

## **ANNEX III**

### **REVIEW OF THE EMPIRICAL LITERATURE**

*Review of empirical literature*

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<b>Review of the empirical evidence</b>									
<b>Author (year)</b>	<b>Sector</b>	<b>Sample</b>	<b>Country</b>	<b>Period of time</b>	<b>Dependent variable</b>	<b>Independent variable</b>	<b>Static or dynamic</b>	<b>Econometric methodology</b>	<b>Results</b>
<b>Hart and Prais (1956)</b>	Distilleries, commercial and industrial, and iron, coal and steel.	Quoted firms	United Kingdom	1885-1950	Firm growth (final size divided by the initial) measured in employees.	Classification between small, medium and large firms.	Static-3	They compare the evolution in periods of 16 years.	Gibrat's Law is accepted. Firm growth distributions are similar.
					Analysis of firm size distribution. Observation of entries, exits and size changes.		Dynamic-2	Firm mobility is analysed in period of 5 years.	Gibrat's Law is accepted from 1885 to 1939, but 1939-50 small firms grow faster. Small firms have a higher probability to failure.
<b>Simon and Bonini (1958)</b>	Manufacturing sector.	The largest 500 firms. They use Hart and Prais's (1956) data base.	United States	1954-1956	Logarithm of the firm size in employees for the end of the time interval	Logarithm of the firm size in employees for the beginning of the time interval	Static-3	Graph of the logarithms of the firm size in the beginning and the end of the period.	Gibrat's Law is accepted since graphs are highly skewed.
<b>Hymer and Pashigian (1962)</b>	Manufacturing sector.	769 firms from the largest firms.	United States	1946-1955	Growth of assets in the end of the period.	Growth of assets in the beginning of the period.	Static-3	OLS regression. Industries were ordered by quartiles and their arithmetic average and standard deviation of growth rates were calculated.	Gibrat's Law is refused. The average size is not related with firm size. There is a negative relation between size and deviation.

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<b>Mansfield (1962)</b>	Steel, petroleum and tire industries.	All firms from <i>the Directory of the American Iron and Steel Institute, the Petroleum Refiner, the Rubber Red Book, Moody's Industrials</i> .	United States	Steel (1916-54), petroleum (1921-57) and tire (1937-52)	Growth of gross tons of ingot capacity (steel), daily crude capacity (petroleum) or employment (tire).	The same but for the beginning of the period.	Static-1	Chi-2 test to determine whether the frequency distributions are the same in each class.	Gibrat's Law is refused in seven of ten cases.
							Static-2	Chi-2 test to determine whether the frequency distributions are the same in each class.	Gibrat's Law is refused. The smallest surviving firms have higher and more variable growth rates than larger firms.
							Static-3	Chi-2 test to determine whether the frequency distributions are the same in each class.	Gibrat's Law is accepted, but in half of the cases, the firm growth variation is smaller in the largest firms.
<b>Singh and Whittington (1975)</b>	Manufactures, construction, distribution and services.	1955 surviving quoted firms	United Kingdom	1948-54 and 1954-60.	Logarithm of the firm size measured in assets in the final period.	Logarithm of the firm size measured in assets in the initial period.	Static-3	Regression to all the industries and separately to 21 industries.	Gibrat's Law is refused. Firm growth deviation has a negative relation with size. Positive relationship of firm growth and size in 19 industries, but not significant.
							Dynamic-2	Regression by least squares.	Gibrat's Law is not accepted. Firms growing faster (slower) than average, they also have a faster (slower) growth than the average growth.

<b>Suárez (1977)</b>	Electricity, chemistry, construction, textiles and mines industries from Agendas <i>Financieras del Banco de Bilbao.</i>	46 firms	Spain	1962-72	Annual firm growth measured in net assets.	Initial firm size measured in net assets.	Static-3	Regression by least squares.	Gibrat's Law is accepted. However He suggests that small firms should behave equally.
						Annual firm growth measured in net assets from the previous period.	Dynamic-3	Regression by least squares.	Past firm growth rates do not have any influence in the future growth rates.
<b>Chesher (1979)</b>	Services and manufactures.	183 quoted companies that survived the period.	United Kingdom	1960-1969	Deviation of the logarithm of the firm size respect the average logarithm firm size	The same deviation but from the previous year.	Dynamic-2	Regression with an autoregressive process of first order of the disturbances.	Gibrat's Law is refused when applied during different years
<b>Droucopoulos (1983)</b>	Manufactures and services.	The largest firms 152, 420, 551 and 396 for each period.	The whole world	1957-77, 1967-72, 1972-77 and 1967-77	Firm growth measured in employees.	Size, dummies controlling the industry and country.	Static-3	Results of second and third order for the size variable are obtained.	Gibrat's Law is refused. Weak negative relation between growth and size for all firms, but for period 1972-77.
<b>Pisón (1983)</b>	Large firms.	18 firms	Galicia (Spain)	1975-80	%of growth in the period measured in net assets and profitability	Initial firm size in the period.	Static-3	OLS estimation.	Gibrat's Law is accepted. But the sample was very small.
<b>Buckley, Dunning and Pearce (1984)</b>	19 manufacturing industries.	The largest firms: 636 and 866 firms respectivel	The whole world	1972 and 1977	Firm growth measured in employees and profits.	Size, multinationality and quadratic size. Dummies of multinationality, industry and	Static-3		Gibrat's Law is accepted, but firm growth rates differ significantly between countries and industries. No

