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# OWNERSHIP AND CONTROL STRUCTURE, AGENCY COSTS AND INVESTMENT DECISIONS IN MEXICAN MANUFACTURING FIRMS

Área de Investigación: Finanzas

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## RESUMEN

### OWNERSHIP AND CONTROL STRUCTURE, AGENCY COSTS AND INVESTMENT DECISIONS IN MEXICAN MANUFACTURING FIRMS

**Área de investigación:** Finanzas

We study how ownership and control structure may explain investment decisions of Mexican manufacturing firms. We use an econometric model to explain this relationship. We focus on micro, small, medium and large size firms. We use certain characteristics of the firms (size, cash flows and investment opportunities) as control variables. The econometric assessments confirm that ownership and control structure may influence investment decisions. Control variables are positive determinants of investment. Our results suggest that control has a positive relationship with investment when firm size increases. Also, an important finding is that the medium size is the point of transition to less-concentrated ownership and control structures. Agency costs are a positive determinant of investment decisions. Also, such costs have a direct relationship with the degree of separation between ownership and control.

**Palabras clave:** Ownership, Control, Investment



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## PONENCIA

### OWNERSHIP AND CONTROL STRUCTURE, AGENCY COSTS AND INVESTMENT DECISIONS IN MEXICAN MANUFACTURING FIRMS

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#### Introduction

The different interests between owners and managers about firm investment decisions are important to understand the firm performance. The person in charge of these decisions faces the challenge to obtain an efficient resources allocation. So, a dominant stream in corporate governance has been the discussion about the investment strategies in the context of asymmetries between interests of owners and managers. These asymmetries between are common when firm size increases. Separation of ownership and control structure of the firm is direct related to agency costs.

Here we study the determinants of investment decisions in Mexican manufacturing firms because studies for emerging economies are relatively scarce. Particularly, we focus on how ownership and control structure influences investment decisions. We use an econometric model to explain this relationship. We focus on micro, small, medium and large size firms. We control for certain firm characteristics that capture the constraints that firms face by nature. They include firm size, cash flow and investment opportunities.

The contributions of this research focus on two areas. The former contributions relate to the literature on investment determinants. Traditional studies focus on developed economies, not in emerging ones. The second contribution is methodological. To the best of our knowledge, econometric comparisons of the degree of separation between ownership and control according to firm size do not exist.



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The paper is organized as follows. Section 1 reviews the literature. Section 2 describes the methodological design: data, variables and econometric model specification. Section 3 shows our regression results. Section 4 discusses them in terms of their implications for corporate governance theory. Finally, section 5 concludes.

### 1. Literature review and background

Here we review the economic literature about firm investment decisions. The review follows the guidelines of the corporate governance and agency problems. We begin our review by describing the relation among ownership, control and agency costs. Then we incorporate the influence of firm size. We indicate some studies that have analyzed these determinants of investment decisions on empirical and theoretical grounds in developed countries. Finally, we describe the research about this issue in developing countries, like Mexico.

#### 1.1 *Ownership, control and agency costs*

First, it is necessary to know who is the responsible to make decisions in a firm. Agency theory analyses how the stakeholder's interests define corporate decisions. When these interests differ, such differences are translated into agency costs (Ang, Cole and Lin, 2000).

Agency theory analyzes these interests' differences through the principal-agent problem. The separation between ownership and control functions generates this problem. It is due to the asymmetries between owners and managers interests (Daily, Dalton and Cannella, 2003). These asymmetries are related to agency costs, Ang, Cole and Lin, (2000) indicate that agency costs increase with the degree of separation between ownership and control.

It is necessary to introduce two concepts: ownership and control. Ownership is the equity stakes of firms and control is to have the authority to determine corporate policies. Berle and Means (1932) have a pioneer research about the divorce of ownership from control in large U.S. corporations. This issue was the dominant in the modern corporate governance theory. However, this statement has been subject to criticism. Particularly, Cheffins and Bank (2009)



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discuss various empirical studies of ownership and control conducted between 1930s and 1980s. They conclude that U.S. corporate governance has never been characterized by a wholesale divorce of ownership from control. When this separation of functions exists, the owners delegate decision making authority on employees.

According to this not conclude discussion about divorce of ownership from control, we still need to assess the relevance of agency theory among firms. Such assessment can be developed by analyzing agency costs in firms where exist differences among ownership and control structures.

