Firm Size Distribution with Shrinkage in a mature Italian Industrial District.

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Abstract: In this paper we analyze the relationship between the distribution of firm size and a stochastic process of growth. The process we refer to, formulated by Steindl (*Random Processes and the Growth of Firms*, Griffin, London, 1965), seems to describe the shrinkage in Added Value (AV) experienced by the oldest industrial Italian district: the textile district of Prato. We find that the Pareto distribution suggested by the same model, fits well on the firm AV of universes for each of the seven considered years (from 1994 to 2000). In particular, by means of an analysis of firm demography we emphasize the inverse relationship between concentration and birth rate of firms embodied in the Pareto distribution coefficient. According to this feature, positive demography is the key to prevent the spreading of a high concentration process, which has never been a characteristic of the district for the last three decades.

Key words: firm size, birth and death process, shrinkage, Pareto distribution, concentration.

Jel: L11, L25, L67

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Although this is the result of a team work, sections 2, 3.3 and 4.3 are to be attributed to Ganugi, sections 3.2 and 4.2 to Crosato and sections 3.1, 3.4 and 4.1 to Cipollini, introduction and conclusions to the three authors.

1. Introduction

Shrinkage refers to an economy characterized by a negative mean rate of growth over a span of years and has been mainly a topic of economic history (for 17° century in Italy see Cipolla, 1956 and Malanima, 2002). The modest rate of growth of Added Value (AV) which has characterized Italy in the decade 1993-2003[1] has made this case relevant for some Italian Industrial districts, among which Prato, the oldest district in Italy and one of the most important in Europe for Textile Industry (for a deep investigation of macroeconomic accounts of this district see Cipollini and Ganugi, 2002). Its textile companies have suffered a negative Added Value mean rate of 3.3% at Constant Prices (see Table I) in the period 1994-2000.

In this paper we aim:

- to analyze the size of textile companies according to different variables chosen as proxies of size itself which, as we are now going to explain, can remarkably behave differently in the district (about the use of different variables as proxies of size see Boeri, 1989);
- to model the stochastic process of shrinkage concerning the district using a pure statistical procedure founded on an accurate analysis both of firm size distribution and of net entry rates (for a non-parametric analysis of size distribution see also Cipollini, Ganugi 2001) .

The most relevant difficulties to shape firm size distribution about Italian Industrial districts are two.

One is the very modest size of most firms together with the lack of coverage of the same units by SCI, the official survey on Gross Product by ISTAT, the national Italian statistical office. SCI covers in fact firms with at least 20 employees (up to 1997, and with at least 100 employees starting from 1998) which represent a thin minority in the Italian Industrial districts.

The other difficulty results from a curious effect concerning the National Accounts of the districts: the stability and even the increase of the overall Sales and Total Assets in spite of AV shrinkage.

The Industrial Organization of the district firms has in fact been characterized by a progressive deverticalization which has involved the production of the same amount of AV by a rising number of firms.

We have faced the first problem - the absence of individual data of district firms - substituting SCI with Economic Accounts of the same firms. In Italy in fact, as emphasized in a previous work (see

[1] The mean rate of growth of AV for manufacturing sector in the decade 1994-2003 has been 0,82% (ISTAT, 1995 prices)

Ferrari, Ganugi, Gozzi, 1999 and Ganugi, Galli, 2003), the economic content of Economic Account, at least for AV, Sales and Total Assets, is the same as SCI.

The data in this work are by the Universe of Economic Accounts of the textile district Companies for the period 1994-2000, supplied by Cerved, the File of Economic Accounts of the Union of Chambers of Commerce which are purchased yearly by ASEL of Prato (see Table II for the total number of firms we have worked on and Table III for each year total amounts of the different considered variables).

The second problem - changes of opposite sign in AV and Sales (and Total Assets as well) - has been solved analyzing firm size by means of the three variables above quoted. Among the companies we work on, we have also considered those with Added Value equal to or lower than zero because of the relevance of small companies with negative gross profits.

Within the framework of models of firm stochastic growth, stagnation and shrinkage have been dealt with respectively by Simon (1955, 1960), Steindl (1965) and Champernowne (1973), the last one dealing with fix panels (see Ganugi, Grossi, Crosato, 2003).

