

**DO WALMARTIANS RULE?  
THE POLITICAL INFLUENCE OF THE  
EMERGING MIDDLE CLASS\***

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*Resumen:* Se pretende responder la siguiente pregunta: ¿el incremento en el consumo de bienes durables –como los electrodomésticos– ayudó a que el partido en el poder mantuviese la presidencia de México en el 2006? Dicho de otra manera, ¿la clase media votó a favor del actual modelo económico? Limitaciones en los datos forzaron a contestar estas preguntas de manera indirecta estableciendo correlaciones y no causalidades, con los respectivos problemas de identificación. Sin embargo, esta investigación no pudo rechazar la hipótesis aludida. En una elección cerrada, un pequeño efecto puede hacer la diferencia, y este análisis sugiere que eso ocurrió.

*Abstract:* The present paper tries to answer the following question: did an increase in the consumption of durable goods -such as electric appliances- help the incumbent party to retain the Mexican presidency in 2006? Stated differently, did the middle class vote to support the current economic model? Important data limitations made the use of indirect tests and correlations necessary, rather than causalities -with the associated identification problems. Nonetheless, the paper was not able to reject the hypothesis mentioned above. In a tight election, a small effect could make the difference; and this analysis suggests that this is likely what happened.

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## 1. Introduction

In July 2006, Mexicans voted for a new President in the tightest national election ever. The strongest candidates came from the PRD (Democratic Revolution Party), considered as a center-left party with some proclivity to state intervention in economic issues;<sup>1</sup> the PAN (National Action Party), considered a center-right party and typically pro-market;<sup>2</sup> and the PRI (Institutional Revolutionary Party), considered ambiguous in ideological terms but typified as centrist.<sup>3</sup>

As background, the PRI ruled Mexico for 72 uninterrupted years. It was not until the election of 2000 when the PAN legally and peacefully overthrew it,<sup>4</sup> accomplishing its first Presidential period from December 1st, 2000 to November 30th, 2006. As for the PRD, although it has never been in command of the Federal Executive Administration, it has been in control of Mexico City's Executive Administration for the last twelve years.

For the first time ever, during the election of 2006, the two parties once considered as the opposition ended up in first and second place, leaving the PRI's candidate far behind in third place. In February 2006, when the campaigns started officially, the advantage of the PRD's candidate over the PAN's candidate was around nine points; by late June 2006 –the month before the election– the gap was reduced to three points (Mitofsky, June 2006) or in a technical draw according to some national electoral surveys (Moreno, Mancillas and Gutierrez, 2006). The winner of the presidential election, after some political and legal struggles, was the PAN's candidate but by less than 1% of the votes; slightly more than the ones received by the PRD's.<sup>5</sup> The official figures gave 35.89% of the votes to the former and 35.33% to the latter; the PRI got only 22.23%.<sup>6</sup> With this change of preferences from supporting the PRD at the beginning of campaign to supporting

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<sup>1</sup> Actually, it came from a coalition named *Coalición por el bien de todos*, an alliance between the PT (Labor Party) and *Convergencia*, which are politically smaller than the PRD. His name is Andrés Manuel López Obrador.

<sup>2</sup> His name is Felipe Calderón Hinojosa.

<sup>3</sup> As well, it came from a coalition named *Alianza por México*, which also included the PVEM (Mexican Green Ecologist Party), which is politically smaller than the PRI. His name is Roberto Madrazo Pintado.

<sup>4</sup> In coalition with the PVEM. But, in September 2001, it ended the coalition.

<sup>5</sup> The PRD's candidate, to date, has not recognized the official results of the Presidential Election.

<sup>6</sup> Federal Electoral Institute's (IFE) official database

the PAN on Election Day, a question emerges: did an economic rationale play a role in the final election results or was it just political strategies?

While the PRD candidate's platform represented more drastic changes in terms of the current economic model, the PAN candidate's was based on modifications of the existing one. The support of the principal candidates was clearly divided according to two variables: geographical zone and income group. The northern and western parts of the country solidly supported the PAN's candidate, while the central and southern parts of the country supported the PRD's. In terms of income groups, the latter's main support came from the lower income people –not surprising since the campaign's motto was “The poor ones first”– while support for the former came largely from the upper income groups (Mitofsky, July 2006; Institute of Marketing and Opinion, 2006).

