Dynamic Capabilities and Competitive Advantage into Mexican Firms: Testing Gibrat's Law*

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Abstract

This paper inquires into the existence of dynamic capabilities and competitive advantage in Mexican firms. Dynamic capabilities refer to the particular nonimitability capacity firms possess to shape, reshape, configure, and reconfigure their assets so as to respond to changing technologies and market conditions for escaping the zero-profits condition. In turn, competitive advantage refers to the capacity of firms for acquiring economic rents. In this sense, dynamic capabilities and competitive advantage are likely to be essential to the survival of firms in markets characterized to be innovative and in rapid technology change. It is argued that local firms ought to stimulate their own dynamic capabilities to successfully compete in markets. On the other hand, foreign firms would eventually transfer their own capabilities (technology and know-how) to local subsidiaries to successfully compete in these markets. Making use of econometric methods, it is corroborated the relation between firm performance (Law of Proportionate Effects) and dynamic capabilities into firms in Mexico.

Keywords: dynamic capabilities; competitive advantage; Gibrat's Law; panel unit root tests; emerging economies; Mexico.

Resumen

Este trabajo analiza la existencia de capacidades dinámicas y ventajas competitivas en las empresas mexicanas. Las capacidades dinámicas se refieren a la capacidad de

no imitabilidad que tienen las empresas para formar, reformar, configurar y recon-figurar su activos, a fin de responder a las demandas tecnologías y las condiciones de los mercados para escapar de la condición de cero beneficios. La ventaja com-petitiva se refiere a la capacidad de las empresas para adquirir rentas económicas. En este sentido, las capacidades dinámicas y la ventaja competitiva son esenciales para la supervivencia de las empresas en los mercados caracterizados por una tasa alta de innovaciones y cambio tecnológico. Se argumenta que las empresas locales deben estimular sus propias capacidades dinámicas para competir con éxito en los mercados. Por otro lado, las empresas extranjeras eventualmente transfieren sus propias capacidades (tecnología y know-how) a las filiales locales a fin de competir con éxito en estos mercados. Haciendo uso de métodos econométricos, se analiza la desarrollo de las empresas en relación con la Ley de Efectos Proporcionales y probar la existencia de capacidades dinámicas en las empresas de México.

Palabras clave: capacidades dinámicas; ventaja competitiva; Ley de Gibrat; panel de pruebas de raíz unitaria; economías emergentes; México.

JEL Classification Codes: M10; C22; C23.

1. Introduction

This paper inquires about the relationship between dynamic capabilities and com-petitive advantage, on the one hand, and firm performance and market competi-tion in emerging economies, on the other. Particularly, we discuss whether foreign and local firms in Mexico should develop dynamic capabilities and competitive advantage to successfully compete in this market. In so doing, we test for the validity of the Law of Proportionate Effects or Gibrat's Law into Mexican firms. Gibrat's Law or the Law of Proportionate Effects proposed by R. Gibrat in 1931 has served as a referent model to explain corporate growth dynamics (Cefis et el. 2005), and then later it has contributed to test for the existence of dynamic capa-bilities developments into firms (Helftat 2007). It is argued that when the Law of Proportionate Effects does not hold, it is more likely to find dynamic capabilities,

and thus competitive advantage into firms (Helfat 2007). Basically, dynamic capabilities refer to the particular nonimitability capacity that firms possess to shape, reshape, configure, and reconfigure assets so as to respond to changing technologies and markets in order to escape the zero-profit condition (Teece 2009; Teece et al. 1997). Meanwhile, competitive advantage refers to the capacity of firms for acquiring economic rents (Teece 2009).

Dynamic capabilities are likely to be essential to the survival of firms in industries and environments which can be characterized as hypercompetitive that result from rapid innovative, globalized, and deregulated environments (Teece 2009). Eventually, foreign firms (multinational enterprises) in emerging economies would be just transferring their own capabilities (technology and know-how) to their local subsidiaries to successfully compete in emerging markets. From this perspective, local firms must be engaged in developing their own dynamic capabilities it they want to successfully compete in these markets.