Steindl's shrinkage model, assuming positive rate of entry, leads to Paretian size distribution. Given negative growth, the parameter of the same distribution depends strictly on the rate of net entry. The lessening of the entry rate implies a rising concentration, while the increasing of the same rate implies a decreasing concentration. According to this feature, positive demography is the key to prevent the spreading of a high concentration process, which has never been a characteristic of the district for the last three decades.

2. The National Accounts of the District: a paradox.

As we have just hinted, "National Accounts" of Italian Industrial District is characterized by a curious effect: Sales and Total Assets of an area can feature a constant, even positive rate of growth in spite of AV shrinkage (see Table I).

The explanation of this apparent paradox is the deep deverticalization process of firms which involves the production of same amounts of AV by a growing number of firms (see Barca, 1985 and Brusco, Giovannetti, Malagoli 1979). The item which used to be supplied by one or few firms is now supplied by many, each one high specialized in producing a part of it.

In the light of this different pattern of the district flows, it can be worth to investigate firm size distribution according to different variables: Total Assets, Sales, AV.

We have calculated AV at constant prices through double deflation. ISTAT supplies Production Price Index for each Industry including the Textile. For Intermediate Goods and Services ISTAT supplies only one Price Index for all Industries.

The cause of AV shrinkage in the Textile districts is the asymmetry of the markets in which the firms operate: they face the rising prices of relevant services - legal, banking and transport - and intermediate goods such as water, methane, electricity, which cannot be compensated by higher Production Prices without a loss of market shares.

To supply a systematic analysis of the phenomenon we have calculated growth rates using two different structures of data, all of them belonging to the same archive and concerning the span of years 1994-2000 (see Table II for the total number of firms and Table III for each year total amounts of the different considered variables)

- fix panel, closed to entry and exit of new firms and therefore representing the *core* of the district;
- universes of companies, both family managed and/or employing staff, subject to entry and exit of similar firms.

3. The distributions of the size in the Panel

3.1 The choice of the distributions and tests.

We begin our analysis starting from the panel structure, composed by 866 firms working on TA, Sales and Added Value, and 788 firms working on positive Added Value.

Assuming panel data, stochastic growth models refer to Lognormal and Pareto.

Lognormal is in fact the statistical distribution proper of 1931 Gibrat model and 1945 Kalecki's, while Pareto is undertaken by 1973 Champernowne's.

Our first result is that the fitting of the statistical model is strongly conditioned by the choice of the size variable.

The tests we have used are: Kolmogorov-Smirnov (KS), k^2_0, k^2, Cramer-Von Mises (CVM) and Anderson-Darling (AD). We have chosen to measure the goodness-of-fit of the distributions by five different tests in order to obtain more robust results. It is worth noting in particular that k^2_0 and k^2 differ from the other three tests because of their working on correlation - and not distance - measures. Finally, as we need to operate also on Pareto distribution, we have excluded onlynormality tests such as Jarque-Bera or Shapiro-Wilk. (For further details on the above tests see Gan, Koehler 1990).

3.2 Total Assets

The distribution that fits better on firm size measured by Total Assets is the lognormal till 1998 (see Table IV): in this period, although Pareto distribution shows a good fit, passing 3 or 4 out of 5 tests, Lognormal distribution performs even better.

Subdividing the entire panel into three parts of equal size according to the tertiles of Total Assets, and considering the median of the growth rate TA(t)/TA(t-1), we observe that in the first two years the rate decreases sharply as far as the third group, while in the other years- with the exception of 1998 - the same rate decreases in the second group and increases in the third (see Table V) .

The above result is not trivial given the reference to Lognormal of Gibrat's and Kalecki's models.

According to Gibrat's the firm size is lognormal and the log rate of growth is the same for all the size ranges of the Sector, while the variance of logarithms of size (logarithmic variance) is increasing. On the contrary, according to Kalecki, the log of the growth rate decreases linearly with respect to the log of size and the logarithmic variance is constant, with a consequent impediment to the increase of concentration.

The pattern of growth rate emerging from our data leads us to conclude that, with respect to Total Assets, Gibrat's law does not hold, in spite of lognormality of size (a similar result about TA emerged in other sectors as well, see Ganugi, Grossi, Gozzi, 2004).