### 1.2 *Investment decisions and firm size*

Traditional economic theory indicates that the maximization of profits explains the behavior and decisions of firms. Particularly, from the view of financial economics, firms are considered as flows of financial streams that depend on investments. Such view explains why the study of optimal investment decisions and their determinants is considered an important research field for economist.

So, investment decisions are fundamental for the firm performance. Also, these decisions may produce differences in the interests of owners and managers. Andres (2008) argues that the concentration between ownership and control is associated with low agency costs. Also, it could reduce the information asymmetries in investment decision process. The author studies a panel dataset of non-financial German firms. He finds evidence about more efficient investment decisions and fewer agency conflicts and information asymmetries in family firms. It is due to the advantages of family ownership in aligning the interests between managements and owners. Syriopoulos, Tsatsaronis and Roumpis (2007) present similar evidence. They indicate that ownership structures influence the firm resources allocation. Also, they argue that corporate governance mechanisms could control agency problems. They find a direct relationship between ownership concentration and market value in Greek firms. This relationship is established through investment decisions.





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However, Danielson and Scott (2007) do not agree with the previous findings. They identify two elements in investment decisions: overinvestment and underinvestment. They conclude that the first one increases when firms adopt less-concentrated ownership and control structures. Underinvestment is more prevalent in growing firms with concentrated ownership and control structures. This research uses a qualitative methodology based in owner's perceptions. The authors indicate that agency conflicts can distort a firm's investment decisions if all ownership and control interests do not reside in one person.

### 1.3 *Agency costs, investment and firm size*

The importance of consider the size firm variable is assumed by Crespi and Schellato (2007). They indicate that the relationship between the degree of concentration of the ownership and control structure and firm investment behavior must consider firm size.

According with the importance of firm size, the research of Bøhren, Cooper and Priestley (2007) conclude that better corporate governance drives managers to invest more, and to exert more effort in finding highly productive investment projects. Also it allows managing their investments efficiently. So it improves the efficiency of capital allocation. The authors examine evidence of US manufacturing firms. They control by firm size, cash flow and investment opportunities.

Empirical evidence is not conclusive; Gugler, Mueller and Yurtoglu (2007) indicate that the degree of concentration between ownership and control is an important element of investment decision process. They analyze evidence of European firms with attractive investment opportunities, asymmetric information problems, limited cash flow and deficient management. They find that family firms (with concentrated structures) are more affect in their investment decisions than non-family firms, due to a more information asymmetries. So, this review shows that the debate is not conclusive.



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#### 1.4 *Corporate governance in emergent economies*

The empirical studies about ownership, control and investment are from developed economies. Studies focused on developing economies, like Mexico, are scarce. Examples are the Castrillo and San Martin (2007) and Ruiz and Steinwascher (2008) ones. The first one presents empirical evidence about firms listed in Mexican Stock Exchange. This research focuses on ownership and control structure, with emphasis in family control as a mechanism of supervision and control of the managers. The concentration of ownership and control in the family reduces the principal-agent problem. However, this study does not relate ownership and control structure to investment decisions.

Ruiz and Steinwascher (2008) support the relationship among corporate governance, diversification strategies and financial performance with the analysis of non-financial firms listed in Mexican Stock Exchange. They indicate that firms, whose ownership is concentrated in a majority shareholder, focus towards the domestic market, whereas family firms try to diversify their productive activities and sources of income. However, none of these studies focus on agency costs, investment decisions or firm size.

## 2. Methodology

Here we describe the methodological design of the investigation. Specifically, we describe the sources of data and the indicators used in the econometric assessments. Furthermore we describe the econometric modeling and testing procedures used to analyze the relationship among ownership and control structures and investment decisions in the Mexican manufacturing firms.

### 2.1 *Data sources*

We use data from the “Economic Census 2003” reported by the Mexican Bureau of Statistics (INEGI). Such census is constructed accordingly to the North-American-Industry-Classification-System (NAICS). We use a longitudinal data set because previous censuses are built with non-



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comparable methodologies. In Mexico census data are collected every five years. Currently, data for the census collected in 2008 are not available.