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		y to 1972 and 1977.				nationality.			significant relation between growth and size.
<b>Kumar (1985)</b>	Manufacturing industries and a limited range of services from the <i>Company Accounts Data-bank in Cambridge</i> .	2000 quoted surviving companies	United Kingdom	1960-76	Logarithm of the annual firm growth. Size is measured in net assets, employees and sales.	Logarithm of the annual firm growth but one period before. Logarithm of size at the beginning of the period.	Dynamic-2	OLS regression. Distinction between internal growth and growth by acquisition	Gibrat's Law is not accepted. Existence of persistence but weaker than Singh and Whittington (1975). Weak negative relationship between firm growth and size.
<b>Evans (1987a)</b>	Manufacturing industries from the <i>Small Business Data Base</i> .	20000 firms, but there are not the smallest ones.	United States	1976-1982	Logarithm of the annual firm growth. Size is measured in employees.	Logarithm of the following variables: size, age, quadratic size, quadratic age and the cross product between size and age.	Static-2	OLS and Maximum Likelihood controlled for the sample selection bias and the heterosceasticity.	Firm growth decreases with size, including young firms (confirming Jovanovic's (1982) theory.
<b>Evans (1987b)</b>	Manufacturing industries from the <i>Small Business Data Base</i> .	Random sample of 42,339 firms, 13,735 of which are young.	United States	1976-1980	Two estimations: Firstly, the difference of the logarithm of size measured in employees. Secondly, the variability of firm growth.	Logarithm of the following variables: size, age, quadratic size, quadratic age and the cross product between size and age.	Static-2	Maximum Likelihood controlled for the sample selection bias and the heterosceasticity.	Gibrat's Law is not accepted. Firm growth decreases with size, especially between young firms.
<b>Hall (1987)</b>	Manufactures.	1194 firms that represents the 90% of employe	United States	1973-79 and 1976-83.	Logarithm of firm growth measured in employees.	Logarithm of firm size at the beginning of the period.	Static-3	OLS regression corrected for sample attrition, heteroscedasticity and non-linearity.	Gibrat's Law is refused. Negative relationship between size and growth and its standard deviation.

		nt but 1% of firms.							No difference between small and large firms.
<b>Dunne, Roberts and Samuelson (1988)</b>	Manufactures from the <i>Census of Manufactures</i> with at least 5 workers one year.	265000 firms active in the first 3 years and 295000 during the last 2 years.	United States	1963, 1967, 1972, 1977 and 1982.	Stock market actions, relative average size from survival firms and the accumulated failure rates to each cohort of firms.	Results are presented in three groups: 1) new firms, new plants, 2) diversified firms, new plants, 3) diversified firms, mix of products.	Dynamic-3		Stock market decreases with age. Average firm size increases with age. Failure rates increases slowly each period. Diversified firms have a higher firm size and lower failure rates.
<b>Contini and Revelli (1989)</b>	Manufactures	1000 firms.	Italy	1980-1986, a recession (1980-83) and an expansion (1983-86);	Logarithm of firm growth measured in employees.	Logarithm of firm size, age, and the previous firm growth.	Static-2	OLS regression. The introduction of the squared terms of size and age.	Firm growth has a negative relation with size. During the recession there is not relation between growth and age, and during the expansion it is negative.
							Dynamic-2	OLS regression. Estimation for the largest firms (more than 10 employees). Problems of heteroscedasticity and sample selection bias are mentioned.	Small firms usually have expansions and recessions in periods of 3-4 years. This is the reason why there is a negative relationship between growth and the lagged growth. Largest firms show a positive relation and greater than zero.
<b>Dunne, Roberts and</b>	Manufactures from the	Plants that	United States	1967-72- 77	Growth measured	Dummies of size class.	Dynamic-2	Regression.	Gibrat's Law is refused always. For

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<b>Samuelson (1989)</b>	<i>Census of Manufactures</i> with at least 5 workers one year.	entered in 1967, 1972 or 1977. There are 219,754 plants.			with employees and variance of growth rate.				the surviving firms, firm growth and its variance decline when the age increases.
<b>Philips and Kirchoff (1989)</b>	Manufactures and services from the <i>United States Establishment Longitudinal</i>	New firms with a single plant and less of 500 employees.	United States	1976-86	They distinguish the firm growth and the survival.	Age	Static -2	Classification of manufactures in four groups depending on the number of employees.	Positive relationship between firm growth and age. Most firms do not grow during first four years.
<b>Acs and Audretsch (1990)</b>	Manufacturing industries from the <i>Small Business Data Base</i> .	xxxx	United States	1976-1980	Average of firm growth measured in employees.	xxx	Static-1	Classification of manufactures in four groups depending on the number of employees.	Gibrat's Law is accepted. There are not significant differences in the firm growth between different sizes.
<b>Bourlakis (1990)</b>	Manufactures.	633 firms. 305 survived the period of observation	Greece	1966-1986	Firm growth in employees.	Size, age and other explicative variables.	Static-3	Results controlled by the sample selection bias and the heteroscedasticity. Classification between durable and non-durable consume goods and capital goods.	Gibrat's Law is refused. Growth decreases with age and size.
<b>FirtzRoy and Kraft (1991)</b>	Metallurgic industry.	51 firms	West Germany	1977-79	Firm growth measures as the difference between the sales in 1979 and 1977 divided by the initial	Size, age (with dummies) and other explicative variables.	Static-2	Correction of heteroscedasticity.	Gibrat's Law is refused. Smaller firms and younger firms grow faster. More innovative firms, more profitable firms and firms with better-qualified workers, grow faster.