Given lognormality of size and decreasing rate of growth, the Kalecki's model might describe the growth process of the first two years although this result is not stable. In fact:

- the growth rate shows a U-shaped trend in the remaining years ;
- in the last two years, when the growth rate of the third class is remarkably higher than the remaining two, the goodness of fit of Pareto results to be at first equal and than better than lognormal (see Table IV).

As for concentration, we can remark that indexes show very slight changes during the 7 years (see Table VI). It is interesting to note that according to the Gini's index, we have, although slightly, an order of concentration robust in time: Total Assets, Sales, AV.

This is not the case of C4 and C50, where C4 and C50 are the sums of market shares of the top 4 and 50 district firms respectively.

3.3 Sales at Constant Prices.

The fitting of lognormal is not as good as it is on Total Assets (see Table IV). For three years (from 1995 to 1998) however lognormal passes 5 tests out of 5, while its fitting deteriorates sharply in the last three years (when the best model seems to be Pareto).
According to Sales, rates of growth in the three classes are less regular than for Total Assets (see Table VII): in 1995, 1997 and 1998 the third class has the highest rate, or suffers the most contained shrinkage; in 1996 and 1999 it is the opposite, while during 2000 it is the second class that has the highest growth. In the last year, when companies of the first class have the smallest rate of growth, we register a complete refusal of Lognormal and an acceptance of Pareto by all the tests. As regards concentration, all the five indexes show an increase, even if lesser than 1 point (see Table VI).
The high instability of growth rates and of size statistical distribution represents a serious impediment to the possibility of shaping the growth process according to some stochastic model (about statistical regularity of growth see Ganugi *et al*., 2002).

3.4 Constant Price AV

As we have stressed in the previous paragraph, it is AV to shrink.
The goodness-of-fit of Pareto is always excellent in each of the 7 years while that of lognormal is always worse and is totally refused in 1994 and 1997 (see Table IV and Figure 1). It is then Pareto distribution the best representation of the shrinkage on panel data of the district companies.

4. The distributions of the size in the universe.

The enlargement of the panel to the universe involves the following results:

- AV is neatly Paretian;
- not only AV but Sales as well is Paretian;

- Lognormal is confirmed to be the distribution of Total Assets.

Once verified the sensitiveness of the statistical model to the choice of the variables and to the kind of considered companies - panel or universes of companies - the chief aim of this paper remains the analysis of shrinkage. Henceforth we concentrate on the distribution of the size measured in AV and on the statistical model that can describe it.

4.1. Demography.

It is first useful to specify the features of the demography in our universes and our choice to record entries and exits of the firms**:**

- for entry we mean not only the genuine birth of a company but also the formation of new companies as a consequence of transformation of sole-proprietor firms or limited partnership into companies, mergers of pre-existent companies and relocations into the districts of productive units operating in other provinces;
- in the same way in the exits we include not only bankruptcies but also liquidations, mergers and relocations;
- to calculate the yearly rates of entry (exit), we have considered those companies which have submitted Economic Accounts in the considered year for the first time (the last Economics Account in the previous year, disappearing then in the selected year);
- the firm stock in every year does not correspond to the previous year firm stock plus the entries and minus the exits, because a limited number of firms fluctuate over the archive, generating some slight discrepancies.

Entries and exits with the respective percentages calculated on the stocks of companies are reported in Table IX. The Table presents the comparison between the median of AV at Constant Prices for the entries and exits and the first quartile of the distribution of AV.

The relevant aspects of the entries of textile companies are several and here we try to resume them:

1. their entry rate is always considerable;

2. the same rate shows two different levels: the subperiod 1994-1997 characterized by a geometric mean of 12.08 %, and the second subperiod 1998-2000 featured by the remarkably lower mean of 5.38 %.[2]
3. their median size is supplied by Table IX :
   a. every year it lies below the median of the universe;
   b. it is besides smaller than the first quartile for 5 years out of 7;
   c. its changes are of the same sign as the changes of the universe first quartile.
4. the last, but not least, important feature of the entries is their decreasing contribution to the AV of the district: 7% in 1994 and nearly 1% in 2000, with the result of missing the counterbalance of the loss of AV induced by the exits from 1997 to 2000. (see Table X).