Firm-level data are not available due to confidentiality reasons. We deal with such constraint by constructing a set of four representative firms for each of the 182 industries included in the census. We build the representative firms accordingly to the number of employees. A micro firm has no more than 10 employees. A small firm has between 11 and 50. A medium firm has between 51 and 250. A large firm has at least 251 employees. This classification follows the one of the Mexican Economics Ministry for manufacturing firms.

The census classifies firms of each industry into groups according to the number of employees. For example, the first group includes firms with 0 to 2 employees. The second group includes firms with 3 to 5, and so on. The census has 12 classificatory groups for each of the 182 industries. As we have indicated, the Mexican Economics Ministry uses a different classification for the firms. Table 1 shows the relationships between both classifications.

**Table 1: The census and the Mexican Economics Ministry classifications for the firms of an industry**

Census' Classification of Firms in the Industry $i$ ( $t$ )	Employees in the Firms that Belong to Group $t$	Mean of Employees in the Firms that Belong to Group $t$ ( $Mjt$ )	Type of Firm According to the Mexican Economics Ministry' classification
1	0-2	1	Micro
2	3-5	4	Micro
3	6-10	8	Micro
4	11-15	13	Small
5	16-20	18	Small
6	21-30	25	Small
7	31-50	40	Small
8	51-100	75	Medium



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9	101-250	175	Medium
10	251-500	375	Large
11	501-1000	750	Large
12	1000+		Large

*This table shows the relationships between the Economic Census' classification and the one of the Mexican Economics Ministry. The census classifies firms of each industry into groups according to the number of employees. The census has 12 classificatory groups for each of the 182 industries. Mexican Economics Ministry' classification for manufacturing firms considers four types. A micro firm has no more than 10 employees. A small firm has between 11 and 50. A medium firm has between 51 and 250. A large firm has at least 251 employees. The mean of employees for the firms of the twelfth group is the average of employees with respect to the total of firms in the twelfth group. Here we use the classification of the Economics Ministry.*

We build a variable that describes the behavior for the representative firm of size "j" of industry "i". We calculate a weight indicator for empirical purposes. We use the mean of the number of employees by group to calculate it. This is calculated as follows:

$$P_{ijt} = \frac{n_{ijt}M_{jt}}{\sum_t n_{ijt}M_{jt}} \quad (1)$$

$$i = 1, \dots, 182$$

$$j = 1, 2, 3, 4$$

$$t = 1, \dots, 12$$

where  $P_{ijt}$  is the weighted indicator of the industry "i", size "j", group "t";  $n_{ijt}$  is the number of firms of the industry "i", size "j", group "t";  $M_{jt}$  is the mean of the number of employees of size "j" in group "t"; the subindex "i" refers to the i-th industry; the subindex "j" refers to the firm of size "j" (micro, small, medium and large firms); the subindex "t" refers to the t-th groups included in the size-j classification.

Then we use the weighted indicator of each one of the four representative firms of industry  $i$  to estimate each variable assessed econometrically. We multiply  $P_{ijt}$  by each variable included in the census classification for each one of the twelve groups of firms  $V_{ijt}$  (see Table 2 for a list of variables). Such multiplications added accordingly to each subindex “ $t$ ” will provide us with a variable each representative firm of size “ $j$ ” of the industry “ $i$ ”.

$$RF_{ij} = \sum_t P_{ijt} V_{ijt}$$

$i = 1, \dots, 182$   
 $j = 1, 2, 3, 4$   
 $t = 1, \dots, 12$ 
(2)

where  $RF_{ij}$  is a variable associated to the representative firm of the industry “ $i$ ”, size “ $j$ ”;  $P_{ijt}$  is the weighted indicator of the industry “ $i$ ”, size “ $j$ ”, group “ $t$ ”.