There is a popular notion among economists that establishes that stable macroeconomic conditions enhance welfare. The rationale behind is that stability enables better planning, the existence of long-term financial contracts, and a larger credit supply. The availability of credit, together with the liberalization of trade, allows more consumption of a series of goods (including many durable goods) by middle-income groups. Recently, an article published by *The Economist* concluded very similarly: “Faster growth, low inflation, expanding credit, and liberal trade are helping to create a new middle class in Latin America...” (*The Economist*, 2007). These ideas produced some echo in the media. For example, less than one month before the election, an editorial from *The Wall Street Journal* (WSJ) suggested that the election could be defined by people who buy durable goods in Walmart (Lyons, 2006); the title of this paper is derived from it. The central thesis of the WSJ analysis was that PRD's proposal could be attractive to the middle class voters because of the low growth rates of the Mexican economy and of its inherent inequality; but, on the other hand, that the PAN's model could also be preferred because of the possibility of avoiding other crises.<sup>7</sup> So, both a more egalitarian distribution and stability are attractive features to middle class voters and political parties may tend to direct their platforms to them (Dixit and Londregan, 1998).

This study intends to test the aforementioned hypotheses, expressed as follows: was the middle class a decisive element in the

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<sup>7</sup> The transition from the PRI Administration to PAN Administration in 2000 was the first presidential transition that did not end in an economic crisis since the 1970s.

Presidential election in Mexico by preferring “stability” rather than “change”? The quest is twofold: first, a definition of who composes the relevant middle class is needed; and later, an evaluation of their role in the election. The paper is organized in the following way: Section 2 sketches briefly the concept of middle class and its dynamics; in section 3, a discussion of the ideal data set and the available one is presented, with emphasis on the identification of effects; section 4 includes the econometric specifications and their interpretation; and finally, section 5 briefly concludes.

## 2. Conceptual Framework

Who is the middle class? While a first approach at the question may hint at a trivial answer, a deeper analysis should provide a series of complex elements encompassed in the definition. When it is employed to refer to middle-income groups, then it is straightforward and statistical in nature (that is, the middle class would be an interval around the median of the income distribution). Obviously, some technical problems emerge: the use of per capita or household income, the need for adjusting income by equivalent scales, the consideration of purchasing power at specific localities, among others. Nonetheless, if these kinds of problems are not completely solved, at least they are very well understood (Deaton, 1997).

The definition that is typically used for middle class is more subjective in nature and refers to the achievement of certain living standards. It may be linked to specific behaviors or capacities, like having different types of capital (social, economical, or cultural), specific patterns of eating, or by practicing varieties of leisure activities (Tomlinson, 2003). The definition may also vary through time: while only the rich could own a car at the beginning of the twentieth century in the developed countries, fifty years later it was a middle class characteristic in the same nations. It may also be linked to specific geographic areas or countries. So, an interesting question is, do the middle-income groups constitute the middle class? because in Latin America this is not normally the case: “[in Latin America] middle-income households are not middle class at all; they are actually rather poor...” (Birdsall, 2002).

Given the difficulties of identifying the middle class, it is not surprising that few papers have been written discussing the effects of structural reforms in Latin America during the 90s on that group. To some extent, the root of the problem in the definition, as argued

above, is that middle class should be associated with welfare levels instead of income. Hence, the statistical income measure of the middle class families is not accurate enough, especially in Latin America. In addition, while a fair amount of studies consider the effects of the reforms in the region on both poverty and inequality, welfare dynamics remain considerably obscure (Birdsall, 2002; Lora and Panizza, 2002; Villarreal, 2006). Efforts to link the change in the economic model that occurred in Latin America with electoral outcomes are also very limited (Lora and Olivera, 2004).