As for the exits we can emphasize the following aspects:

1. their pattern is opposite to that of entries, i.e. the exit rate increases from a 0.3% in 1994 to a 4.5% in 2000;
2. their median size is lower than the median of the universe in each year, and below the first quartile in 5 years out of 7;
3. the percentage of AV explained by the exits increases from 0.09% of 1994 to 1.8% of 2000.

4.2 A 'birth and death' stochastic model proposed by J. Steindl.

The model we use is a specific part - the one regarding negative growth - of a more general model formulated by Steindl (1965) entitled "The firm as a population of customers". This model is developed by Steindl considering the stock of customers as a measure of firm size. However, as he has remarked, the model can be interpreted both in terms of Sales and Net Capital.

The hypotheses of the model are:

a) in a small interval of time *Ät* there is a chance *ìÄt +o(Ät)* to lose a client and a chance *ëÄt +o(Ät)* to get a new one, where *ì* and *ë* are two positive constants, and *o(Ät)* vanishes faster

[2] note that if from the universe of companies we shift our attention to the universe of firms, which also includes limited or special partnership and sole-proprietor firms, the rate of entry increases its stability.

Yearly rate of entry on the universe of all firms (chamber of commerce of Prato).							
Year	1994	1995	1996	1997	1998	1999	2000
% entries	4,099	3,551	3,194	3,698	4,081	3,145	3,258

than *(Ät)*. The corresponding probabilities for a stock of *n* customers are *nìÄt +o(Ät)* and *nëÄt +o(Ät)* respectively;

b) the rate of entry is constant;

c) the greater is the firm size the smaller the mortality.

Hypothesis a) says that the probability an existing firm possessing *n* clients grows by acquiring new ones is *nëÄt+o(Ät)* and the probability the same firm shrinks by losing old clients is *nìÄt+o(Ät)*. The constants *ë* and *ì* have then to be interpreted as each firm growth rate and shrinkage rate respectively, consequently the difference *ë–ì* quantifies the variation rate (growth or shrinkage depending on the relationship between *ë* and *ì*) of the firm. Here we are considering the event in which *ë* is lower than *ì*, hence the AV shrinkage proper of the district.

This first hypothesis is thus fundamental from the point of view of growth dynamics because it contemplates that both the possibility of increasing and of shrinking are, for a firm, independent of its size.

"*By its very nature, the model cannot describe the competitive advance or decline of firms in detail except as random changes. We have assumed that ë e ì are equal for firms; consequently there are no differences in competitive strength.*" (Steindl, 1965 p. 47)

Hypothesis b) concerns the rate of entry, i.e. the number of new firms in proportion to the existing population: such rate is considered constant by Steindl (as also by Simon, 1955,1960). It is necessary to remark that for stability of entry rate Steindl assumes that the same rate fluctuates in a narrow range: "*(the model) is drastically simplified and based on the observation that new entries as percentage of existing firms (the birth rate of firms) are comparatively stable. For the post-war era in the USA for example the rate fluctuated between 8 and 10 per cent.* "(Steindl 1965 p. 49).

Through hypothesis c) it is supposed that the firm dies when the population of customers comes to an end and this probability is inversely dependent on the size.

If on one hand, as it is underlined by Steindl, this model does not consider expressly the effects of competitiveness - being the constants *ë* and *ì* equal for all the firms and therefore equal the firm probability of growth - on the other hand hypothesis c) specifies that small firms have higher mortality.

The presence of this asymmetry between small and big firms as regards the probability of death raises the problem of scale economies.

Steindl cares to precise that his model does not assume constant returns to scale: "*the model is by no means based on constant return*" (Steindl, 1965, p. 72).

But in spite of this, large firms enjoy the advantage of a lower probability of death.

The stochastic process of Steindl involves a Pareto distribution in the right tail, which is defined as follows in case of negative growth:

$$P_n = Cn^{-(1-w)}\Gamma(1-w) \qquad (1)$$

where *n* is firm size, Γ is the Gamma function, $C = \left[\sum_{n=0}^{\infty}\left(\frac{l}{m}\right)^{n}\frac{1}{n+1-w}\right]^{-1}$, with $w = \frac{e}{l-m}$, *ë< ì* and e the net rate of entry.