The theoretical approach adopted in this research is derived from the resource-based view, the dynamic capabilities approach, and the evolutionary theory of the firm. This theoretical approach supports the findings achieved in this research suggesting that dynamic capabilities are more likely to be developed into industrial sectors where local firms are more abundant. On the contrary, multinational enterprises in emerging markets would be just transferring their own capabilities to their local subsidiaries to compete in these markets. In the case of Mexico, the results achieved in this research suggest that dynamic capabilities have been mostly developed in industrial sectors such as retail commerce, cement and construction materials, as well as chemicals and petrochemicals.

Besides this introduction, this research is organized into six sections. Section 2 presents a literature review on the theoretical approaches supporting this research: (1) the resource-based view, (2) the dynamic capabilities approach, and (3) the evolutionary theory of the firm. Section 3 discusses a general model of Gibrat's Law in relation to dynamic capabilities and competitive advantage developments into firms. Section 4 contains a discussion on panel unit root methods to testing for the existence of dynamic capabilities into Mexican firms. Actually, three different panel unit root methods are discussed: (1) the Im-Peseran-Shin test, (2) the

Augmented Dicky-Fuller-Fisher test, and (3) the Phillip-Perron-Fisher test. Section 5 describes the data used in this research. Section 6 discusses the main results obtained in this work that demonstrate the existence of dynamic capabilities into firms of some industrial sectors in Mexico. Finally, Section 7 summarizes some conclusions drawn from this research.

2. Literature Review

In the strategic management literature, there are three complementary theoretical approaches aiming to explain dynamic capabilities and competitive advantage developments: (1) the resource-based view, (2) the dynamic capabilities approach, and (3) the evolutionary theory of the firm. Each of these approaches has made its own contributions to understand how firms develop and sustain a competitive advantage when competing in markets. In this paper, we adopt a theoretical framework built upon these theoretical approaches in order to explain resources and capabilities developments into Mexican firms. Making use of econometric methods, we search for evidence supporting the existence of dynamic capabilities and competitive advantage into firms in some specific industrial sectors in Mexico. In this sense, Gibrat's Law or the Law of Proportionate Effects gives the possibility to empirically test for the existence of dynamic capabilities derived from competitive advantage developed by firms in specific industrial sectors.

The stream of literature contributed to the development of the resource-based perspective and dynamic capabilities approach is enormous. However, core references aiming to explain firm's behavior from the perspective of the resource-based view are Barney (1986, 1991), Barney and Clark (2007), Dierickx and Cool (1989), Mahoney and Pandian (1992), Montgomery and Wernerfelt (1988), Peteraf (1993), Rumelt (1984), and Wernerfelt (1984). In the case of the literature on dynamic capabilities, key papers dealing with firm performance and competitive advantage are Kogut and Zander (1992), Langlois (1991), Lippman and Rumelt (1982), Markides and Williamson (1994), Nelson (1991), Prahalad and Hamel (1990), Teece (1982, 1986), Teece (2009), and Teece et al. (1997). Finally, Nelson (1991), Nelson and Winter (1982) are obliged references in the case of the evolutionary theory of the firm.

The resource-base view, the dynamic capabilities approach, and the evolutionary theory of the firm have made their own contributions to develop a common theoretical framework that search to explain how firms compete in markets through dynamic capabilities and competitive advantage developments (Makadok 2001; Tecce 2009). Within this tradition, firms are fundamentally understood as heterogeneous in terms of the resources they deploy, as well as the internal capabilities they develop. This characteristic allows firms to build up competitive advantage to compete in markets (Barney 1986, 1991; Barney and Clark 2007; Connor 1991; Dierickx and Cool 1989; Foss 1997; Foss et al. 1995; Lippman and Rumelt 1982; Mahoney and Pandian 1992; Nelson and Winter 1982; Peteraf 1993; Teece 1982, 1986, 2009). In this sense, the dynamic capabilities approach and the resource-based view agree in relation to the role played by assets specificity when firms conceive and implement an adequate strategy to develop dynamic capabilities and competitive advantages to successfully compete in markets (Foss 1997; Teece et al. 1997).

