\beta)$$

Given that  $G(\cdot)$  is strictly monotonic, the direction of the partial effect of the variable  $x_k$  on spoiled ballots is the same as the sign of  $\beta_k$ . This way, considering the possible functional relations between discussed variables in section 4 and the electoral turnout, the model proposed with this technique is expressed the following way:

$$E(y_i | x_i, c_i) = G \left( \begin{array}{l} \beta_0 + \beta_1 MV_i + \beta_2 IM + \beta_3 IM_i^2 + \beta_4 \sigma_i^2 + \beta_5 e_i \\ + \beta_6 \text{pob.rural}_i + \beta_7 \text{pob.ind}_i + \beta_8 \text{mig} + \beta_9 \text{DEI} + c_j + v_i \end{array} \right) + \varepsilon_i$$

$$i=1, \dots, 2013$$

### Data

The key variable of interest is the rate of spoiled ballots, in our study is measured as spoiled ballots as a percentage of all ballots cast in local elections for each municipality. In order to estimate the parameters of our model; we collected data on the political variables in the model for 2013 municipalities in Mexico in each local election held from 2006 to 2008. Municipalities created after the year 2005 were left out of the analysis, as well as those that selected mayors through a system of uses and customs. In addition, we use the 2005 Mexican Census of Population and National Council of Evaluation of Policy for Social Development to obtain data at the municipal marginalization index, education, rural and indigenous population, and income inequality.

In Table 2 we present some descriptive statistics and we describe the variables considered in the econometric model. Voter abstention is measured as the number of people inscribed in the nominal list that did not vote as a percentage the total number of citizens in the nominal list for each municipality  $i$ . The variable ranges from zero to one, the source of information were the electoral institutes of each state. In a typical municipality, the rate of voter abstention on local elections is 42.5%. It is significantly greater than spoiled ballots, with a standard deviation of 14.8 %.

To measure the political competition, we use the electoral margin (MV) in municipal elections, i.e. the difference of the percentage of votes cast

for the winner in the election minus the votes obtained by the second party. The source of information for the construction of this variable was the data base of local elections published by the Center of Investigation for Development AC (CIDAC) on their website. The average electoral margin in municipalities is equal to 16.3 %. In the closest elections in our data shows a vote difference of 0.6 % between the two leading candidates, while in election with the highest margin is 100 %.

These differences are statistically possible for two reasons: the first is that in Table 2 we can observe that at least in one municipality there was only one competitor. The second is that in some municipalities, the PRI still maintains hegemonic power with a practically nonexistent competition. The heterogeneity of the municipalities is manifested in the dispersion of the variables. For example, the lowest rate of electoral turnout was 11.6 % (highest abstention is 88.4 %), while the highest rate was of 92.3 % (lowest abstention is 7 %).

TABLE 2. DESCRIPTIVE STATISTICS

Variables	Unit of measure	Obs.	Average	Std. Deviation	Min	Max	Period	Source
Spoiled Ballots	%	2027	0.0265	0.0184	0	0.1626	2006-2008	Electoral Institutes
Voter Abstention	%	2022	0.4251	0.1477	0.0704	0.8839	2006-2008	Electoral Institutes
Electoral Margin	%	2027	0.1630	0.1114	0.0060	1.00	2006-2008	Center of Investigation for Development AC (CIDAC)
Marginalization Index	Units	2454	0.3446	0.1457	0	1	2005	National Council of Evaluation of Policy for Social Development (CONEVAL)
Education	Units	2456	6.0611	1.5587	1.41	12.89	2005	Population and household count of 2005 (INEGI)
Rural population	%	2456	0.6079	0.3616	0.0000	1.00	2005	Population and household count of 2005 (INEGI)
Indigenous population	%	2456	0.2491	0.3574	0.0000	1.00	2005	INEGI
Income inequality (Gini)	Units	2453	0.4160	.0482	.2469	0.6895	2005	National Council of Evaluation of Policy for Social Development (CONEVAL)
Intermediate elections	Unit	2027	0.7618	-	0	1	2006-2008	Electoral Institutes

Source: Own elaboration with data from diverse sources.

Concerning socioeconomic conditions, the differences are enormous. We used the index of municipal marginalization of 2005, elaborated by the National Council of Population (CONAPO) to measure the marginalization of the municipalities we used. In this case, we normalize the variable so that it takes values from zero to one. Also, education (e) is measured by the average number of years of schooling in the municipality. The source of information used is the population and household count of 2005. The average years of education in the population are 6.06 in the municipalities, the highest value is 12.89 years of education while the lowest is 1.4 years.