The net rate of entry e is given by the number of new born firms minus that of the dead ones on the total number of firms and quantifies therefore the net relative variation of the number of universe firms.

The *core* of the model of Steindl lies in the composition and in the meaning of the coefficient of the Paretian distribution: in case of growth the Pareto coefficient is exactly equal to the ratio between net entry rate e and growth rate *ë-ì*. In case of shrinkage the coefficient (*1-ù*, see the exponent in equation 1) is given by the difference between 1 and such ratio, and again totally dependent upon the same ratio.

Now in this part of the model, and in our very case, as long as the net entry rate remains positive, such ratio will always be negative and the coefficient of Pareto greater than 1.

At this point two methodological considerations have to be added about the Pareto's distribution:

- this distribution has finite mean only if the parameter assumes values greater than 1 and the same mean increases as the parameter approaches 1;
- a decrease of the parameter signals an increase of concentration as it is shown by its inverse relation with the Gini's ratio of concentration.

In the light of these observations it is evident that as the rate of entry decreases, 1- *ù* approaches progressively 1, with consequent increase of the mean size and of concentration, evidenced by the decreasing of the same coefficient and by the correspondent increase of Gini's ratio.

In the same way, if the coefficient of Pareto departs from 1, a decrease of mean size and of concentration will take place, highlighted by a decrease of Gini's ratio.

It is worth noting that the stabilizing influence of entries is sufficient to create an impediment to the enlargement of size variability and of concentration as well, enlargement proper of the process *à la* Gibrat.

In the next paragraph we analyze to what extent our data are well shaped by this model.

4.3. Goodness of fit of Pareto distribution and Steindl's model to the Universe of companies.

As we have seen the main features of Steindl's model are:

- negative growth;
- constancy of the entry rate;
- decreasing rate of mortality with respect to size;
- Paretian distribution which embodies the inverse link between net entry rate and concentration.

We have now to compare these features of the model with the effective characteristics of our empirical distribution.

- Shrinkage. Although at a lower intensity, shrinkage measured in AV at constant prices is also proper of the universe of the district companies (see Table I). The mean rate is in fact of -0.6%, quite far from the -3.3% of the panel, but however remarkable, considering the strong demography of the district: a mean of 8.5% in the observed period (see Table IX);
- Constancy of entry rate. As we have stressed in paragraph 4.1 (note 2) in the period we analyze, the entire universe of firms - companies, limited partnerships, sole-proprietor firms - is characterized by a constant rate of entry. The subset of companies - which represents our data set - is featured by two subperiods of constant entry rate (see Table IX and paragraph 4.1).
- Mortality and size. A very high turnover emerges among small companies with a consequent high mortality in this dimensional band, accompanied by stability of large companies (see paragraph 4.1 and Table IX);

- Net entry rate and behaving of the distribution. Mean rate of net entry is positive (see Table IX) and the Pareto well shapes constant price AV each year (see Figure 2 for1997): all the five tests supply positive answers (see Table VIII).

  According to Gini's index and the parameter of Pareto, concentration increases slightly (see Table XI).

On the whole, given the AV shrinkage, the Paretian shape of AV and the positive net entry rate, we conclude for the opportunity to model the district firm size distribution by the stochastic model of Steindl, above resumed.

Since, according to the same model, the parameter approaches 1 and concentration increases along with the decrease of net entry rates, we conclude that positive demography is the key to curb the inequality among the district firms.

5. Conclusions

In this paper we have studied firm size distribution with shrinkage - a negative growth rate of AV for a span of years – in the oldest Italian Industrial District. In this area AV at Constant Prices decreases yearly of 3.3% in the panel and of 0.6% in the universes of companies from 1994 to 2000. Given the high net entry rate, the stock of companies is much greater in 2000 (1427 firms) with respect to 1994 (1126 firms, see Table II), 0.6% has to be considered a high mean rate.

Our analysis of the firm size distribution has been developed both on different structures of data - panel and universes of companies - and different variables as Total Assets, Sales, AV.