					sales.				
<b>Variyam and Kraybill (1992)</b>	Manufacturing, sales and service firms from a survey conducted by <i>Small business Development Center</i> .	422 firms with less than 500 employees	25 counties in Georgia (United States)	5 years	Difference of logarithms of final and initial sizes and divided by the years. Measure in employees.	Initial size and age, their squares and cross product, dummies of independent establishment, manufacturing and sales, and different cross products.	Static-2	Regression with OLS.	Initial size does not substantially affect survival
<b>Wagner (1992)</b>	Manufacturing industry.	7000 firms with at least 20 workers.	Low Saxony (Germany)	1978-89	Logarithm of the difference between the firm size and the average of all the firms, measured in employees.	The lagged dependent variable (for 1 or 2 periods).	Dynamic-3	Regression with OLS. It is assumed an autoregressive first order process. He distinguishes between firms that produce basic products and consume goods.	Gibrat's Law is refused. There is positive autocorrelation between the firm growths. Small firms do not grow faster than the largest ones.
<b>Amirkhalkhali and Mukhopadhyay (1993)</b>	Industrial firms published in the <i>Fortune</i> list.	The largest surviving 231 firms. They are classified as R&D intensive sector or not.	United States	1965-87	Logarithm of the firm growth	Logarithm of firm growth from one and two previous years, The initial size. Dummies identifying R&D intensive firms.	Dynamic-2	Regression with OLS.	Gibrat's Law is not accepted. Positive autocorrelation between firm growth rates. Weak negative relationship between firm growth and its size.
<b>Audretsch and Mahmood (1994a)</b>	Manufacturing firms from the <i>Small Business Data Base</i> .	11.300 new firms that were born in 1976. Classified	United States	1976-86	Firm growth measured in employees.	Size, innovative activity, scale economies, intensity of capital, industrial growth and	Static-2 Static-3 (analysing by industries)	Regression with OLS.	Firm growth has a negative relationship with size and capital intensity, positive with the innovation, scale economies,

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		by single or multiplant				dummies for multiplant firms.			industrial growth and multiplant.
<b>Dunne and Hughes (1994)</b>	Manufacturing industries from <i>EXSTAT database</i> where small firms are not represented correctly.	1709 quoted and unquoted firms.	United Kingdom	1975-80 and 1980-85	Logarithm of firm size at the end of the period. Measured in net assets.	Logarithm of firm size at the beginning of the period.	Static-2	Regressions are estimated by OLS.	Gibrat's Law is refused since smallest firms grow faster. Age has an inverse relation with growth.
					Logarithm of firm growth. Measured in net assets.	Logarithm of previous firm growth. Measured in net assets.	Dynamic-2	Regressions are estimated by OLS.	Weak evidence of persistence in growth.
<b>Mata (1994)</b>	Manufacturing industries from a survey from the Ministry of Employment.	3308 firms with more than 5 employees.	Portugal	1983-88	Growth rates measured in employees.	Firm size from the previous year.	Static-2	Estimation with OLS. Mata mentions some sample selection problems and heteroscedasticity.	Gibrat's Law is refused. Surviving firms and the smallest firms grow faster.
<b>Wagner (1994)</b>	Manufacturing industry from the Statistical Office.	10743 entries from 4 different cohorts.	Low Saxony (Germany)	1987-90	Growth rates measured in employees.	-	Static-2	Distribution of the firms depending on the growth rate.	There are no clear-cut nexus between firm size and firm growth.
<b>Audretsch (1995a)</b>	Manufacturing firms from the <i>Small Business Data Base</i> .	11154 new firms that were born in 1976. Classified by single or multiplant	United States	1976-86	Firm growth measured in employees.	Innovation rate, small-firm innovation rate, mean largest plant size, firm size, industry growth, organisation structure	Static-2	Estimation with OLS.	Gibrat's Law is refused: smaller firms grow faster. Neither the innovative environment nor scale economies have impact on growth.
<b>Das (1995)</b>	Computer hardware	51 firms that were	India	1983-88	Logarithm of firm growth	Previous size, age, cross	Static-1	Unbalanced panel data with fixed	Gibrat's Law is refused since smaller

	industry from the computer magazine <i>Dataquest</i> .	active at least one year during the period.			measured in sales.	product, quadratic size and quadratic age. Size of two previous years		effects.	plants grow faster. The estimation with fixed effects is the most suitable. Evidence of non-observed heterogeneity.
<b>Doms, Dunne and Roberts (1995)</b>	Manufactures from <i>Census of Manufactures, Survey of Manufacturing Technology</i> and <i>Standard Statistical Establishment List</i> .	6090 plants	United States	1959-88	Firm growth measured in employees.	Employment size class, labour productivity, technologies, capital per worker, cohort of entry.	Static-1	Estimation with OLS controlled by Heckman's (1978) correction.	Gibrat's Law is refused since younger plants, higher productivity plants and smaller plants have higher rates of growth.
<b>Reid (1995)</b>	73 micro-firms from <i>Enterprise Trusts in the Lothian, Fife and Strathclyde regions</i> (EVENT, GET, LET, ASSET <i>etc</i> )	73 firms with less than 3 years and less than 10 employees.	Scotland (United Kingdom)	1985-88	Logarithm of assets	Previous logarithm of assets	Static-1	Model with simultaneous equations to estimate growth and profits.	Gibrat's Law is refused (smaller firms grow faster). Presence of a trade-off between growth and benefits.
<b>Stanley, Buldyrev, Havlin, Mantegna, Salinger and Stanley (1995)</b>	Manufacturing industries from <i>Compustat</i> .	4071 firms	United States	1993	Logarithm of sales	Initial firm size	Static-1	Analysis of firm distribution using a technique common in physics: Zipf plot.	The log-normal distribution fits the data well except for the upper tail.
<b>Amaral,</b>	Manufactures	Xxx	United	1974-93	Logarithm of	Initial size,	Dynamic-2	Panel tests. Use of	Gibrat's Law is