To prove the hypothesis that urbanization takes to a debilitation of the interpersonal links, we include the proportion of the population that lives in rural zones (Rural population). In effect, there are municipalities with 100 % of their population living in rural locations, while in other municipalities nobody lives in rural zones. Although on average 60.8 % of population in municipalities lives in rural zones with a standard deviation of 36 %. The same occurs with the indigenous population, in average is of 24.9 %, with a standard deviation of 35 %. To prove the argument of social homogeneity we use the percentage of indigenous population in the municipality. The source of information is the population and household count of 2005 done by the INEGI.

We used the Gini Index at a municipal level estimated by the National Council of Evaluation of Policy for Social Development (CONEVAL) to control the differences caused by income inequality ( $\sigma^2$ ). Intermediate elections (DEI) is a *dummy* variable that takes values of 1 if the local election is intermediate or zero otherwise. The source of information was the electoral institute of each federal entity.

### *Empirical Analysis*

Earlier, the theoretical expectations of the relationships between the dynamics of the party system and the casting of spoiled ballots were discussed. As explained before, the relationship between closeness and spoiled ballots could be either positive or negative. To test this relation, firstly a simple correlation (Pearson's r) explanatory analysis was made among independent variables of the equation to avoid multicollinearity problems. We found that the different variables that could be used to measure the economic adversity such as poverty, marginalization and per capita income are highly correlated. In the same sense, these variables are correlated with the average years of education, for this reason we decided not to include them in the same model.<sup>5</sup>

<sup>5</sup> As we recognized earlier, results are only hypothetical and it is impossible to identify the real determinants of the spoiled ballot.

In Table 3 we report the marginal effects estimated for our model of spoiled ballots in Mexican municipalities from 2006-2008, given the median values of each variable.<sup>6</sup> We present four models according to variables included in the regression analysis. In the columns [1] and [2] are reported estimation results obtained replicating the specifications estimated by Soto and Cortez (2014), but considering as dependent variable the percentage of spoiled ballots, also education and income inequality are excluded from the model to avoid multicollinearity problems, while they are included in columns [3]. In the last column, we try to isolate the marginal effect of electoral margin on spoiled ballots.

TABLE 3. MARGINAL EFECTOS ON SPOILED BALLOTS IN MEXICO

Variables	[1]	[2]	[3]	[4]	Median Values
Constant					
Electoral Margin	0.0055(Notes 3) (0.0020)	0.0055(Notes 3) .0020	0.0060(Notes 3) (0.0022)	.0052(Notes 2) .0022	0.2000
Gini	-	-	0.0260(Notes 3) (0.0042)		0.4240
Marginalization Index	0.0197(Notes 3) (0.0057)	.0182(Notes 3) .0023	-		0.3211
Marginalization Index squared	-0.0019 (0.0072)	-	-		0.1222
Rural population	-0.0018(Notes 2) (0.0007)	-0.0018(Notes 3) .0007	-0.0004 (0.0007)		0.5449
Indigenous population	0.0017(Notes 2) (0.0009)	.0017(Notes 2) .0008	0.0038(Notes 3) (0.0007)		0.1874
Education	-		-0.0011(Notes 3) (0.0002)		6.2865
Intermediate election	0.0088(Notes 3) (0.0008)	.0088(Notes 3) .0008	0.0085(Notes 3) (0.0008)	.0066(Notes 3) .0008	0.7137
Fix effects	yes	yes	yes	yes	
Obs	2013	2026	2013		

Source: Own elaboration.

Note 1: Level of significance at 10 % Standard error in parentheses.

Note 2: Level of significance at 5 %.

Note 3: Level of significance at 1 %.

Our findings provide evidence that patterns of spoiled ballots are explained in part by variation in the political competition. In all

6 Because of the non-linear structure of the model, the coefficients obtained through this technique cannot be interpreted directly. Therefore, we do a transformation according to the established criteria in the equation (3) and those are reported in the chart.

specifications we find that Electoral Margin produces a positive effect on the percentage of spoiled ballots, the effect is highly statistically significant (the t-stat is typically greater than 6 in absolute value) and stable across specifications. An increase in 10 % on the electoral margin is associated with an increase in the proportion of spoiled ballots of 0.6 %.

That is, when the race is closer individuals are less likely to null their vote. These findings are consistent with the idea that spoiling their ballot has a greater cost of opportunity when the election is very competitive. In this sense, the behavior of electors casting null ballots is not very different from the behavior of electors who abstain from going to the polls, so they react in the same way when the electoral race becomes closer.

Aldashev and Mastrobuoni (2011) shown that margin at electoral unit level has a negative effect on invalid ballots, which is the opposite to the prediction of explanation based on voter protest. They found that if the leading margin increases from one election to the other within the same electoral unit, the fraction of invalid ballots reported at this unit decreases.