From this perspective, the resource-based view and the dynamic capabilities approach both can be synthesized into a general model searching to explain how firms create economic rents through two distinct causal mechanisms (Makadok 2001): selecting (resource-picking) and deploying (capability-building) resources. The resource-picking mechanism takes place before the acquisition of a resource, allowing firms to acquire good resources and to avoid acquiring bad resources (Makadok 2001). In fact, this mechanism known as the Ricardian perspective has been codified into the resource-based view as the main mechanism to create economic rents (Barney 1986; Conner 1991; Makadok 2001; Montgomery and Wernerfelt 1988; Peteraf 1993; Wernerfelt 1984). On the other hand, the capability-building mechanism known as the Schumpeterian perspective has been codified into the dynamic capability view, distinguishing a capability from other types of resources. In this approach, a capability is firm-specific and the primary purpose of a capability is to enhance the productivity of the other resources (Dierickx and Cool 1989; Mahoney 1995; Makadok 2001; Nelson and Winter 1982; Teece et al. 1997). In fact, capabilities cannot easily be bought, but they must be built (Makadok 2001; Teece et al. 1997), and so capabilities may be subject to market failure

(Amit and Schoemaker 1993; Makadok 2001).

In short, an important distinction between resource-picking and capability-building mechanisms has to do with their timing (Makadok 2001): economic rents under the resource-picking mechanism are created before the acquisition of resources given that this mechanism has its impact at the decision phase (Ricardian perspective), while firm's capabilities can only generate economic rents after other resources are acquired given that this mechanism has its impact at the implementation or deployment phase (Schumpeterian perspective). In addition, it is worth saying that the two mechanisms could be complementary in some circumstances but substitute in others (Makadok 2001).

The idea of dynamic capabilities however might be understood as the particular nonimitability capacity that firms possess to shape, reshape, configure, and reconfigure their assets so as to respond to changing technologies and market conditions in order to escape the zero-profit condition (Teece 2009; Teece et al. 1997). The dynamic capabilities approach suggests that to developing dynamic capabilities, and hence competitive advantage, the firm must be effective than their rivals at both selecting and deploying resources (Foss 1997; Kogut and Zander 1992; Langlois 1992; Makadok 2001; Prahalad and Hamel 1990; Teece et al. 1997). A standard model from the resource-based view and dynamic capabilities approach which underlie competitive advantage across firms should essentially include the following features (Makadok 2001; Peteraf 1993). First, resource bundles and capabilities are heterogeneous across firms. In this sense, the imperfectly competitive factor markets through which resources are developed enable these resources to be a source of economic rents (Barney and Clark 2007; Peteraf 1993). However, heterogeneity may imply Ricardian rents characterized by the presence of superior productive factors which are limited in supply (inelastic supply curves) that explain economic rents within this perspective (Barney 1986, 1997; Connor 1991; Montgomery and Wernerfelt 1988; Peteraf 1993; Wernerfelt 1984). As it was already mentioned before, the selecting mechanism for acquiring strategic resources in order to create Ricardian rents takes place before the acquisition of those resources by the firm, meanwhile the Schumpeterian dynamic capability view highlights the importance of an alternative rent creation mechanism, namely the capability buil-

ding mechanism (Makadok 2001). As a result, the productive resources controlled by the firm cannot be expanded as they are fixed or quasi-fixed and scare (Peteraf 1993). Nevertheless, Dierickx and Cool (1989) suggest several factors that a particular strategic factor market may be imperfectly competitive: (1) uniqueness, (2) lack of entry, (3) abandon of profit maximizing behavior, (4) financial strength in just some firms, and (5) lack of understanding by some firms about a strategy. In this sense, core competencies such as those which involve collective learning and are knowledge-based are enhanced as they are applied (Prahalad and Hamel 1990).