## 2.2 Variables

Here we describe the main variables used in our study. We use the ones proposed by Ang, Cole and Lin (2000), Bøhren, Cooper and Priestley (2007) and Danielson and Scott (2008). The variables used in the econometric assessments are summarized in the following table:

**Table 2: Investment and its determinants (variables)**

Variables	Measures	Indicator of the census
Dependent variable		
Investment	Fixed capital expenditures	Gross fixed capital formation (Value of the fixed assets bought minus the value of the fixed assets sold)
Independent variables		
Ownership and control structure	Ownership	Ratio of owners, relatives and other employees non-remunerated to total employees





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	Control	Ratio of management employees to remunerated employees
	Agency costs (1) The operating expenses ratio	Ratio of operating expenses to annual sales
	Agency costs (2) The asset utilization ratio	Ratio of annual sales to total assets
Investment opportunities	Ratio of output to capital	Ratio of production value to fixed capital stock
Cash flow	Earnings	Net earnings
Firm size	Fixed assets	Total value of fixed assets

*This table shows the variables and indicators used in the econometric assessments. The dependent variable is investment. The other variables are the independent variables used in this investigation. The table includes the definitions of the variables (indicators) according to the Economic Census of INEGI (Mexican Bureau of Statistics).*

Our main set of variables includes indicators of ownership and control. We consider three elements for this structure: ownership, control and agency costs. We follow Bøhren, Cooper and Priestley (2007) to build ownership and control indexes. We define the ownership index as the ratio of owners, relatives and other employees non-remunerated to total employees. Also, we define the control index as the ratio of management employees to remunerated employees. These indexes allow us to quantify the ownership and control structure.

We follow Ang, Cole and Lin (2000) and Danielson and Scott (2007) to use the agency cost concept. In order to use it we assume that the agency costs increase with the degree of separation between ownership and control. So we use agency costs as a proxy of this separation. We use two alternative measures of agency costs. The first one is the ratio of operating expenses to annual assets (operating expenses ratio). The second measure is the asset utilization ratio, which is defined as the ratio of annual sales to total assets. These ratios

are efficiency measures that indicate how effectively the firm's management controls operating costs and deploys its assets. There is an inverse relationship between efficiency and agency costs.

### 2.3 Modeling specification and econometric techniques

We use a log-linear functional form specification to describe the relationships between ownership and control structure and investment. Such specification allows the regression coefficients to measure the elasticity of investment with respect to each independent variable (determinant). Moreover, the log transformation reduces the possibility of heteroscedasticity problems. We use the Breusch-Pagan test to detect heteroscedasticity problems. Also, we use the Jarque-Bera test for normality in residuals.

We use three sets of regressions. The first set includes ownership and control indexes and agency costs measures. The second one only uses ownership and control indexes. Finally, the third set only includes agency costs. Each set is conformed by four regressions that assess how ownership and control structure relates to investment for firms of a specific size (micro, small, medium and large). We estimate different regressions for comparison purposes. We justify this election with the correlations presented in table 3. Thus the model specifications are:

$$\ln I_{ij} = \alpha_0 + \alpha_1 \ln O_{ij} + \alpha_2 \ln C_{ij} + \alpha_3 \ln OE_{ij} + \alpha_4 \ln AU_{ij} + \alpha_5 \ln IO_{ij} + \alpha_6 \ln CF_{ij} + \alpha_7 \ln S_{ij} + \varepsilon_{ij} \quad (3)$$

$$\ln I_{ij} = \alpha_0 + \alpha_1 \ln O_{ij} + \alpha_2 \ln C_{ij} + \alpha_3 \ln IO_{ij} + \alpha_4 \ln CF_{ij} + \alpha_5 \ln S_{ij} + \varepsilon_{ij} \quad (4)$$

$$\ln I_{ij} = \alpha_0 + \alpha_1 \ln OE_{ij} + \alpha_2 \ln AU_{ij} + \alpha_3 \ln IO_{ij} + \alpha_4 \ln CF_{ij} + \alpha_5 \ln S_{ij} + \varepsilon_{ij} \quad (5)$$

where  $I_{ij}$  is investment;  $O_{ij}$  is the ownership index;  $C_{ij}$  represents the control index;  $OE_{ij}$  is the operating expenses ratio;  $AU_{ij}$  represents the asset utilization ratio;  $IO_{ij}$  represents the investment opportunities;  $CF_{ij}$  is cash flow;  $S_{ij}$  is the size of the firm;  $\varepsilon_{ij}$  is the random error term.

We use Ordinary Least Squares (OLS) for estimation purposes in the three sets of regressions. In addition, we use specification-error Ramsey tests. The tests allow us to validate the econometric assumptions regarding the functional specification form and to detect omitted-variable bias. We present the following hypothesis:

- i. The ownership and control structure explains investment decisions of the Mexican manufacturing firms.
- ii. Agency costs have a direct relationship with the degree of separation between ownership and control in Mexican manufacturing firms.
- iii. Firm characteristics (firm size and cash flow) affect investment decisions of Mexican manufacturing firms.
- iv. Environment characteristics (investment opportunities) influence investment decisions of Mexican Manufacturing firms.