Socioeconomic and macroeconomic variables play an important role in predicting the level of ownership of financial assets and durable goods, such as electric appliances<sup>8</sup> (Soutar and Cornish-Ward, 1997). If a consumer perceives an increasing probability of a macroeconomic crisis or personal financial distress, he will decrease his demand for durables and will limit his purchases (Mishkin, 1978). In other words, the decision of a family to acquire durable goods is not straightforward: both the ability (that is, having covered basic needs and a relative high income) and stable macroeconomic conditions are needed.<sup>9</sup>

For the purposes of this investigation, the emerging middle class will be considered as those families that have improved their living standards, approaching this with the recent acquisition of durable goods, such as electric appliances. In other words, we define the emerging middle class as families who did not have electric appliances in 2000 but did in 2006. This definition is helpful because it takes into account four big concerns: first, it captures the improvement in welfare of the households involved by the acquisition of durables; second, it reflects that they do not have uncovered needs and that they do have a relative high income; third, it indicates that the macroeconomic variables felt in Mexico were stable; and fourth, it excludes households that already owned durables and centers on those families that, between elections, increased their welfare. Some proclivity to favor “stability” instead of “change” is expected in this group (so they can acquire more durable goods), and it is expected that these preferences should be reflected in their voting for the PAN’s candidate.

A legitimate concern could be: what about households that were

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<sup>8</sup> The order for obtaining these appliances is also relevant, being as follows: refrigerators, washing machines, vacuum cleaners, other appliances, other labor saving devices, and finally, luxury goods.

<sup>9</sup> For instance, it could mean that a particular household have surpassed the third and last poverty line defined by the Social Development Secretary (sevenm SEDESOL): the patrimonial line, where the family has enough income for food, dressing, education, transportation, and household maintenance.

rich and that now have fallen down to middle class? First, it is important to recall that Mexico has not had an economic crisis since mid and late 90s, which precludes massive falling of welfare standards. Second, even though some families probably had this misfortune, it could be assumed that this group of middle class voters would prefer “change” instead of “stability”. That is, the economic model proposed by the incumbent party and its new presidential candidate (PAN) has not helped them. This situation is properly captured by the models proposed.

### 3. The Data Set

According to the scope of the proposed analysis, some specific information is required. The ideal database would be a panel of the Mexican families that would allow us to track the evolution of their economic and sociodemographic characteristics between 2000 and 2006, including their participation and voting preferences in the 2006 Mexican political process. Specifically, it would be useful to know whether or not a family acquired any electrical appliances or other durable goods in the referred period, or even if they lost some of these; in addition to the usual identification variables such as household income level, their participation in any governmental social programs, and where they live. With this, inference of their welfare dynamics and its correlation with the families’ voting choices could be directly calculated.

Unfortunately, there are some technical limitations to the data available for the research. The first one is that voting is secret and it is not mandatory, and no one, not even the electoral authorities, knows who voted for whom. The most disaggregated, available, and official information is the results by voting booth –or casilla– with the total and absolute votes for each candidate and with the location of where it was placed. With this, at least, a direct association could be made between the political preferences reported by casilla and the families living nearby.

The second limitation is that INEGI –the federal institution in charge of gathering and publishing the statistical and geographical information– does not manage panel data for its biennial national household surveys, named ENIGH, *National Income - Expenditure Household Survey*. Instead, it randomly selects the families every time. This precludes tracking a particular family’s characteristics between 2000 and 2006.

The third limitation is knowledge of the exact geographic location of the families surveyed in the ENIGH. Because of security and confidentiality purposes, this information is only available down to a municipality level. So, there could not be a direct match between these families' characteristics and the casilla results reported by the IFE; unless, aggregated municipal electoral results and aggregated municipal characteristics were used.

Consequently, the data employed in this study, merging the data available from the IFE and INEGI, had the following characteristics: different households and family member information between 2000 and 2006, with the information of which municipality they live in, and the elections results for this same geographical location. Two possible econometric specifications emerge to test the political preferences: the first uses the evolution of the characteristics of the municipalities (aggregating family changes as reported in the ENIGHS by geographical unit and comparing periods); and the second obtains the probability of a family having electric appliances in 2000 and predicts whether a family seen in 2006, with its current characteristics, could have had these in 2000. Both will be explained in the following section.