Second, it is argued the existence of ex post limits to competition as a necessary condition to sustaining rents. In fact, sustained competitive advantage requires that the condition of heterogeneity be preserved through putting in place ex post limits to competition (Peteraf 1993). Consequently, there are in the resource-based theory two critical factors limiting ex post competition (Barney 1991; Dierickx and Cool 1989; Peteraf 1993): (1) imperfect imitability that include mechanisms such as property rights, information asymmetries, and frictions impeding imitative competition (Rumelt 1987), and (2) imperfect substitutability that determine the grade of elasticity of demand curves. These factors make resources nontradable, giving firms the possibility to develop sustained competitive advantage.

Finally, another feature characterizing this model implies resources to be perfectly immobile if they cannot be traded (Peteraf 1993). In this sense, imperfect resource mobility that is specialized to firm-specific needs allows for maintaining rents by the firm. In this sense, ex ante limits to competition allow for preventing costs from offsetting the rents.

On the other hand, and in relation to the evolutionary theory of the firm and the dynamic capabilities approach, it follows that firm evolution in this theoretical framework is assumed to be nonrandom and will depend on its prior history (Foss et al. 1995; Helfat et al. 2007). In this sense, firm change is constrained by their past actions and resource base that enable it a persistent heterogeneity in relation to the resources it manages and persistently outperforming others (Barney and Clark 2007; Helfat et al. 2007). This feature means that dynamic capabilities enable firms to enter new business and extend old ones through internal growth, acquisitions, and strategic alliances, and thus altering the firm's resource base and

opening new strategic alternatives (Helfat 1997; Helfat et al. 2007). Consequently, the ability to identify new strategic opportunities provides a potential continuing source of competitive advantage, altering the firm's resource base by creating new resources in order to change its business by means of acquisitions and alliances, or through the innovation and entrepreneurial activity (Denrell et al. 2003; Helfat et al. 2007).

From this discussion, it follows that the resource-based view, the dynamic capabilities approach, and the evolutionary theory of the firm is an adequate framework to analyze firm performance from the viewpoint of dynamic capabilities and competitive advantage.

From an empirical perspective, many studies related to dynamic capabilities as a source of competitive advantage have demonstrated persistent differences between firms in a same industry in terms of the type and amount of their capabilities (Helfat et al. 2007). In this context, the dynamic capabilities approach and the evolutionary economic theory explain persistent heterogeneity in firm traits that must explain whether the evidence shows that firm growth patterns are random, or whether other patterns consistent with dynamic capabilities and evolutionary theory explain the data. In the first case, Gibrat's Law would explain firm growth as a random walk, meanwhile in the second case firm growth must be following a pattern consistent with the dynamic capabilities approach.

In the last years, empirical work aiming to test firm performance for the viewpoint of sustained competitive advantage and dynamic capabilities has therefore challenged Gibrat's Law from both frequentist and Bayesian methods. However, some empirical studies analyzing firm performance from the development of dynamic capabilities approach are Cubbin and Geroski (1987), Muller (1986) and Waring (1996) at the industry level, and McGahah and Porter (1999), Waring (1996) at the firm level, as well as many other studies more specifically from the perspective of the Law of Proportionate Effects are Aslan (2008), Cefis et al. (2004), Geroski (2000), Geroski et al. (2003), Geroski et al. (1997), Harris and Trainor (2005), Hart and Oulton (1996), Petrunia (2005), and Waring (1996). In this research, we use panel unit root methods to test for the validity of the Law of Proportionate Effects which assumes that the size of a firm follows a random walk.

3. General Model of Gibrat´s Law

Gibrat's Law literature is large and too extensive. Most of the studies analyzing the validity of the Law of Proportionate Effects are devoted to manufacturing firms (Audretsch et al. 2002; Petrunia 2005). Nevertheless, Audretsch et al. (2002) provide an extensive review of the literature on the validity of Gibrat's Law in manufacturing sectors suggesting that the results achieved in these papers are not conclusive (Audretsch et al. 2002; Geroski 2000). Actually, with some exceptions, the majority of these studies are devoted to analyze the relationship between firm performance and firm growth in industrialized countries (Aslan 2008). In fact, as far as we know, this is this first time that an analysis of the Law of Proportionate Effects is carried out in the case of Mexico.