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<b>Buldyrev, Havlin, Leschtorn, Maass, Salinger, Stanley and Stanley (1997)</b>	from <i>Compustat</i> .		States		firm growth	temporal dummies, and dummies controlling simultaneously sector and period (to control specific sectorial shocks).		methodologies of Monte Carlo to analyse the distributions and the power of the test.	refused. Limitation of test cross-section (there is a loss of power and it has difficulties to refuse Gibrat's Law). Firm size converges to a mean size (specially during recessions).
<b>Santarelli (1997)</b>	Hospitality sector.	11660 start-ups	Italy	1989-94	Logarithm of firm growth measured in employees.	Logarithm of firm growth measured in employees for the previous year.	Static-2	20 equations are estimated at a regional level.	Gibrat's Law can not be refused in 14 of the 20 Italian regions. The reason is that homogenous firm distribution of Italian firms.
<b>González and Correa (1998)</b>	Manufactures and service industries	1715 firms	Sta. Cruz de Tenerife (Spain)	1990-1993	Logarithm of firm growth measured in employees, added value or income.	Logarithm of firm size measured in employees, added value or income.	Static-2	OLS	Gibrat's Law is refused in favour to small firms.
						Logarithm of firm growth measured in employees, added value or income.	Dynamic-2	OLS	There is no presence of dependence among past and future growth.
<b>Harhoff, Stahl and Woywode (1998)</b>	Manufacturing, construction, trade and services sector from <i>Creditreform</i> .	8068 firms	Germany	1989-1994	Logarithm of average annual growth rate measured in employees.	Logarithm of initial size, age, the quadratic size and age, cross product between age and size. Dummies identifying firm characteristics.	Static-2	They analyse the problems of sample selection (Heckman's (1979) method), heteroskedasticity with an OLS estimation.	Gibrat's Law is refused. There is a negative relationship between firm growth and size.
<b>Almus and Nerlinger (1999)</b>	Manufacturing industries from	32045 firms	West Germany	1989-98	Logarithm of average annual	Firm specific variables (size, quadratic size,	Static-2	Multivariate regressions. They also calculate the	Gibrat's Law is refused. There is a negative relationship

	CREDITREF ORM from the ZEW- Foundation Panel.				growth rate measured in employees.	age...), founder- specific and firm external characteristics.		elasticity of firm growth in relation to firm size.	between firm growth and size. Young and small innovative firms have greater growth rates.
<b>Audretsch, Santarelli and Vivarelli (1999)</b>	Manufactures from <i>National Intitute for Social Security (INPS)</i> .	1570 firms created in 1987.	Italy	1987-93	Logarithm of the firm size in the end of the period.	Logarithm of the firm size at the beginning of the period.	Static-1 Static-3	Within industry cross-sections.	Gibrat's Law is refused and more significantly among surviving firms.
<b>Hart and Oulton (1999)</b>	Manufacturin g and non- manufacturin g sectors from the <i>OneSource database</i> .	29000 firms divided in 12 groups.	United Kingdom	1989-93.	Logarithm of the size measured in employees.	Logarithm of the size from the previous year.	Static-1	OLS introducing dummy variables on the intercepts and size classes.	Gibrat's Law is refused. Smaller firms grow faster.
<b>Lotti, Santarelli and Vivarelli (1999)</b>	Manufacturin g industries from the <i>Italian National Institute for Social Security</i> .	1570 firms with at least one employee	Italy	1987-93	Logarithm of firm size measured in employees.	Logarithm of firm size from the previous year measured in employees.	Static-2	Heckman's (1979) procedure to control sample selection. They apply tests for heteroskedasticity using the OLS and White's correction.	Initially, smaller firms grow faster over the entire period. But there is a convergence towards a Gibrat-like pattern.
<b>Almus and Nerlinger (2000)</b>	Manufacturin g industries in three size classes (less than 5 workers, 6 to 19, more than 19) from the ZEW- foundation panel.	784 firms from 1990-2, 1420 from 1991-3, 2831 from 1992-4, 3495 from 1993-5, 4278 from 1994-6.	West German y	1989-96	Logarithm of firm growth measured in employees.	Logarithm of firm growth measured in employees for the previous year.	Dynamic-2	They use the Chesher's (1979) methodology to explore Gibrat's Law.	Gibrat's Law is refused for young firms but there are not differences between technologically intensive and non- intensive sectors.
<b>Fariñas and</b>	Manufactures.	1971	Spain	1990-95	Logarithm of	Dummies of size	Static-1	They show how the	Wald statistics show