#### 4. Econometric Specification

Basically, the main intention is to find any correlation between the household's political preferences and their social, economical, and demographic variables that could hint at any preference for stability (PAN) or for change (PRD). Two different methods will be used to approach the main thesis: one, correlating the municipal's characteristics with its local presidential election outcome; and two, simulating an evolution of the households observed in the ENIGH 2006, from 2000 to 2006, using probit specifications, in order to correlate this simulated change with the outcome of the presidential election in the municipality where they live.

##### 4.1. *Method 1: Aggregated Municipal Characteristics*

###### 4.1.1. Description

In accordance with its name, the present methodology's main objective is to find a correlation between the overall welfare evolutions in a

particular municipality and the official results of the Presidential Election of 2006. It is expected that families in a particular municipality will prefer the PAN's candidate if they experienced an increase in the possession of durable goods, such as an electric appliance or a house. This accords with the arguments expressed in the WSJ article cited above, which associate voting for the PAN's candidate with the wish for more economical stability. In contrast, PRD's candidate should be preferred in those municipalities where durable acquisitions, or the housing market, were slower.

First, the political preference variable (the dependent) must reflect both the direction and the magnitude of a relative electoral achievement of one party over the other. The most straightforward option was to compute a ratio of the votes received by the two parties that concern this study, excluding the voting results of other political parties.<sup>10</sup> Mathematically, the votes received by the PRD in each municipality were divided by the votes received by the PAN in the same location. Afterwards, the natural logarithm of the calculated ratio was obtained, ending with a voting ratio  $[VR]$  variable. Note that this procedure will draw out a distribution around zero (in the case of a tie:  $\ln(1)=0$ ) and will treat the differences in both directions symmetrically ( $\ln((a/b))=-\ln((b/a))$ ), facilitating the interpretation of the coefficients in the model. So, positive outcomes represent a preference for the PRD, and negative ones represent a preference for the PAN.

Second, an index was needed in order to summarize the total change in the possession of the electric appliances in each municipality. While appliances can be considered separately, the interpretation of the total statistical effects would be much more cumbersome than of a single effect. Accordingly, we computed the percentages of households, by geographical unit, which had at least one radio, stereo, TV, VHS, video games console, computer, fan, refrigerator, blender, iron, washing machine, vacuum cleaner, and microwave,<sup>11</sup> for 2000 and 2006. Given that two years were used, two vectors were calculated, one for each year, showing the percentage of households possessing these specific appliances, so the difference between the two could be calculated (2006's vector minus 2000's vector): a positive difference should mean higher welfare; and a negative should mean lower wel-

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<sup>10</sup> Whether this fact may obscure important decisions (e.g. strategic voting), remains a subject for future research.

<sup>11</sup> While the list is not exhaustive (with respect to the list included at ENIGH), it is almost complete and represents the most expensive appliances.



fare. Finally, these differences were grouped into an index using principal components analysis, recognizing different weights for different appliances (for instance, acquiring a refrigerator is not the same as acquiring a blender). According to Johnson and Wichern (1998), the main purpose of the principal component analysis is to explain the variance-covariance structure of a set of variables through a few linear combinations of these variables. This permits data reduction and compound interpretation. The total population variance can be explained by adding up the Eigen values of each component as proportion of the sum of the Eigen values of all the components (Johnson and Wichern, 1998). For this specific set of electric appliances, the first three components capture 63.3% of the total population variance. The predicted results of the first three principal components were added up and used to construct the electric appliances change index [*EACI*]. It is important to note that the three principal components can be used as three independent variables. The advantage of building an index that incorporates the three of them is that it permits simpler interpretation.<sup>12</sup>

Third, the difference from 2000 to 2006 of the municipal average per capita real income [ $\Delta RI$ ]<sup>13</sup> was also computed and used in the model as a control variable. It was included in order to capture the “income effect” in the political preferences. As well, the proportion of households, by municipality, that are currently paying their house mortgages [*H*] was constructed, because their vulnerability to macroeconomic distress makes us suspect that they would prefer stability.