The dynamic capabilities theory can be tested by means of Gibrat's Law in that expected changes in firm size would be proportionate to its actual size. If the Law of Proportionate Effects holds, firm growth should be independent of its size, or the logarithm of firm size should follow a random walk (Helfat et el. 2007; Petrunia 2005). In this case, if Gibrat's Law holds, three proportions are valid (Petrunia 2005): (1) firm of different size classes have the same average proportionate growth, (2) the variance of growth rates is the same for all size classes, and (3) there is no serial correlation in growth rates. Nevertheless, it would be expected to achieve different conclusions depending on different sample size of firms regarding acceptance or rejection of Gibrat's Law (Petrunia 2005; Mansfield 1962). However, the Law of Proportionate Effects can be tested on three different populations: (1) all firms, (2) surviving firms, or (3) larger firms than the minimum efficient scale.

The empirical model commonly tested in order to prove the validity of the Law of Proportionate Effects can be stated as follows (Cefis et al. 2005; Sutton 1997):

$$S_{it} - S_{it-1} = \varepsilon_{it} S_{it-1}$$

and

$$S_{it} = (1 + \varepsilon_{it}) S_{it-1} = S_{i0}(1 + \varepsilon_{i1})(1 + \varepsilon_{i2}) \dots (1 + \varepsilon_{it})$$

where S_{it} is the size of firm i determined by a double indexed stochastic process, ε_{it} is a random variable denoting the proportionate rate of growth between *t-1* and *t* for firm *i*. It is worth recalling that in a short period of time, ε_{it} can be regarded as small and the approximation $\ln(1 + \varepsilon_{it}) = \varepsilon_{it}$ can be justified (Cefis et al. 2005). Therefore, taking logs, we have:

$$lnS_{it} \cong lnS_{i0} + \sum_{i=1}^{T} \varepsilon_{it}$$

Consequently, if the increments of ε_{it} are independently and normally distributed, then lnS_{it} follows a random walk and the limiting distribution of S_{it} is lognormal (Aslan 2008; Cefis et al. 2005; Helfat et al. 2007). In this case, the growth of the firm is unrelated to its current size and only depends on the sum of idiosyncratic shocks, allowing for testing Gibrat's Law in terms of its logarithmic specification (Cefis et al. 2005):

$$lnS_{it} = \beta_{i0} + \beta lnS_{it-1} + u_{it}$$

where u_{it} is a random variable that satisfies:

$$E(u_{it}|S_{it-s}, s > 0) = 0$$

and

$$E(u_{it}u_{jr}|S_{it-s}, s > 0) = \begin{cases} \sigma^2 & i = j \text{ and } t = r \\ 0 & \text{otherwise} \end{cases}$$

Gibrat's Law will be confirmed if the null hypothesis of $\beta = 1$ is not rejected against the alternative hypothesis of $\beta < 1$ (Cefis et al. 2005). An equivalent specification used in the literature on the Law of Proportionate Effects is based directly on corporate growth rates as follows (Cefis et al. 2005):

$$ln\frac{S_{it}}{S_{it-1}} = \beta_{i0} + \beta_1 lnS_{it-1} + u_{it}$$

The Law of Proportionate Effects is confirmed if data do not reject the null hypothesis of $\beta_1 = 0$, against the alternative hypothesis of $\beta_1 = 0$. In this research, the objective is therefore to get insight on the existence of dynamic capabilities among firms in Mexico through testing for Gibret's Law validity. A measure of firm performance could be growth in firm size, in the sense that most of the time firms seek profitable growth (Helfat et el. 2007). In fact, in the absence of growth, firms could improve their performance only by reducing costs or raising prices. Nevertheless, market forces and technological constraints may limit how much firms can reduce costs or raise prices in a sustained manner for more than a few years. Actually, firms often seek growth persistence from increased sales of products and services, for existing products, improved products, and new products, in existing and new markets. Consequently, growth persistence (sales revenues, number of employees or accounting value of assets) is a critical attribute characterizing competition in markets.