### 3. Empirical assessment

Previously, we have described the use of three set of regressions. We use ownership and control indexes in equation (4). We use asset utilization and operating expenses ratios in equation (5). We use the variables in (4) and (5) equation for comparison purposes in equation (3). Table 3 reports the correlations for each pair of variables used. We find a weak correlation between each pair of variables, so we can justify our set of regressions.

**Table 3. Correlations for ownership and control structure variables**

Variables and firm size	Asset utilization and operating expenses	Ownership and control
Micro	0.0474 (0.526)	0.1506** (0.0431)
Small	0.0858 (0.2509)	0.7148*** (0.0000)
Medium	-0.0842 (0.2651)	0.301*** (0.0000)
Large	-0.0881 (0.2503)	0.2719*** (0.0003)



*The significance levels are given in parenthesis. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively. We use the pairwise correlation.*

Table 4 reports the regression outcomes for the first set of regressions. Firm size coefficients are positive and significant, independently of the type of firm. In most cases, the coefficients associated to cash flows and investment opportunities are significant and positive.

Ownership and control indexes are significant for micro firms. Control index is positive and significant for small firms. In most cases, operating expenses are positive and significant, except for small firms. The asset utilization ratio is positive and significant for micro firms. In all cases, the results show high values of  $R^2$ . In addition, the joint significance F tests suggest that the independent variables are necessary to explain investment decisions.

**Table 4. Investment decisions and ownership and control structure in Mexican manufacturing firms (OLS regressions – Equation 3)**

Firm size	Micro	Small	Medium	Large
<b>Regression indicators</b>				
Ownership	0.45*** (3.21)	-0.10 (-1.12)	-0.07 (-1.15)	-0.06 (-1.02)
Control	-0.49*** (-4.32)	0.48*** (2.90)	0.17 (0.66)	0.20 (1.20)
Operating expenses	0.43** (2.28)	0.30 (1.10)	0.84** (1.98)	0.67* (1.91)
Assets utilization	0.01* (1.88)	0.002 (0.31)	0.002 (0.22)	0.002 (0.22)
Investment opportunities	-0.01 (-0.05)	0.48*** (2.68)	-0.07 (-0.29)	0.67*** (3.18)
Cash flow	0.31*** (2.83)	0.01 (0.06)	0.30*** (3.30)	0.13* (1.85)
Size	0.48*** (3.79)	1.09*** (9.41)	0.66*** (5.76)	0.83*** (9.25)
Constant	-5.40*** (-4.75)	-9.93*** (-7.09)	-4.52** (-2.52)	-4.37*** (-3.77)



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Observations	181	181	177	172
F	133.21***	103.82***	36.27***	92.76***
Prob > F	0.00	0.00	0.00	0.00
R <sup>2</sup>	0.84	0.81	0.60	0.80

The dependent variable is investment. The *t*-statistics are given in parenthesis. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

Table 5 reports the regression outcomes for the second set of regressions. Here we find that the firm size coefficient is positive and statistically significant in all cases. The coefficients associated to investment opportunities are positive and significant for small and large firms. Cash flow coefficients are positive and statistically significant for small and medium firms.

Ownership index is positive and significant for micro firms. On the other hand, control index is negative and significant for micro firms. Control index coefficient is positive and significant for small and large firms. Like in the previous set of regressions, the results show high values of R<sup>2</sup>. Such values confirm that the explanatory variables can explain investment decisions. Again the F tests confirm that the set of independent variables explains them.