Fourth, the percentage of households in the municipalities that in 2006 participated in each of the two flagship social programs of the Mexican Federal Government (*ProCampo* [*PR*] and *Oportunidades* [*OP*]) was also computed to estimate its political impact. Participation was considered without consideration of the magnitude of the transfer. *ProCampo* has been defined as

...a hybrid [program] between compensation, welfare, and adjustment, defined in the context of a political window of opportunity to compensate the losers of trade liberalization, but with a definite welfare twist toward the rural poor... (Sadoulet, Davis and Janvry, 2001).

*Oportunidades* is a Conditional Cash Transfers program linked to school attendance by children along with regular medical check-ups

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<sup>12</sup> This alternative specification (with the three components as independent variables) was tested and the results are the same qualitatively.

<sup>13</sup> In Mexican pesos of 2000.

(Berhman, Parker and Tood, 2005). Because both are nationwide programs intended to improve the quality of life of the beneficiary families, it is important to separate its influence from our main variable ( $EACI$ ).

Fifth, two dummies were created: the first one indicates if the governor of the state in which the household analyzed is located is a member of the PRD [ $PRD$ ]; and the second one if it is a member of the PAN [ $PAN$ ] (PRI governors were dropped to avoid multicollinearity<sup>14</sup>). The intention is to separate local political inertia from the economic rationale we wished to discover.

Finally, the model is represented as follows:

$$VR_i = \alpha_0 + \alpha_1 EACI_i + \alpha_2 \Delta RI_i + \alpha_3 H_i + \alpha_4 PR_i + \alpha_5 OP_i \\ + \alpha_6 PRD_i + \alpha_7 PAN_i + \varepsilon_i,$$

where the  $\alpha$ s are the parameters to be estimated, subindex  $i$  the municipalities in the analysis ( $N = 224$  observations in this first approach), and  $\varepsilon$  the error term.

Two caveats should be discussed before presenting the results of this method. First, the ENIGH reports a weight named factor that is defined as the inverse probability that a household is selected. If it is used as frequency and each observation's factor is added all up, it would add up to the total population of Mexico. However, it would not do so accurately for the total populations of the states, nor of the municipalities. Nevertheless, because of the absence of a "municipal factor", and with the knowledge that some weight should be employed with the observations reported in the ENIGH, the factor weights were used for municipal computations anyway. Second, IFE's presidential elections database includes every municipality in Mexico –of which there are around of 2,200– because it was a federal election; in contrast, the ENIGH includes between 300 and 500 municipalities, depending on the year surveyed. This means that there are some variations between the municipalities sampled, especially for the smaller ones, in terms of population. So, in order to compute the evolution of a municipality, it should appear in the ENIGH 2000 and in the ENIGH 2006. This occurred with 224 municipalities, which will be subject for this analysis. So, because the ENIGH is not designed to perform analysis at a municipal level, the validity of our procedure would depend

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<sup>14</sup> Interestingly, when it was used instead of PRD or PAN, this variable had no statistical significance.

upon the absence of any systematic bias. That is, because we could only compare the municipalities that were in both ENIGHs, those that did not match may have had a particular political preference towards PRD or PAN, according with their characteristics. These characteristics could have been part of the eligibility criteria used by the INEGI to survey them.

#### 4.1.2. Results

The regression results are presented in table 1, which were obtained using the General Method of Moments. While this is not the only possible estimation method, it imposes very few restrictions on the data, encompasses other methods (like 2SLS), and allows simple correction of standard econometric problems (Arnold and Crack, 1999). The average amount of schooling of the head of the households for each municipality proved to be a good instrumental variable to deal with the endogeneity of Municipal Per Capita Real Income Change, because it explains this independent variable and it is orthogonal to the dependent variable of the model. After doing this, the  $C$ -statistic that behaves as a  $\chi^2$ , with one degree of freedom (one endogenous variable), and with a null hypothesis, which stated that the endogenous variable behaves as if it were exogenous, with a value of 1.3652. That is, the endogeneity problem was corrected. The final results are:

**Table 1**  
*Aggregated Municipal Characteristics Results*

	<i>Coefficient</i> <i>(Std. Err.)</i>
Electric Appliances Change Index	-0.1575 (0.4315)
Municipal Per Capita Real Income Change	$1.277 \times 10^{-4}$ $(1.078 \times 10^{-4})$
Families with House Mortgages	-1.4932* (0.8060)
<i>Oportunidades</i>	1.0774** (0.4997)