A way of testing whether or not the requirements of Gibrat's Law are met is to study the relationship between the logarithms of firm size at the beginning and end of a period (Aslan 2008; Petrunia 2005). Actually, this approach may allow for testing the significance of the relationship between the Law of Proportionate Effects hypothesis and growth persistence, and hence the existence of dynamic capabilities among firms, carrying out panel unit root tests (Chen and Lu 2003; Del Monte and Papagni 2003; Geroski et al. 2003; Goddard et al. 2002; Oliveira and Fortunato 2003, 2006; Petrunia 2005). Effectively, when Gibrat's Law holds, this approach implies that firm growth (log of sales revenues) in each period follows a random and independent trajectory. Hence, in this case, the estimated coefficient on prior period size (log of sales revenues) should be zero, and the error term should be normally, independently and identically distributed with mean zero (Helfat 2007). In other words, under the Law of Proportionate Effects hypothesis, firm growth follows a random walk characterized by a constant term plus a random error term (Aslan 2008; Helfat 2007; Petrunia 2005).

It is possible to perform several unit root tests in panel data econometric models. Therefore, in this research, we performed three unit root tests to examine the possibility of finding dynamic capabilities and so competitive advantage in some

firms in specific industrial sectors in Mexico. The unit root tests applied in this case were: (1) the Im-Peseran-Shin test (IPS test) (Im et al. 2003), (2) the Fisher-type Augmented Dickey-Fuller test (ADF test) and (3) the Phillips-Perron test (PP test) (Maddala and Wu 1999; Choi 2001). The aim of using these tests is thus to get insight on the existence of dynamic capabilities at the firm level in the most active industrial sectors in Mexico.

4. Panel Unit Root Method

Although there has been considerable empirical research using dynamic capabilities and the resource-based view reasoning, the congruency between the theory and the methods used deserves a closer look (Perry et al. 2005). In fact, the relationship between resources and/or capabilities possessed by a firm, and the economic performance of the firm are based on traditional classical statistical approaches of regression analysis (Bergh 1998; Maijoor and van Witteloostuijn 1996; Miller and Shamsie 1996), namely on whether there is a statically significant association between a resource and/or capability and economic performance (Perry et al. 2005).

However, econometric methods have also been applied to test for the Law of Proportionate Effects validity. In this sense, it has been argued that the univariable unit root tests possess low power against panel unit root tests alternatives (Aslan 2008; Diebold and Nerlove 1990). In this sense, many panel unit root tests have been developed with an emphasis on the attempt to combine information from the time series dimension with information obtained from the cross-sectional dimension (Asteriou and Hall 2007). This section discusses the Im-Peseran-Shin (IPS) test, Augmented Dicky-Fuller-Fisher (ADF-Fisher) test, and Phillips-Perron (PP) test to test for stationarity in sales data series of Mexican firms. In short, panel unit root tests allow us to test sales data in different heterogeneous firms in Mexico.

4.1. Im-Peseran-Shin Test

The Im-Peseran-Shin (2003) test is based on simple averages of t-statistic for each β obtained from (N) augmented Dickey-Fuller unit root tests. The IPS test allows

for individual unit root processes and it can be performed as follows:

$$\Delta G_{i,t} = \alpha_i + \beta_i G_{i,t-1} + \varepsilon_{i,t} \qquad\qquad i = 1, \dots, N \ and \ t = 1, \dots, T$$

where $H_0: \beta_i = 0 \ \forall i$ and $H_1: \beta_i < 0 \ \exists i$ suggesting that at least one series follows a stationary process . In consequence, the null hypothesis of the IPS test is that all series are non-stationary processes and the alternative hypothesis that at least one series of the panel are assumed to be stationary. In addition, the IPS test includes the so called $t - bar$ statistic defined as the average of the individual Dickey-Fuller (DF) or augmented Dickey-Fuller (ADF) τ_I statistic can be defined as:

$$\bar{t} = \frac{1}{N} \sum_{i=1}^{N} \tau_I$$

$$\tau_I = \frac{\hat{\beta}_i}{\hat{\alpha}_{\hat{\beta}_i}}$$

The main contribution of the IPS test is to relax the assumption about the alternative hypothesis which supposes that all coefficients are equal among themselves.