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<b>Moreno (2000)</b>	<i>Encuesta de Estrategias Empresariales (ESEE)</i> from the Spanish Ministry of Manufacturing.	firms, with all the firms with more than 200 workers, and a random sample of firms between 10 and 200 workers.			firm growth rate measured in employees.	categories and sector.		average growth and the failure probability change with size and age. They correct sample selection bias and heteroscedasticity. Following Dunne <i>et al.</i> (1988), they distinguish potential and observed growth rates.	size is not uniform and that firm growth differences are not significant between sizes. The negative relationship between failure rates and size compensates the negative relation between surviving firm growth rates and sizes. The net effect of age on firm growth is similar to the firm size effect.
							Dynamic-1		The average firm growth decreases with firm age although this relationship is not so outstanding between firms with more than 500 employees.
<b>Klette and Griliches (2000)</b>	Firms in high-tech industries from the Norwegian R&D-performing line of	586 firms with at least 20 employees.	Norway	1985-1995	Logarithm of the number of employees	Previous logarithm of the number of employees	Static-2	OLS regression	Gibrat's Law is accepted.
<b>Lazarova, Urga and Walters (2000)</b>	Manufactures	147 large quoted firms	United Kingdom	1955-85	Logarithm firm growth measured in total net		Dynamic-2	They analyse the long run convergence. Use of Augmented Dickey-	Firm that survived more than 30 years show a random growth. Firm size does

<b>Lensink, van Steen and Sterken (2000)</b>	Annual survey.	Panel of 811 firms	Netherlands	1995-99	Firm growth	Initial firm size.	Static-2	They analyse the differences between small and large firms.	Gibrat's Law is accepted.
<b>Machado and Mata (2000)</b>	Manufactures from the survey from the Ministry of Employment and covers all firm sizes.	Active firms between 1983 (18552 firms) and 1991 (26515 firms).	Portugal	1983-91	Firm size.		Static-1	Box-Cox Quantile regression to analyse the firm size distribution (FSD). Regression estimated with Generalized Least Squares (GLS) and they apply a normality test of estimated standardized error terms.	Gibrat's Law is not hold: lognormality prediction for the FSD is not confirmed. Firm characteristics affect to firm size, but this effect is larger for the superior quantiles. FSD shifts towards the smallest firms.
<b>Pfaffermayr and Bellak (2000)</b>	Manufactures.	700 national and foreign largest corporations	Austria	1996-99.	Logarithm of firm growth	Logarithm of initial firm size.	Dynamic-2		Gibrat's Law is accepted.
<b>Scherer, Harhoff and Kukies (2000)</b>	High technological firms.	110 firms	United States.	1986-1995	Logarithm of final firm investment	Logarithm of initial firm investment	Static-2	A Monte Carlo experiments with monthly investments.	After ten years of random growth would appear skewness in the market.
<b>Acs and Armington (2001)</b>	LEEM registry	6 millions of establishments.	United States.	1994-95	Logarithm of firm growth measured in employees.	Previous logarithmic size and age.	Dynamic-2		Gibrat's Law is accepted only for multiplant establishments. There is a negative relationship between size and growth.
<b>Blonigen</b>	Manufacturing	688 plants	Japanes	1987-1990	3-year	Logarithm of	Static-2	OLS regression	Gibrat's Law is

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<b>and Tomlin (2001)</b>	g industries from <i>Japan's Expanding US Manufacturing Presence</i> by the Japan Economic Institute.		e plants in the United States.		percentage change in plant-level employees from 1987 to 1990.	initial size in employees, logarithm of plant age, dummy for joint venture and industry dummies.		controlling by heterogeneity	refused since smaller plants grow faster than the larger ones. There are learning effects.	
<b>Bottazzi, Dosi, Lippi, Pammolli and Riccaboni (2001)</b>	Pharmaceutical industry from the <i>Pharmaceutical Industry Databe</i> .	Top 150 firms	USA, United Kingdom, France, Germany, Spain, Italy and Canada	1987-97	Firm growth measured in sales and market shares (normalized by the average over all firm sizes in a given year).			Static-2	Ordering firms by its firm grow rates and plotting the distribution function of firm sizes.	Gibrat's Law is refused since the distribution presents a fatter upper tail than a Gaussian.
								Dynamic-2	Plot of the probability density of growth obtained, the time autocorrelation of firm growth and the autocorrelation coefficients. There are also growth transition matrices at the aggregate level.	Presence of persistent forms of heterogeneity across firms. Autocorrelation in firm growth increases with the scale of observation.
<b>Geroski and Gugler (2001)</b>	Manufactures and agriculture from <i>Amadeus</i> database.	Around 25,000 firms	EU-15 with but Ireland, Luxembourg plus	1994-98	Difference of the firm size measured in employees between two periods.	Previous firm size in logarithm, age and others.		Static-2	Pooled and fixed effects estimations.	Evidence of "convergence clubs" since small and young firms grow more, while mature and large firms are best