**Table 5. Investment decisions and ownership and control structure in Mexican manufacturing firms (OLS regressions – Ownership and control indexes)**

Firm size	Micro	Small	Medium	Large
<b>Regression indicators</b>				
Ownership	0.53*** (3.82)	-0.09 (-1.02)	-0.09 (-1.60)	-0.08 (-1.33)
Control	-0.42*** (-3.74)	0.55*** (3.63)	0.35 (1.46)	0.28* (1.79)
Investment opportunities	-0.02 (-0.13)	0.55*** (3.22)	-0.11 (-0.46)	0.71*** (3.35)
Cash flow	0.21** (2.10)	-0.07 (-0.91)	0.22*** (2.68)	0.05 (0.83)
Size	0.57*** (4.76)	1.15*** (11.74)	0.69*** (6.12)	0.85*** (9.38)
Constant	-5.81***	-10.23***	-4.19**	-3.65***

	(-5.26)	(-7.59)	(-2.33)	(-3.34)
Observations	181	181	177	172
F	177.53***	145.62***	49.43***	127.69***
Prob > F	0.00	0.00	0.00	0.00
R <sup>2</sup>	0.84	0.81	0.59	0.79

The dependent variable is investment. The t-statistics are given in parenthesis. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

Table 6 reports the regression outcomes for the third set of regressions. Firm size coefficients are positive and significant, independently of the type of firm. Operating expenses show a similar pattern. However, asset utilization is not relevant. Cash flow coefficient is positive and significant for micro, medium and large firms. In most cases, the coefficients associated to investment opportunities are significant and positive, except for medium firms. In all cases, the results show high values of R<sup>2</sup>. In addition, the joint significance F tests suggest that the independent variables are necessary to explain investment decisions.

**Table 6. Investment decisions and ownership and control structure in Mexican manufacturing firms (OLS regressions – Agency costs)**

Firm size	Micro	Small	Medium	Large
<b>Regression indicators</b>				
Operating expenses	0.48** (2.45)	0.58** (2.37)	0.99** (2.52)	0.84** (2.51)
Assets utilization	0.009 (1.17)	0.0005 (0.07)	0.001 (0.13)	-0.00008 (-0.01)
Investment opportunities	0.28** (2.11)	0.47** (2.57)	-0.05 (-0.18)	0.67*** (3.24)
Cash flow	0.19* (1.76)	0.05 (0.51)	0.34*** (3.98)	0.19*** (3.13)
Size	0.82*** (6.82)	1.01*** (9.25)	0.66*** (5.87)	0.77*** (11.73)
Constant	-8.43*** (-8.30)	-11.10*** (-8.22)	-5.39*** (-3.49)	-4.65*** (-4.13)
Observations	181	181	177	172
F	152.68***	138.40***	50.66***	129.25***



Prob > F	0.00	0.00	0.00	0.00
R <sup>2</sup>	0.81	0.80	0.60	0.80

The dependent variable is investment. The *t*-statistics are given in parenthesis. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.

We support the robustness of our previous results with specification-error Ramsey tests. Such tests allow us to deal with the differences of information. Here we use two versions of the Ramsey test. The first one, the traditional RESET test, uses powers of the estimated independent variable as regressors. The second one uses powers of the RHS variables. The null hypothesis is that the model is adequately specified in both versions of the test.

The outcomes of the tests of both sets of regressions suggest that the econometric assessments for medium and large firms do not have specification errors. The modeled relationships between ownership and control structure and investment decisions seem adequate in most cases. However, the exception is referred to micro and small firms. For these firms, the regressions suggest the existence of omitted variable-bias and/or incorrect functional forms. Also, the Ramsey tests suggest that the differences reported between the three sets of regressions should not be considered relevant (see Table 7).

**Table 7. Model validation (Specification tests)**

Firm size	Micro	Small	Medium	Large
<b>Models with all variables</b>				
Ramsey test (H <sub>0</sub> : model has no omitted variables)	8.16***	6.07***	0.73	0.60
Prob > F	0.0000	0.0006	0.5330	0.6171
Ramsey test, rhs (H <sub>0</sub> : model has no omitted variables)	1.93**	1.81**	1.20	1.39
Prob > F	0.0126	0.0222	0.2581	0.1336
<b>Models with ownership and control</b>				
Ramsey test (H <sub>0</sub> : model has no omitted variables)	10.45***	6.28***	1.15	0.87
Prob > F	0.0000	0.0005	0.3308	0.4594



Ramsey test, rhs ( $H_0$ : model has no omitted variables)	2.97***	2.04**	1.46	1.50
Prob > F	0.0003	0.0156	0.1256	0.1105
<b>Models with agency costs</b>				
Ramsey test ( $H_0$ : model has no omitted variables)	11.74***	8.34***	1.03	1.02
Prob > F	0.0000	0.0000	0.3788	0.3840
Ramsey test, rhs ( $H_0$ : model has no omitted variables)	3.32***	2.53***	1.21	1.30
Prob > F	0.0001	0.0022	0.2698	0.2108

