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THE VALIDITY OF GIBRAT'S LAW IN DEVELOPING COUNTRIES (2005-2013): COMPARISION BASED ASSESSMENT

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ABSTRACT

According to Gibrat's Law of Proportionate Effect, the growth rate of a given firm is independent of its size at the beginning of the examined period. While earlier studies tended to confirm the Law, more recent research generally rejects it. This study aims to highlight important empirical studies that performed analysis of Gibrat's Law in which about 60 papers were taken into account in this study. The main objective of this study is to investigate the validity of Gibrat's Law in developing countries. The present study classifies the literature on Gibrat's Law based on three types of empirical results: the first type accepts Gibrat's Law, the second type rejects Gibrat's Law, and the third classification reconciles both acceptance and rejection of Gibrat's Law. We found that in most of the manufacturing sectors, Gibrat's Law fails to hold, but for the service sector Gibrat's law was valid. Additionally, only a few empirical studies have investigated Gibrat's law in developing countries; most of the studies have been conducted in developed countries. Furthermore, most of the empirical studies that have been employed in the developed countries rejected the Gibrat's Law. In conclusion, based on the labor intensive feature, SME has the ability to absorb a lot of labor due to the low cost of creating job opportunities for both developed and developing countries. From this overview, it can be inferred that it is possible to implement the law for developing countries, and therefore we could probably have the same effect that the Gibrat's Law is not valid as smaller firms tend to grow faster than larger firms.

***Keywords*: Gibrat's Law, SMEs, labor intensive, developed countries, developing countries**

1. Introduction

Gibrat's Law has become the focus of a large number of empirical studies in industrial economics. Robert Gibrat, in his book "Inegalites Economiques", sought a model of firm and industry dynamics that would explain his finding that firm size distributions within an

industry were highly skewed and appeared to be approximately lognormal. His simple explanation for this finding is the law of proportionate effect or what has become known as Gibrat's Law (Sutton, 1997).

There have been a number of empirical examinations testing Gibrat's Law in the past 50-70 years. Mansfield (1962) pointed out that there are three main renditions of Gibrat's Law. The first version postulates that the law holds for firms that exited the industry as well as for those remaining in existence. The second interpretation is that the law holds only for firms that survive over the relevant time period. The third interpretation is that the law applies only to firms that are large enough to exceed the Minimum Efficient Scale (MES) level of output.

The comparison of empirical studies testing Gibrat's Law is possible in each of the samples used, sectors, and size measurement and therefore, the methodologies applied. However, given the ambiguity in the existing literature, the present study attempts to classify the literature on Gibrat's law based on three types of empirical results: the first type that accepts Gibrat's Law, the second type that rejects Gibrat's Law, and the third classification which reconciles both acceptance and rejection of Gibrat's Law.

1.1 Objectives of the Study

According to Gibrat's Law of proportionate effect, the growth rate of a given firm is independent of its size at the beginning of the examined period. A small number of empirical studies have investigated Gibrat's Law in developing countries; however, most of these studies have been conducted in developed countries. Hence, is it possible to implement the law for developing countries as it is for developed countries? In the context of our work we seek to discern the possibility of declining or accepting Gibrat's Law in developing countries. Therefore, the primary objective of this study is to investigate the validity of Gibrat's Law in developing countries. This work is rich in empirical studies of Gibrat's Law as we intend to furnish a solution to the question of whether developing countries can implement the Gibrat's Law. In addition, we also investigated into what are the expected results for Gibrat's Law. This paper therefore will fill the gap in the literature by providing more evidences of Gibrat's Law in developing countries.

2. Evidence of Gibrat's Law

2.1 Empirical Evidence of Accepting the Fulfillment of Gibrat's Law

In the last decades, various studies began to appear which empirically tested the validity of Gibrat's Law. Table 1 shows the classification of empirical studies which had tested the Law of proportional effect. Fujiwara, Guilmi, Aoyama, Gallegati, and Soum (2008) showed that the growth rate of each firm was independent of the individual firm's size at the beginning of the study and their solution was shown for total assets, number of employees and gross revenue.

In the U.S insurance market, Choi (2009) investigated the relationship between firm size, age and growth rate. Choi's data consisted of 823 firms during the period of 1992 and 2001. From this sample, he also tested the relevance of Gibrat's Law. He found that growth and firm size were independent, as predicted by Gibrat (1931). Using quintile regressions, Leitao,

Serrasqueiro, and Nunes (2010) tested Gibrat's Law in the context of listed Portuguese companies, consisting of a total of 39 companies for the period of 1998-2004. They found that growth of listed Portuguese companies was independent of their size. Thus, they accepted Gibrat's Law. This section introduced the studies that accepted the Gibrat's Law. Hence, in the next section studies that view Gibrat's Law as not valid are highlighted.