			Switzerl and						described by Gibrat's Law. Moreover, Convergence is more likely to occur within industries across countries than within countries across industries.
<b>Heshmati (2001)</b>	Manufactures from the <i>Market Manager's</i> database and supplemented with additional information from the regional Labour Market Office.	7884 firms with a tasable turnover exceeding SEK 10000	Sweden	1993-98	Firm growth measured in employees, total net assets and total net sales. All in logarithmic form.	Several variables representing the firm, its behaviour, the human capital and the conditions from the local labour market.	Static-1	Regressions with OLS, GLS and adjustment models. A within and between estimation are also estimated and compared their results.	Gibrat's Law is refused. Negative relation between firm size and growth for the model with employees. This relation is positive for the model with sales, so there are scale effects. The size effect is not statistically significant for the model with assets.
<b>Lotti, Santarelli and Vivarelli (2001)</b>	Instruments industry from the Italian National Institute for Social Security.	214 firms created in 1987 with at least one employee.	Italy	1987-1993	Deviation of the logarithm of the firm size respect the average logarithm firm size, all measured in employees.	The dependent variable for the first and second previous years.	Static -1	Regressions with OLS and Sample Selection Model. They apply Chesher's (1979) method. Estimations for firms between 1 to 5 employees and firms with more than 5.	Gibrat's Law is refused is refused during first years (small firms grow faster), but Gibrat's Law is confirmed to firms with a size larger than a minimum size and age.
<b>Del Monte and Papagni (2001)</b>	Manufactures.	659 firms	Italy	1989-97	Firm growth measured in sales (deflated by the deflator		Dynamic-1	Panel data estimations applied to firms classified by sectors and sizes.	Gibrat's Law is accepted.

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					of the added value) and employment.			Test of unit root based on the estimations calculated in the temporal series from each firm.	
<b>Vennet (2001)</b>	Bank sector from the OCDE Bank Profitability database.	230 observations.	23 OECD countries	1985-94	Deviation of the logarithm of the firm size respect the average logarithm firm size, all measured in the total asset volume and the adjusted total assets.	The lagged dependent variable for the first and second previous years.	Dynamic-1	Data panel estimation applying Chesher's (1979) methodology.	Convergence of bank sizes during 1985-89, but their sizes stabilise during 1990-94. Factors such as the expansion of the market, the macroeconomic growth and bank efficiency determine the bank size evolution.
<b>Shanmugam and Bhaduri (2002)</b>	Manufactures from the Centre for Monitoring Indian Economy Prowness database.	392 firms	India	1989-1990 and 1992-1993	Rate of growth measured in employees.	Logarithmic size of the beginning period, logarithmic age, their quadratic value and their cross product.	Static 2	OLS and Fixed Effects model.	Gibrat's Law is not accomplished and age exerts a positive impact on the firm growth.
<b>Becchetti and Trovato (2002)</b>	Manufacturing industry from the Mediocredito database.	1832 firms	Italy	1995-97	Growth in number of employees	Industry dummies, macrosector dummies, size, year of establishment, total amount of shareholders, dummy	Static-1 Static-2	Cross-sectional estimation	Gibrat's Law is not refused for large firms, but it does not hold for small and medium sized firms.

<b>Botazzi, Cefis and Dosi (2002)</b>	Pharmaceuticals, primary metals, machine tools and textiles from the <i>MICRO.1</i> data base.	Firms with more than 20 employees.	Italy	1989-96	Normalised logarithm of employees, sales and value added		indicating subsidies, exports.	Dynamic-2	Probability distributions for growth rates.	Gibrat's Law is refused. There is systematic heterogeneity across firms, striking persistent differences and profits tends to be asymmetrically distributed.
<b>Davidsson, Kirchhoff, Hatemi-J and Gustavsson (2002)</b>	Manufactures and services from Statistics Sweden.	11748 firms with more than 20 employees.	Sweden	1987-96.	Growth index calculated as 1996 employment minus initial employment divided by the average of 1996 and initial employment.	Age, size, overall enterprise size, industry sector, change in industry sector, legal form, change in legal form and governance, change in governance, international activities, location, change in location.		Static-2	OLS equation controlling heteroscedasticity with a White's (1980) correction.	There is a negative relationship between firm size and its growth.
<b>Goddard, Wilson and Blandon (2002)</b>	Manufactures from the <i>Nikkei Kaisha Jouhou</i> publications.	443 firms quoted	Japan	1980-96	Logarithm of firm growth measured in assets	Logarithm of firm initial size		Dynamic-2	Use of Monte Carlo methods, a panel test and a cross sectional test.	Gibrat's Law is rejected. Log firm sizes are mean reverting towards heterogeneous equilibrium values.
<b>Hardwick and Adams (2002)</b>	2 samples of insurance companies	210 surviving firms from	United Kingdom	1987-91 and 1992-96	Logarithm of firm growth measured in	Logarithm of the size from the first and second		Dynamic-1	They use the Chesher's (1979) methodology to	La Gibrat's Law is refused during 1987-91(smaller firms grow

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	from <i>Synthesis Life Database.</i>	1987-91. And 210 surviving firms from 1992-96			assets.	previous years.		explore Gibrat's Law.	faster). But there are not significant differences during 1992-96. There is not evidence that firm growth is negative related with profits.
<b>Piergiovanni, Santarelli, Klomp and Thurik (2002)</b>	Service industries from the <i>Italian National Institute for Social Security.</i>	9051 firms with at least an employee.	Italy	1989-94	Firm growth rates measured in employees	Initial firm size	Static-1 Static-2	Those authors apply the Chi-square test.	Gibrat's Law holds only for cafes and camping sites. In the Static-2 version only camping site rejects Gibrat's Law.
					Logarithm of firm growth in employees	Previous firm growth	Dynamic-1	Those authors apply the Chi-square test.	Gibrat's Law is accepted for camping sites.
<b>Santarelli and Vivarelli (2002)</b>	Firms in electrical and electronic engineering from the <i>Italian National Institute for Social Security.</i>	129firms with at least an employee created in 1987. 83 firms survived.	Italy	1987-1993	Logarithm of firm measured in employees.	Previous size measured in logarithm of firm measured in employees.	Static - 1	OLS and Sample Selection Model with a Heckman equation.	Small firms grow faster.
<b>Cabral and Mata (2003)</b>	Database from a private firm, that collects balance sheets and the second database is a survey from the	515 firms	Portugal	1984-1991	Logarithm of size measured in number of employees	Logarithm of size measured in number of employees	Static - 2	Analysis of the cohort of firms	Those authors observe that firm size distribution is significantly right-skewed, evolving over time toward a lognormal distribution.