**Table 1**  
(continued)

	<i>Coefficient</i> ( <i>Std. Err.</i> )
<i>ProCampo</i>	-2.4744** (1.1226)
PRD Governor	0.6719*** (0.1415)
PAN Governor	-0.4587*** (0.1555)
Constant	-0.0050 (0.2004)

Note: Significant at \*10%, \*\*5% and \*\*\*1%

The first variable [Electric Appliances Change Index] refers to the central question of this study. Note that, even though its coefficient did not achieve statistical significance, the negative sign suggests a correlation between the acquisition of electric appliances in the municipality and voting for the PAN's candidate, as expected. Acquiring durable goods requires stability and we suspect that those who benefited from stability would want more. However, this method does not conclusively show this.

In contrast the Municipal Real Income Change's coefficient shows a positive sign, suggesting a positive correlation with the PRD's candidate; but, like the first variable, it was not statistically significant either. Notwithstanding, it could be conjectured that those municipalities that experienced a positive change in real income would demand more change, as assumed and typified by the PRD.

The sign of the coefficient for the variable of families that are currently paying their house mortgages had a negative sign, statistically significant at 10%. What it captures is that the municipalities that had a larger proportion of this type of family preferred the PAN's candidate over the PRD's; an assumed preference for stability over change.

The governmental programs *Oportunidades* and *ProCampo* were noticeably divided between the candidates: the families benefitted

from the former highly supported the PRD's, and those from the latter supported the PAN's candidate. The result was expected for the program Oportunidades, because it is intended to help the poorest Mexicans in the country, and the PRD's campaign was highly oriented towards them. More surprising was the result of *ProCampo*, which had a negative sign and it was also significant at 1%. Given its almost exclusive presence in rural areas, we did not expect it to be correlated with a preference for the PAN's candidate.

The dummies related to the political affiliation of the state governor were, as assumed, highly correlated and statistical significant with their respective parties' presidential candidate. That is, having a PRD governor meant strong support of families in that state for the PRD's presidential candidate; same for a PAN Governor.<sup>15</sup>

#### 4.2. Method 2. Probit pseudo-panel

##### 4.2.1. Description

The section's main intention is to approach the same main hypothesis but from a different angle. The basic idea is to simulate the existence of a pseudo-panel (that takes into account the availability of electric appliances while leaving other things constant) lead by the next auxiliary question: would the families observed in the ENIGH of 2006 have had electric appliances under the year 2000's conditions? While the methodology places some extra burden on the assumptions, it is able to work with the full sample avoiding some caveats of the previous section.<sup>16</sup>

The identification strategy consists of two stages. In the first stage, a probit auxiliary model computes the probability of a family seen in the ENIGH 2000 having a specific electric appliances according with their characteristics. Afterwards, in the second stage, these

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<sup>15</sup> A potential question for future research to identify whether it is political geographical preferences or governors' activism that is correlated with voting preferences.

<sup>16</sup> Recall that method 1 uses two ENIGHs and that, because they are not panel data, the only way to compare them is to use the municipal characteristics that change between the two surveys; in contrast, method 2 uses household observations, instead of aggregating information at the municipal level, and uses the ENIGH 2006 to make its final regression, using the ENIGH 2000 only as an auxiliary data set.

probabilities are used to predict whether a family seen in the ENIGH 2006, according to their current characteristics, would have had appliances in 2000; creating a pseudo-panel. By doing so, there is a special recognition that the probabilities of having electric appliances in 2006 are different than in 2000, leaving other things constant. That is, because the second stage uses the characteristics seen in 2006, and not the ones seen in 2000, any possible changes in the pseudo-panel would be attributed to changes in the availability of appliances, or different market conditions.

The probit's variables used for the first stage were: quarterly real income [ $RI$ ],<sup>17</sup> a dummy for electric service in the household [ $ES$ ], household size [ $HS$ ], a dummy for household ownership [ $HO$ ]—whether they were paying their house mortgage or whether they already own it—, and four dummies for each locality size. This last variable categorizes localities according with its population size. Being: 1) for those localities with more than 100,000 inhabitants [ $LS1$ ]; 2) for those between 15,000 and 100,000 [ $LS2$ ]; 3) for those between 2,500 and 15,000 [ $LS3$ ]; and 4) for those that have less than 2,500 [ $LS4$ ]. A probit was run for each electric appliance [ $EA$ ] used in Method 1 cited above (13 electric appliances).