2.2 Empirical Evidence of Rejecting the Fulfillment of Gibrat's Law

Various earlier studies examine the validity of Gibrat's Law. In Harris and Trainor's (2005) study, the data of U.K. manufacturing covering the period of 1973-1998 was used. The sample accounts for one-third of the total manufacturing real gross output during the relevant period. Size was measured as real gross output, employment and real gross value added. Four panel unit root tests were used to study the relationship between growth and size. The tests were applied to unbalanced plant-level panel data. They found that Gibrat's Law is rejected in virtually all cases.

Additionally, Bothner (2005). Used a dataset which consisted of 1,140 market segments in 43 countries, for the period of 1995-1999. Relative size of firms was measured as a function of the level of structural equivalence between firms having market contacts. Three standard panel tests of Gibrat's Law were conducted, based on regression of log growth on initial log firm size. Tests included a set of additional variables, to control for acquisitions, national market size, changes in firm strategy. Bothner found that proportional growth declines only moderately with size, showing a modest departure from Gibrat's Law, according to which the estimate of lagged sales would equal unity. In other words, Gibrat's Law was rejected.

In another analytical study, Calvo (2006) attempted to find out whether small, young and innovative firms have experienced greater employment growth than other Spanish firms over the period of 1990-2000. The data was consisted of 967 manufacturing survival firms. All the results rejected Gibrat's Law and emphasized that small firms grew faster than larger firms.

Furthermore, Carrizosa (2006) compared manufacturing and service sectors for Spanish firms in the period of 1994-2002. In his study, Gibrat's Law was rejected in favor of higher growth for small firms. In the same year, Bottazzi and Secchi (2006) presented an analysis of the growth pattern of the worldwide top 198 firms in the pharmaceutical industry that covered sales figures for seven western markets from 1987 to 1997. They found that Gibrat's Law has to be rejected. This is similar to the findings of Al-Mahrouq's study (2006) that focused on the relationship between firm size and growth in the manufacturing sector in Jordan for the period 1998-2003. Al-Mahrouq found that Gibrat's Law was invalid in the manufacturing sector in Jordan as smaller firms grew at faster rates in comparison to their larger counterparts.

In addition to previous empirical work, Lotti et al. (2007) studied the validity of Gibrat's Law for Italian radio, TV and telecommunications equipment firms from 1987 to 1994, of which the sample size included 3285 firms. They concluded that small firms grew faster than larger firms. Similarly, Hansen (2007) examined the relationship between size and growth rate by applying Gibrat's Law for the firms, used a longitudinal data set consisting of 1564

Danish firms in the period of 1990 to 2002. This data came from a private Danish company. He concluded that Gibrat's Law was rejected.

Falk (2008) investigated the relationship between firm size and growth by analyzing multinational enterprises that spanned 15 European countries. Using data for roughly 20000 firms for the period from 2000-2004, they found that firm size had a significant negative impact on firm growth. Additionally, Coad (2008) examined if Gibrat's Law held for French manufacturing firms by using data collected from 8496 firms for the period from 1996 to 2004. The study rejected Gibrat's Law as it found that smaller firms had the highest growth rate. In yet another study, Hoxha (2008) examined the validity of Gibrat's Law in Kosovo. Kosovo is undergoing a transitional period where the creation of new small firms is expected to play an important role in the country's economic development. As Kosovar firms play a central role in the country's economic development and growth, in his study, Hoxha (2008) examined the validity of Gibrat's Law by using 289 firms established between 1997 and 2002. Production, trade and service sectors were taken into account. Size was implied by the number of employees. He found that small firms grew faster than large firms which mean that Gibrat's Law did not hold for Kosovo's firms.

Similarly, Piergiovanni (2010) tested Gibrat's Law against a large sample of firms that were active in the Veneto region of Italy. In the period from 1995 to 2005, he found that the law was not confirmed in the early stages of the firm's life cycle when younger firms were growing faster than established firms. Hence, fast growing small and medium-sized enterprises may have played a role in the development and structural transformation of the local organization in the Veneto region during the 1990s and early 2000s. However, Mukhopadhyay and Amirkhalkhali (2010) empirically examined the validity of Gibrat's Law. Mukhopadhyay and Amirkhalkhali applied the dynamic model analysis of panel data on a sample of the 500 largest industrial firms in the USA during the period of 2000-2007. They found that larger firms grew faster, violating Gibrat's Law. In the same year, Daunfeldt and Elert (2010) investigated if Gibrat's Law is rejected or not, in which they used employees and revenue as a measurement of firm size, the data set was consisted of 288,757 firms in several industries in Sweden during the period of 1998-2004. The results rejected Gibrat's Law as small firms tended to grow faster than large firms. After one year, Aldemir (2011) developed and tested Gibrat's Law using a sample of 379 small renewable energy firms in Spain for an observation period of 2000 to 2009. The size of the firms was indicated by assets. He reported that the growth of small firms was higher than their large firms; in other words, the study rejected Gibrat's Law.