	Portuguese Ministry of Employment.								
<b>Correa, Acosta, González and Medina (2003)</b>	Firms belonging to non-financial sectors from <i>Commercial Performance Information Bureau of the University of La Laguna</i> database (CPIBLL).	1,092 surviving firms. Firms with extreme sizes in any of the years were excluded.	Sta. Cruz de Tenerife (Spain)	1990-96	Logarithm of size measured with five variables (total net assets, equity, operating income, added value and multicriteria variable, DIM)	Initial size, age and sectorial variable.	Static	OLS	Gibrat's Law is rejected: small firms grow faster. The age reveals contradictory results and the service sector does not imply a significant impact on the behaviour of firm growth.
<b>Delmar, Davidsson and Gartner (2003)</b>	Manufactures and services from Statistics Sweden.	11748 firms with more than 20 employees.	Sweden	1987-96.	Firm growth rates measure in employees and sales.		Static-2	A 4 step cluster to analyse the firm growth: 1) Selection of 19 variables. 2) Classification of sample between a tryout sample and a holdout one (the last one to check the results from the first one). 3) Solution more stable. 4) Optimum solution obtained and it ensures the internal validation.	Different patterns: "Super absolute growers": Manufacturing SMEs with high growths in sales and employees, which are intensive in knowledge. "Steady sales growers": Large traditional manufacturing firms with high growth in sales, but with less employees. "Super relative growers": Service knowledge intensity SMEs with random development in sales and employees.

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									“Erratic one-shot growers”: Service non-knowledge intensity SMEs with negative firm growth, but one period they present a very high growth.
<b>Faggio and Konings (2003)</b>	<i>Amadeus</i> database, <i>Polish InfoCredit</i> , <i>Estonian Kdrediinfo AS</i> , <i>Intercredit Ljubljana</i> , <i>Creditreform Bulgaria and the Chamber of Industry and Commerce</i> .	834 Polish firms, 233 Estonian firms, 511 Slovakian firms, 1548 Bulgarian firms from 1993-97, and 3776 Rumanian firms from 1994-97.	Poland, Estonia, Slovakia, Bulgaria and Rumania	1993-97	Logarithm of firm growth measured in employees.	Logarithm of initial size. Dummies about commercial orientation, ownership, interaction of lagged firm sizes and dummies of ownership, regional and temporal dummies.	Static-3	5 nested estimations (1 to each country). They follow Hamilton’s (1998) method to obtain a robust regressions.	Gibrat’s Law is refused. Smaller firms grow faster. Hypotheses that there is a restructuring of large firms, since transition requires the reduction of large inefficient and public firms.
<b>Lotti, Santarelli and Vivarelli (2003)</b>	Telecommunication and Radio and TV equipment industries from the <i>Italian National Institute for Social Security</i> .	3285 firms with at least one employee.	Italy	1987-94	Logarithm of firm growth in employees	Previous size in logarithms, age.	Static-1	Introduction of a selection Probit model.	Gibrat’s Law is refused. Smaller firms grow faster. A convergence to a Gibrat-like behaviour emerges since $\beta$ approaches to 1 over time.
<b>Del Monte and Papagni (2003)</b>	Manufacturing industries from <i>Mediocredito</i>	496 firms classified depending on workers	Italy	1992-97	Rate of growth of sales at constant	Logarithm of the expenditure in R&D and previous firm	Dynamic-2	Generalised Method of Moments.	Positive effect of past sales on current sales. Effect of research on firm growth is greater

	<i>survey.</i>	did research or not.		prices	growth of sales.				in the traditional sectors.
<b>Oliveria and Fortunato (2003a)</b>	Manufacturing industries from the annual accounts at the <i>Central Balance Sheet Office</i> .	8814 surviving firms.	Portugal	1990-99	Logarithm of firm growth measured in employees.	Firm size, age, foreign participation and capital structure.	Static-2	Test for a unit root in micro panel to assess whether the first differenced GMM estimator is identifies.	Gibrat's Law is refused. Smaller firms have larger potential growth.
<b>Oliveria and Fortunato (2003b)</b>	Manufacturing industries from the annual accounts at the <i>Central Balance Sheet Office</i> .	9319 surviving firms.	Portugal	1990-99	Logarithm of firm growth measured in employees.	Firm size, age, foreign participation and capital structure.	Static-2	GMM estimation	Gibrat's Law is refused. Large and mature firms have smaller growth rates.
<b>Voulgaris, Asteriou and Agiomirgiana (2003)</b>	Manufacturing industries	143 firm	Greece	1988-96	Growth of sales	Firm size (ratio between assets and employees), age, exports.	Static-2	Panel data using the Fixed Effects methodology	Negative relationship between firm growth and size.
<b>Fotopoulos and Louri (2004)</b>	Manufactures.	2640 firms	Greece	1992 and 1997	Logarithm of the deviation of firm size in 1997 respect to the average. Measured in employees.	Initial firm size and age.	Dynamic-1	Estimation of a kernel non-parametric density function. Estimation of quantile regressions.	Gibrat's Law is not accepted. Firm size and age have a negative impact on firm growth.
<b>Hoogstra and Dijk (2004)</b>	Manufactures and services from the <i>Establishment Registers</i>	34918 surviving establishments, 3061 from	Province of Groningen, Frysland	1994-99	Firm growth measured in employees.	Firm characteristics (size, age, sector and relocation) acting as control	Static-2	Estimation with OLS	There is a positive effect between employment growth and population level. Negative effect of the