*This table shows results of Ramsey test. It is used to detect specification errors. This table shows two versions of the of the Ramsey test. Ramsey test (rhs) uses powers of the independent variables. Instead Ramsey test uses powers of the fitted values of the dependent variable. \*\*\*, \*\*, and \* indicate significance at the 1, 5 and 10 percent levels respectively.*

We conclude by indicating that the evidence supports the view that ownership and control structure influences investment decisions in medium and large firms. We find a point of separation between ownership and control functions in medium firms. For large firms, control activities are more important. Operating expenses as proxy of agency costs are more important when firm size increases.

#### 4. Discussion

Here we have assessed the relationships between ownership and control structure and investment decisions in the Mexican manufacturing firms. The assessments allow us to validate our hypothesis. They confirm that certain firm characteristics may be useful to explain investment decisions. Particularly, firm size and cash flow seem important determinants. They have a positive influence on investment. Also, investment opportunities (environmental factor) seem to have a direct relationship with investment.

Empirically, we believe that the most interesting findings relate to the usefulness of the different ownership and control structure measures: ownership and control indexes and agency costs



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measures. Our econometric assessment suggests that the control index becomes in a positive determinant of investment when firm size increases. A remarkable finding is the situation of the medium firms. We find that ownership and control are not predominant for medium firms. This finding is according to Danielson and Scott (2007) research. They suggest when a firm grows, the degree of separation between ownership and control increases in order to face the size firm increase.

We use two alternative measures of agency costs. The assessments suggest that the asset utilization ratio is not a determinant of investment decisions. Whereas, the operating expenses ratio is a positive determinant. This finding is according to Ang, Cole and Lin (2000) research. They find that agency costs increase with the degree of separation between ownership and control. This separation (represented by agency costs) has a positive relationship with firm size. Methodologically, the assessment procedure seems useful to explain the investment decisions of medium and large firms. Furthermore, it supports the hypothesis that investment decisions in micro and small firms may depend on other determinants, in addition to the ownership and control structure ones. Ekanem and Smallbone (2007) include, among these determinants, the intuition, the social networks and the experience of the entrepreneurs.

## 5. Conclusions

We have studied how ownership and control structure may explain investment decisions of Mexican manufacturing firms. Here we have focused on ownership and control indexes and agency costs measures. We have developed an econometric analysis that uses data for the last census available in Mexico (2003). We have controlled by firm size, cash flow and investment opportunities.

Methodologically, the empirical study has relied on three regression sets for comparison purposes. The first set includes estimations that use ownership and control indexes and agency costs measures. The second one uses ownership and control indexes. The last one includes agency cost measures (the asset utilization ratio and the operating expenses ratio). We have





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used OLS techniques for estimation purposes. In addition, we have used Ramsey tests to validate the econometric outcomes. We have used data of the census to build the indicators of the 182 industries that integrate the Mexican manufacturing sector.

Our findings confirm that the ownership and control structure may influence investment decisions. Control variables are positive determinants of investment. Our results suggest that control has a positive relationship with investment when firm size increases. Also, an important finding is that the medium size is the point of transition to less-concentrated ownership and control structures. Agency costs are a positive determinant of investment decisions. Also, such costs have a direct relationship with the degree of separation between ownership and control.

Methodologically, the assessment procedure seems useful to explain the investment decisions of medium and large firms. Furthermore, it supports the hypothesis that investment decisions in micro firms may depend on other determinants, in addition to the ownership and control structure ones. Ekanem and Smallbone (2007) include, among these determinants, the intuition, the social networks and the experience of the entrepreneurs. Also, we could not include the business entity form variable due to confidentiality reasons. It may be a complementary variable due to it concentrates information about ownership and control characteristics.

We believe that our study provides some ideas for further research. For example, extensions of our analysis could be used to analyze investment decisions in firms that provide financial and non-financial services. The “Economic Census 2008”, when available, may provide data useful for comparison purposes. Finally, our results also suggest that further studies on the determinants of investments in micro and small firms may be necessary.



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