The marginal effect for income inequality is positively related with the percentage of null votes. Power and Garant (2007) contend that income inequality will be negatively related to invalid voting, since in countries with high income inequality the electorate will be more compact and will likely have a higher proportion of the high-SES, high competency voters who are less prone to casting invalid ballots. According to them, our empirical is not consistent with this hypothesis.

On the other hand, squared marginalization index shows no statistical significance on spoiled ballots, suggesting the existence of a lineal relationship between the percentage of spoiled ballots and the grade of marginalization.<sup>7</sup> Marginalization represents a wide range of characteristics of the electorate that would be related to voter competency, and hence we hypothesize that voters in relatively wealthier municipalities will exhibit lower levels of spoiled ballots. Our results in are consistent with this hypothesis, the coefficient for marginalization index is in the expected direction, and it shows statistical significance at conventional levels. An increase of 10 decimals of a unit of the marginalization index causes an increase of 0.2 % in spoiled ballots.

The average years of education are also negatively associated with the percentage of spoiled ballots in Mexico. This finding is consistent with the assumption that education and literacy contribute to the political skill levels of individual voters. This finding is also consistent with empirical research that report blank and spoiled ballots are more common in districts where illiteracy is high. Galatas (2008) suggest that people with high education

<sup>7</sup> This result is maintained using other variables of economic adversity such as poverty, the IDH and the index of social marginalization.

levels are less likely to make a mistake while marking the ballot, choosing voter abstention as a mechanism of protest. According to Cisneros-Yescas (2013), education had a negative relation with spoiled ballots in the federal elections of 2000, 2003 and 2006 in Mexico, i.e. in these elections the null vote increased in municipalities with higher average schooling.

It is common to see in literature arguments that stablish that urbanization will depress invalid ballots, since citizens in urban areas are more likely to be exposed to the kinds of political organization and easily-accessible information that will reduce invalid ballots. We found that rural municipalities had a negative association with spoiled ballots, which makes sense since Power and Roberts's study (1995) from Brazil found that urbanization appeared to have a positive effect on invalid voting for the upper house.

Data also indicates that an increase of 10 % in the rural population reduces the rate of spoiled ballots approximately 0.18 %. The percentage of indigenous population is associated with a higher percentage of null votes because of the propensity people have to make a mistake; an increase of 10 % in the indigenous population increases the rate spoiled ballots by approximately 0.17 %.

## CONCLUSIONS

Before presenting the conclusions, it is convenient to review some limitation of this paper, particularly those from the characteristics of available information. One of the clear limitations of this research is temporality, it is necessary to elaborate a panel data econometric model to study the consistent of the impacts on the temporal horizon. On the other hand, we recognize the article's limitations to explain why the elector spoils his ballot. In this sense, we have to aware that conclusions are only hypothetical, not conclusive.

We used statistical techniques to solve the problem of the dependent variable and the heterogeneity. Using data from municipal elections, we estimated the marginal effects of political, economic and demographic variables used in international studies. The results obtained helped us to corroborate some empirical irregularities found in other works. In additions, we detected some variables in Mexico that do not behave the same as in other countries.

The main question of this research is: what factors influence differences in spoiled ballots in municipal elections in Mexico? Even more, does political competition reduce the percentage of spoiled ballots? International literature suggests that the cost of expressing discontent through a voluntary invalid ballot is higher when the race is close, for this

reason. Our hypothesis is that patterns of spoiled ballots in Mexico are explained in part by variation in the political competition.

We found a positive impact of Electoral Margin on the percentage of spoiled ballots in all the specification of the econometric model; the effect is always highly statistically significant. That is, when the race is closer individuals are less likely to null their vote. These findings are consistent with the idea that spoiling their ballot has a greater cost of opportunity when the election is very competitive. In this sense, the behavior of electors casting null ballots is not very different from the behavior of electors who abstain from going to the polls, so they react in the same way when the electoral race becomes closer.

This analysis shed some considerations that should serve as guidelines for electoral politics. An essential part of democracy consists in guaranteeing citizens true options in electoral competition and these options are not measured by the number of candidates, but rather the level or representativeness that each candidate offers. This way, one of the problems of the Mexican electoral system is the lack of a real mechanism to express the unconformities during elections. In present day, when citizens do not feel represented by any of the candidates or they do not represent a real voting option, the only form of protest is through voter abstention or spoiling the ballot.

A measure that might solve this problem is creating an option of "none of above". With this mechanism, we could separate people who simply make a mistake while voting from citizens that simply do not feel represented by any of the exiting political parties. Second, people who use voter abstention as a mechanism of protest would be reduced, therefore decreasing the analytical problems associated with the electoral data base.

Additional research is needed, for example, to investigate the consequences and motivations people have when they spoil their ballot. A second line of investigation that derives from this work is the analysis of the impact of political competition on the democratization process in Mexico. A third aspect is the relationship between subjective-welfare and participation in Mexico.

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