Recently, Daunfeldt, Elert and Lang (2011) examined the validity of Gibrat's Law within the retail industry in Sweden by using a novel dataset between 1998 and 2004. The collected data covered 18,141 firms with the size of the firm indicated by employment and revenue which were the most common indicators of the firm size. The result was concluded in the rejection of Gibrat's Law since small retail firms tended to grow faster than large ones.

Another study which was conducted by Levrattota, Tessier and Zouikri (2011) aimed to extend and refine Gibrat's Law. The study analyzed a very large sample of 12,811 French manufacturing firms which were active from 1997 to 2007. They found that Gibrat's Law did not hold, and that, moreover, a firm's growth is not random.

In the previous sections, we reviewed studies which tended to either accept or reject Gibrat's Law. Hence, in the following section, we mention studies that have both results of accepting and rejecting the law.

2.3 Empirical Evidence of Reconciling both Results

One of the oldest studies was carried out in America by Mansfield (1962) who observed almost all of the firms in three US manufacturing industries (steel, petroleum refining, and rubber tire). In each industry, several periods of approximately 10 years between 1916 and 1957 were studied. Mansfield rejected Gibrat's Law in 7 out of 10 cases. Smaller firms were found to be more likely to leave the industry. Meanwhile, Kostov, Patton, Moss, and McErlean (2006) investigated if Gibrat's Law holds for the farms in Northern Ireland. Their sample size involved data measured from 1290 farms for the period from 1997 to 2003. They found that farm growth did not depend on initial size, except for the small Northern Island dairy farms. This means that they accepted Gibrat's Law for larger farms and rejected it for the smaller farms.

In Denmark, Bentzen, Strojer and Smith (2006) evaluated the validity of Gibrat's Law by using a large sample over the period from 1990 to 2003. The main result they found was that Gibrat's Law held for the whole service sector except for the business service sector. In contrast, Gibrat's Law failed to hold within the manufacturing and construction industries. Additionally, Carrizosa (2008) discussed the speed of convergence of small firms in the context of Gibrat's Law for manufacturing and service industries. He analyzed unbalanced panel data from 139,922 firms belonging to Spanish firms between 1994 and 2002. His results showed small firms in the service industries did not grow as rapidly as the smaller firms in the manufacturing industries. He reasoned that this was due to the lower medium efficient size (MES) in the service industries which diminished the incentives to grow as well as the positive effect of MES on the speed of convergence.

Aslan (2008) tested Gibrat's Law by using the panel unit root method during the period of 1985 to 2004. The sample size consisted of 103 Turkish firms. To represent the firm size, he used net assets. The survey rejected Gibrat's Law for seven industries, but in other industries he found that firm size and growth were independent.

To investigate possible non linearity between SMEs' growth and their determinant factors, Serrasqueiro, Nunes and Leitao (2009) analyzed the relationships between growth of Portuguese SMEs and their determinants by using the quintile regressions for the period of 1999 to 2005. The size of the firms was indicated by age, intangible assets and cash flow. They accepted Gibrat's Law for lower levels of growth distribution and rejected Gibrat's Law for the upper level of growth distribution.

Recently, Park, and Sydnor (2011) examined the validity of Gibrat's Law within the U.S restaurant firms. The data were comprised of 5818 restaurants, and covering fiscal years from 1995 to 2006. The firm's size variable was measured by sales. They found that U.S restaurant firms have a negative relationship between firm size and growth rates, suggesting a rejection of Gibrat's Law. However, this study found that Gibrat's Law did hold but only for the small scaled international restaurant firms.

For the Swedish Energy industry sector, the study of Tang (2013) is regarded as a pioneering study for this sector. The data consisted of all limited firms in the Swedish energy sector during the period of 1997 to 2011. A random coefficient model was constructed to test Gibrat's Law at the individual firm level. Tang used revenue and number of employees as the indicator of firm size with a sample size of 18137 firms. He found that Gibrat's Law held for 70 percent of cases. In approximately 86 (revenue) and 79 (employment) percent of the cases, Gibrat's Law cannot be rejected at the firm level.