The probit models for the first stage were:

$$EA_i^j = \beta_0^j + \beta_1^j RI_i + \beta_2^j ES_i + \beta_3^j HS_i + \beta_4^j HO_i + \beta_5^j LS1_i \\ + \beta_6^j LS2_i + \beta_7^j LS3_i - i + v_i^j,$$

with the  $\beta$ 's being the parameters to estimate, subscript  $i$  the households in the analysis ( $N = 10,089$  observations in this first stage), superscript  $j$  the specific electric appliance, and  $v$  the error term.

For the second stage, the econometric procedure followed was to store the  $\beta$ 's and use them to predict possession of each appliance, using the same variables but with the ENIGH 2006. If the accumulated probability was over 0.5, it is assumed that the appliance was acquired. With this, two vectors were generated: observed possession of each electric appliance according to ENIGH 2006 [ $v1$ ] and the predicted values [ $v2$ ] using the probit' results. A third vector for each appliance was calculated as  $v3 = v1 - v2$ . The main purpose of this new vector [ $v3$ ] is to capture the pseudo-evolution of the availability of the appliances (aside from evolutions in the characteristics of the

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<sup>17</sup> In Mexican pesos of 2000.

households). Finally, an Electric Appliance Change Index was built with principal components similarly to the Method 1<sup>18</sup> using  $v3$ .

Once the second stage was done, an analogous regression is estimated as in Method 1. All the variables were the same with the exception of income, which we used 2006 income, instead of the difference between income in 2000 and 2006, mainly because we had no information we could use to predict a pseudo-evolution of income between 2000 and 2006. So, due to this limitation, household's real income was used instead of its change. The other important variation is that now every observation is at the household level and the regression can be weighted using the expansion factors as they were supposed to be used: in a nationwide analysis.

Similarly as in Method 1:

$$VR_i = \alpha_0 + \alpha_1 EACI_i + \alpha_2 RI_i + \alpha_3 H_i + \alpha_4 PR_i + \alpha_5 OP_i \\ + \alpha_6 PRD_i + \alpha_7 PAN_i + \varepsilon_i,$$

where the  $\alpha$ 's the parameters to estimate, subindex  $i$  the households in the analysis ( $N = 20,262$  observations in this second stage), and  $\varepsilon$  the error term.

With this methodology the probability of having any of the electric appliances (availability) may have evolved and changed during the last presidential period and this may be correlated with the votes received by the incumbent party's candidate. A major advantage of this procedure is that the analysis could be made by family, and not by municipality, including the full sample. Its basic caveat, as with any two stage model (with stages estimated separately), is that possible statistical noise of the first stage is carried over.

#### 4.2.2. Results

The regression results are presented in table 2, which were obtained using the General Method of Moments because of the endogeneity

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<sup>18</sup> Adding up the first three components. For this specific set of electric appliances, the first three components capture 44.9% of the total population variance (Johnson and Wichern 1998). Adding extra components would increase the explained variance, but the regression results do not change qualitatively. Three components were chosen to keep the instruments used to control endogeneity as simple as possible.

found in the Per Capita Real Income. The schooling and the age of the head of the household, and the household's size were used as instrumental variables to deal with the endogeneity because they explain the independent variable and are orthogonal to the dependent variable of the model. The  $C$ -statistic that behaves as a  $\chi^2$ , with one degree of freedom (one variable endogenous), and with a null hypothesis that the endogenous variable will behave as if it were exogenous, had a value of 0.4697. That is, the endogeneity problem was corrected. The final results are:

**Table 2**  
*Probit Pseudo-Panel Results*

	<i>Coefficient</i> <i>(Std. Err.)</i>
Electric Appliances Change Index	-0.1018** (0.0100)
Municipal Per Capita Real Income Change	$3.62 \times 10^{-6}$ ** ( $1.38 \times 10^{-6}$ )
Families with House Mortgages	-0.0977* (0.0383)
<i>Oportunidades</i>	0.2086** (0.0295)
<i>ProCampo</i>	-0.0069 (0.0494)
PRD Governor	0.8321** (0.0175)
PAN Governor	-0.8034** (0.0186)
Constant	0.1768** (0.0223)

Note: Significant at \* 2% and \*\* 1%

With this approach, the central variable of this study [*EACI*] was statistically significant and it had a negative sign, suggesting



a probable correlation between the availability of electric appliances and voting for the PAN's candidate. In other words, there were exogenous changes to the families' behavior (the changes are assumed in this investigation to be market conditions) related to the acquisition of electric appliances that are correlated with households' political preferences. The variable income in absolute levels [ $RI$ ] was also correlated with the voting for PAN, as electoral surveys cited at the beginning of this paper suggested. The variable  $H$ , those families that were paying their house mortgages, had a negative coefficient sign which reflects the same economic rationale as in Method 1: families with periodical and long-term payments would play conservative and prefer stability over change. The governmental programs of *Oportunidades* [ $OP$ ] and *ProCampo* [ $PR$ ] were positive and negative, respectively, although the latter lost statistical significance.

The PRD and the PAN dummies, as in the methodology before, were significant and they revealed the same: the governor's party influenced in the political preference of the families. While the specific effects within these variables are not identified, it is certain that the political inertia at the state level plays a major role.

Thus, with this second specification, the hypothesis that the availability of electrical appliances and its possession by Mexican households played a role in the election is not rejected. The effect of this variable isolated from other independent variables is statistically significant.

## 5. Conclusions

The Mexican 2006 Presidential Election results were very tight and, at the end, the difference between the winning candidate (who came from the incumbent's party: the PAN) and the PRD's candidate was about half percentage point. This research questioned to what extent the increase in availability of durable goods and electrical appliances could have influenced these results. The underlying issue was the relationship between welfare improvements, the actual economic model of the country, and the popularity of the ruling party. Despite severe data limitations, an econometric model was proposed and tested with two different specifications.

The first approach consisted in comparing the variables at an aggregated municipal level. The central variable of this study (an index that measured the evolution of the possession of electric appliances during the last six years) was not statistically significant; yet it

showed evidence of some proclivity to vote for the PAN's candidate. In contrast, a tendency to vote for the PRD's candidate was related to an increase of the households' average real income at the municipal level; but it was not statistically significant either. On the one hand, the variables in the econometric model that were significant and that favored the PAN's candidate were: if a family was paying its house mortgage, participating in *ProCampo*, and from a state with a PAN Governor. On the other hand, the variables that favored the PRD's candidate were: participation in *Oportunidades* and being from a state with a PRD governor. The basic limitations of the first specification are the employment of data whose survey was not explicitly designed for municipal analysis and the lack of a complete coincidence of municipalities between samples.

In the second approach, a pseudo-panel was constructed to compare possession of the electrical appliances in year 2006 with the predicted ownership according to parameters of year 2000. The driving idea was to explore correlations between the increased availability of durable goods (isolated from income effects) and voting behavior. The variables of this econometric model were very similar to the previous specification, with the difference that now everything is at the household level, making it possible to work with the full ENIGH sample and using the weight factor properly. In this specification, the central variable of the study –the index built to measure the evolution of the availability of electric appliances during the last six years– was correlated with a tendency to vote for the candidate from the incumbent's party (the PAN candidate) and was statistically significant. The main differences were: income significantly correlated with voting for the PAN (in the past specification temporal differences in income was employed) and *ProCampo* is not significant anymore.

This paper began with the question of whether the increased consumption of durable goods –associated in the media with an emerging middle class– could have aided the incumbent party to retain the Mexican presidency in 2006, with the victory of the PAN associated in the media with voter support for PAN's economic model. Important data limitations forced us to employ indirect tests and rely on correlations rather than causalities, with the associated identification problems. Nonetheless, the analysis was not able to reject the hypothesis that an increased in consumption of these goods was correlated with voting for the election winner. In a tight election, a small effect could make the difference, and this paper suggests this probably happened.

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