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		manufacturing, 7839 from retail and 7291 from business services.	and Drenthe in the North of the Netherlands				variables. Locational characteristics (population levels and growth, regional employment growth, large number of firms, employment share of new firms, accessibility, enterprise zones)		employment growth in new firms
<b>Mata and Portugal (2004)</b>	Manufactures from the survey from the Ministry of Employment	613 firms with at least a 10% of foreign participation, and 5938 domestic firms.		1983-89	Firm growth measured in employees.	Age and type of foreign participation	Static-2	Distribution of firm growth rates depending on the type of foreign participation and age group.	Entry by acquisition is made acquiring an ongoing firm and "join the club" of incumbents. While the entry by greenfield, a firm enters relatively small and grows and upgrades its position afterwards.
<b>Oliveria and Fortunato (2004a) and Oliveria and Fortunato (2004b)</b>	Manufacturing and service industries from the annual accounts at the <i>Central Balance Sheet Office</i> .	8072 (419 of them from services) surviving firms in an unbalanced panel.	Portugal	1990-2001	Firm growth	Age, size in the initial period, measure of the extent of the foreign ownership for industry, ratio of book values of total liabilities to total assets and the liquidity.	Static-2	GMM-SYS estimator which uses additional moment conditions that require stronger assumptions on the initial conditions.	Gibrat's Law is refused since small firms grow faster than larger ones. Not only for manufactures but it also for services.
<b>Peña (2004)</b>	Survey obtained with the	114 start-up firms.	Basque Country (Spain)	1997-98	Firm growth measured in employees,	Firm size (approximated by investment), age,	Static-2	OLS regression.	Young firms have more capacity to grow. The estimation with



	collaboration of nine incubators				sales and profits.	firm strategy related variables and variables related with the entrepreneur.			profits was ignored because the low explanatory power.
<b>Reichstein and Dahl (2004)</b>	Manufactures and service industries from NewBiz database.	8739 observations	Denmark	1994-1996	Logarithm of the firm growth	Logarithmic previous size, logarithmic age, growth of regional specialisation and market concentration.	Static	OLS estimation correcting the heteroscedasticity multiplying the firm size with the industry dummy.	Gibrat's Law is rejected
<b>Audretsch and Lehman (2005)</b>	IPO database and publicly available information.	281 IPO firms	Germany		Logarithm of growth of employees	Previous size, age, quadratic size and age, and the university spillovers and the university productivity	Static	OLS estimation and a 2SLS.	Gibrat's Law is rejected: smaller firms grow faster and the university spillovers have a positive impact.
<b>Niefert (2005)</b>	Manufacturing, construction, trade, transport & communication and service sectors.	Sample of 1,387. Firms with 0 or more than 500 employees were eliminated	Germany	1990-99	Logarithmic employment growth.	Size, age, size $\times$ age, limited liability company, patents, innovation variables.	Static 2	Fixed effects equation and first-differencing dynamic panel data to control for time-constant, unobserved heterogeneity.	Gibrat's Law is rejected: smaller firms grow faster than larger ones. She argues that it is a reasonable result because the sample consists of start-up firms.
<b>Nkurunziza (2005)</b>	Survey of firms belonging to textile, food or metal sectors.	224 firms which started in 1992 and 70 firms created in 1999	Kenya	1992-99	Logarithm of firm growth measured in number of full time workers.	Initial size, age, age squared, ethnicity, sector,	Static-2	OLS regression, instrumental variables, fixed effects, GMM and a Heckman selection model of firm growth.	Many models reject Gibrat's Law since initial size is negative and significant supporting the convergence. Age is weakly related to growth.

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<b>Oliveira and Fortunato (2005)</b>	Database constructed by the Portuguese Central Bank belonging to manufactures and services.	Unbalanced panel data of 1248 surviving firms with 5709 observations.	Portugal	1990-2001	Logarithm of firm growth measured in number of employees	Previous size, previous growth, R&D intensity respect sales, investment respect capital, R&D respect knowledge capital.	Dynamic - 2	Generalized Method of Moments (GMM) system estimator and GMM-SYS estimator.	There is a positive relationship between firm size and firm growth: smaller firm grow faster. Moreover, R&D and other investments expel a positive influence.
<b>Botazzi, Secchi and Tamagni (2006)</b>	Data from the <i>Centrale dei Bilanci</i> of firms from manufactures and services.	Firms with more than one worker classified by a financial risk rate.	Italy	1998-2002	Value of total sales, value added and tangible assets in the current period.	Value of total sales, value added and tangible assets in the previous period.	Dynamic - 1	Autoregressive model.	They find that at the aggregate level, manufacturing and service industries, and irrespectively of the size proxy, a negative exponential relation between average firm size average growth rate.

*Source: author's own*