3. Summary

Having presented the literature related to Gibrat's Law, in this study we have highlighted important studies that analyzed the Law for eight years .The conclusion that smaller firms tend to grow faster than larger firms, was the reason for these studies to reject Gibrat's Law. Then again, for those studies that accepted the law, the reason was the growth rate of a given firm that is independent of its size at the beginning of the examined period. For the studies with mixed results, the reasons go back to variation in:

- The period of the study, where we found that there were studies that accepted the law for a sub-period and rejected it for other sub-periods
- The Sectors. We found that some studies rejected the law for some sub-sectors, and accepted it for other sub-sectors, Aslan (2008).
- Region of the country
- Business cycle
- Application of the law for large and small firms, for example Kostov et al. (2006) who implemented the law for large and small firms.
- Different methodology.
- Ultimately, each study differed in size measurements and sample size.

4. Conclusions

This paper has summarized the studies for Gibrat's Law and described the principal differences between them. There are a variety of different measures of size (sales, net assets, value added and many others). However, one of the criteria of size most often used is the number of employees. Moreover, the empirical methods are one of the reasons why the stance of Gibrat has changed (Relander, 2011).

Furthermore, There are a variety of different time periods and length of the period to be utilized. Moreover, the majority of these studies have implemented Gibrat's Law in the manufacturing sector while the service sector has been largely ignored. There is a divergence in the validity of Gibrat's Law between the manufacturing and service sector.

In general, most of the empirical studies that have been applied in the developed countries rejected Gibrat's Law. Lastly, it is also based on the features of SMEs that are labor intensive and has the ability to absorb a lot of labor because of the low cost of creating job opportunities for both developed and developing countries [Atawodi and Ojeka (2012), Al Mahrouq (2010, 2006), Raj and Mahapatra (2009), Avlonities (2008), O´Rrilly and Gemma (2006), Beck, Kunt and Levine (2005)]. From this overview, we can infer that it is possible to

implement Gibrat's Law for developing countries. Hence, we would probably have the same result, in that Gibrat's Law is not valid as smaller firms tend to grow faster than larger firms.

Table 1: Review of Empirical Literature on Gibrat's Law

Accepted Gibrat's Law					
Study	**Country**	**Sector**	**Period**	**Sample**	**Size measurement**
Lensink, van Steen and Sterken (2005)	Dutch	-	1995-1999	811	No. of employees
Fujiwara et al. (2008)	45 European countries	-	1992-2001	260,000	Assets-No. Of employees
Choi (2009)	U.S.A	Service	1992-2001	823	No. of employees
Leitao et al. (2010)	Portugal	Trading	1998-2004	39	Assets

Rejected Gibrat's Law					
Study	**Country**	**sector**	**Period**	**Sample**	**Size measurement**
Harris and Trainor's (2005)	U.K.	Manufacturing	1973-1998	-	Real gross output-No. of employees-real gross value added
Bothner (2005)	43 countries	Service	1995-1999	1,140	Sales
Al-Mahrouq (2006)	Jordan	Manufacturing	1988-2003	-	No. of employees-capital
Calvo (2006)	Spain	Manufacturing	1990-2000	967	No. of employees
Carrizosa (2006)	Spain	Manufacturing-Service	1994-2002	139,922	No. of employees
Bottazzi et al. (2006)	Denmark	Manufacturing	1987-1997	198	Sales
Lotti et al. (2007)	Italy	Service	1987-1994	3,285	No. of employees
Hansen (2007)	Denmark	Manufacturing	1990-2002	1,564	No. of employees
Falk (2008)	15 European countries	Manufacturing-service	2000-2004	20,000	No. of employees
Coad (2008)	France	Manufacturing	1996-2004	8,496	-
Haxha (2008)	Kosovo	Manufacturing-Service-production	1997-2002	289	No. of employees

Piergiovanni (2010)	Italy	Manufacturing	1995-2005	-	-
Levrattota et al. (2010)	France	Manufacturing	1997-2007	12,811	No. of employees
Muhhopadhyay et al. (2010)	U.S.A	All industries	2000-2007	500	Profit- sales
Daunfeledt et al. (2010)	Sweden	All industries	1998-2004	288,757	No. of employees-revenue
Al-Demir (2011)	Spain	Manufacturing	2000-2009	379	Assets
Daunfeledt et al. (2011)	Sweden	Manufacturing	1998-2004	18,141	No. of employees-revenue

Accepted and Rejected Gibrat's Law					
Study	**Country**	**sector**	**Period**	**Sample**	**Size measurement**
Kostov et al. (2006)	Ireland	Production	1997-2003	1290	No. of employees
Bentzen et al. (2006)	Denmark	Manufacturing	1990-2003	626	No. of employees
Crrizosa (2008)	Spain	Manufacturing-Service	1994-2002	139,922	No. of employees
Aslan (2008)	Turkey	Manufacturing-Service	1985-2004	103	Assets
Serrasqueiro et al. (2009)	Portugal	-	1999-2005	350	Assets
Park et al. (2011)	U.S.A	Service	1995-2006	5,818	Sales
Tang (2013)	Sweden	Energy	1997-2011	18137	No. of employees-revenue

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