4.2. ADF-Fisher and PP-Fisher Tests

An alternative approach to panel unit root tests uses Fisher's (1932) results to derive tests that combine the p-values from individual unit root tests. In the same way, the ADF-Fisher test combines the p-values from individual unit root tests. If we define π_i as the p-value from any individual unit root test for cross-section i, then under the null hypothesis of unit root for all N cross-sections, we have the asymptotic results that

$$-2 \sum_{i=1}^{N} \log (\pi_i) \rightarrow \chi^2_{2N}$$

and

$$Z = \frac{1}{\sqrt{N}} \sum_{i=1}^{N} \Phi^{-1}(\pi_i) \to N(0,1)$$

where Φ^{-1} is the inverse of the standard normal cumulative distribution function. It is worth saying that the Phillip-Perron-Fisher (PP-Fisher) test performs similar equations that the ones performed in the case of the ADF-Fisher test. However, PP statistics is just a modification of the ADF t-statistics that take into account the less restrictive nature of the error process (Asteriou and Hall 2007).

5. Data Description

This section provides a description of the data used in this research. The data was taken from the ranking published by *Revista Expansión* of the five hundred most important firms operating in Mexico. This ranking contains annual employment and balance sheet information on firms operating in Mexico. The sample period taken for this research was 1997 through 2009, and firms were analyzed according to the same classification established in this review.

Table 1

Firms' Sales in Mexico by Industrial Sector: Descriptive Statistics (1997-2009)

Industry	Num. of Firms	Mean	Median	Maximum	Minimum	Std. Dev.
Food, Beverage and Tobacco	17	400522.9	360073.7	693396.4	248416.6	141920.4
Automobile and Components	4	271926.2	268784.0	314387.0	236928.5	25968.1
Retail Commerce	9	194775.4	197048.7	285447.2	101487.7	58386.2
Cement and Construction Materials	8	150880.3	114099.4	271308.3	71803.4	73959.9
Telecommunications and Media	6	179170.7	172341.2	226766.3	152781.0	19975.3
Mining	5	71709.9	59251.3	124414.9	36844.5	32589.0
Chemicals and Petrochemicals	5	61141.6	55809.7	91666.1	42657.0	16575.3
Iron and Steel	4	45652.6	31111.7	103848.3	19401.3	27043.3

Descriptive statistics of the sample used in this research are shown in Table 1. The number of firms sampled was 58, and the industry sectors where these firms belong were classified as follows: (1) food, beverage and tobacco, (2) automobile and components, (3) retail commerce, (4) cement and construction materials, (5) telecommunications and media, (6) mining, (7) chemicals and petrochemicals, and (8) iron and steel. The mean and median values by firms at industrial sector level are shown in this Table, as well as maximum, minimum and standard deviation values. This information suggests the inclusion of various firm sizes into the sample. Nevertheless, the ranking of the five hundred most important firms in Mexico is computed taking into account their net annually sales.

The main sources of information to construct this ranking was the Bloomberg System, as well as information realized by the own firms. Some other data in this ranking was realized by *Bolsa Mexicana de Valores* (BMV), *Comisión Nacional de Bancos y Valores* (CNBV), *Comisión Nacional de Seguros y Fianzas* (CNSF), and *Comisión Nacional del Sistema de Ahorro para el Retiro* (CONSAR).

6. Results

The validity of the Law of Proportionate Effects implies that the estimated coefficient on prior period size should be zero and the error term should be normally distributed with mean zero (Helfat et al. 2007). In this sense, firm growth should depend on a constant term plus a random term, and thus it will follow a random walk. This is the case when dynamic capabilities are not likely to be econometrically tested. As it was already mentioned before, a pattern consistent with dynamic capabilities developments would explain firm growth as following a persistent trajectory.

In the case of Mexico, even if the results achieved in this research are not all conclusive, these results suggest the possibility to find out dynamic capabilities, and thus competitive advantage in three industrial sectors: retail commerce, cement and construction materials, and chemicals and petrochemicals (Table 2). These results confirm that in these sectors, Gibrat's Law does not hold, and thus there is substantial evidence of growth persistence, opening up the possibility to find some kind of competitive advantage in firms of these sectors.

Table 2

Persistence Growth under Independent Hypothesis				
Industry	**Number of Firms**	**IPS Test**	**ADF-Fisher Test**	**PP-Fisher Test**
Food, Beverage and Tobacco	17	4.24666	15.99690	17.48250
Automobile and Components	4	-0.46517	9.70447	7.49633
Retail Commerce	9	0.02778	**27.70250**[3]	**40.93820**[1]
Cement and Construction Materials	8	**-4.08298**[1]	**39.45450**[1]	23.12480
Telecommunications and Media	6	-0.57200	15.20330	9.18605
Mining	5	1.36505	6.76930	6.46787
Chemicals and Petrochemicals	5	-0.29778	10.09170	**17.92490**[2]
Iron and Steel	4	0.06693	5.90186	5.66399

1: 1% level of significance.
2: 5% level of significance.
3: 10% level of significance.

Particularly, in the case of chemicals and petrochemicals firms, the null hypothesis of unit root is rejected through performing the PP-Fisher test. In this case, even if the results are not conclusive, they offer the possibility to find competitive advantage in firms of this sector. In this sense, it is well known the importance of petrochemical firms to the Mexican economy in terms of their contributions to GDP and exports.

On the hand, the null hypothesis of unit root is also rejected in the case of firms in retail commerce, and cement and construction materials sectors. In the case of firms in the retail commerce sector, the null hypothesis is rejected through performing both the ADF-Fisher test and the PP-Fisher test, meanwhile in the case of firms in the cement and construction materials sector, the null hypothesis of unit root is rejected through performing both the IPS test and the ADF-Fisher test. As it was already stated, these results give the possibility to dynamic capabilities and competitive advantage in companies of these sectors.

7. Conclusions

The results achieved in this research may confirm the lost of competitiveness observed in the last years by the Mexican economy. According to these results, retail commerce, cement and construction material, and chemicals and petrochemicals are the most dynamic and competitive sectors in Mexico. It is worth saying that the presence of Mexican firms is more frequent in these sectors. This finding demonstrates the importance of local firms against multinational firms when developing dynamic capabilities in Mexican markets. Effectively, in sectors where Mexican firms are predominant, it is more likely to find dynamic capabilities developments, and thus competitive advantage. Moreover, in this case, this finding suggests that numerous firms in some industrial sectors in Mexico, such as automobile and components, mining, or food, beverage and tobacco are successful exporters even if they locally manage just a specific segment (production) of the supply chain. In other words, in the case of emerging markets, the results achieved in this research suggest that local firms are more likely to develop dynamic capabilities and competitive advantage when they operate in local markets. In this case, subsidiaries in local markets may just profit from dynamic capabilities already developed abroad by multinational firms in their home countries. As it was already stated before, multinational firms in emerging economies would be transferring their own capabilities (technology and know-how) to their local subsidiaries in order to compete in local markets. This finding also confirms the principle established in the theoretical approach adopted in this research, saying that dynamic capabilities and competitive advantage can just be developed by firms with an adequate firm-specific resource base that allows them to successfully deploy resources and develop dynamic capabilities.

Nevertheless, in the case of Mexico, further research should be done in relation to the possibility to find sustained competitive advantages within specific firms in some industrial sectors such as retail commerce, cement and construction materials, and chemicals and petrochemicals. The possibility to find such competitive advantages may support the results achieved in this research.

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