The choice to shape firm size by different variables arises from the particular "National Accounts" of the district: as a consequence of Industrial Organization, the shrinkage of AV is accompanied by constancy and even increase and Total Assets and Sales.

The structure of data and the choice of variables result not to be neutral with respect to the choice of the statistical model. Total Assets is always Lognormal (except for the last year in the panel). Sales is strongly influenced by the structure of data. AV is always Paretian.

Because of shrinkage, positive entry rate and Paretian firm size, the district can be well described by the model of Steindl (1965).

According to this model the nature of the process is stochastic and the size is Paretian with parameter strictly dependent on the rate of net entry. Within the same model, given a negative rate of growth, a decrease of the entry rate implies a rising degree of concentration.

Notwithstanding the fact that, since the 70's, a distinctive feature of the district has been a non-high degree of inequality among firms, according to Steindl model the lessening of entry rate can seriously alter the structure of the district.

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TABLE I

Index Numbers of Total Assets , Sales and Added Value

	Panel			Universes		
Year	TA	2000 price Sales	2000 price AV	TA	2000 price Sales	2000 price AV
95/94	1,074	1,029	1,164	1,237	1,166	1,326
96/95	1,033	0,943	0,859	1,046	0,955	0,842
97/96	1,105	1,073	1,003	1,089	1,065	1,002
98/97	1,001	0,955	0,855	1,015	0,973	0,881
99/98	1,041	0,969	0,9	1,062	0,986	0,888
2000/99	1,101	1,089	1,059	1,095	1,102	1,103
geometric mean	1,059	1,008	0,967	1,088	1,039	0,994

TABLE II

Numbers of companies considered in the different groups of firms by different variables. The AV colu mn is subdivided into positive and any (positive, negative or null) AV

	TA		2000 price Sales		2000 price AV	
Year	Panel	Universes	Panel	Universes	Panel	Universes
					>0; all	>0; all
1994	866	1137	866	1137	788; 866	1106;1137
1995	866	1257	866	1257	788; 866	1235;1257
1996	866	1421	866	1421	788; 866	1355;1421
1997	866	1427	866	1427	788; 866	1343;1427
1998	866	1499	866	1499	788; 866	1393;1499
1999	866	1509	866	1509	788; 866	1380;1509
2000	866	1535	866	1535	788; 866	1427;1535

TABLE III

Total amounts (thousands of euro) of the three variables according to the two established groups

	Panel			Universes		
Year	TA	2000 price Sales	2000 price AV	TA	2000 price Sales	2000 price AV
1994	2.119.095,61	3.396.816,30	877.902,01	2.718.838,35	4.285.077,86	1.077.418,57
1995	2.276.469,79	3.496.540,29	1.022.103,93	3.363.747,67	4.998.168,14	1.428.285,14
1996	2.351.423,58	3.296.926,42	878.235,48	3.518.110,33	4.775.206,31	1.203.293,25
1997	2.597.775,32	3.537.468,72	880.722,81	3.829.634,25	5.083.679,95	1.205.808,57
1998	2.599.320,19	3.378.388,59	752.839,66	3.888.200,48	4.948.827,49	1.061.859,83
1999	2.706.329,40	3.274.875,66	677.866,83	4.127.487,76	4.877.325,55	943.408,72
2000	2.980.878,85	3.565.398,48	717.912,29	4.518.818,16	5.377.221,50	1.040.653,14

TABLE IV

Goodness of fit tests results for Lognormal and Pareto distribution (panel)

panel	n. of tests (max 5) which do not refuse the distribution (Pareto or Lognormal) on the indicated variable, at the 5% level.					
	TA		2000 price Sales		2000 price AV(>0)	
Year	Pareto	Lognormal	Pareto	Lognormal	Pareto	Lognormal
1994	4	5	4	3	5	0
1995	3	5	4	5	5	1
1996	4	5	4	5	5	3
1997	4	5	4	5	5	0
1998	4	5	3	1	5	4
1999	4	4	4	3	5	4
2000	5	2	5	0	5	2

TABLE V

Growth rate (median) for TA on three firms groups determined by tertiles (panel)

TA	Year	Small	Medium	Large
growth rates median	1995/1994	9,280	3,434	2,304
	1996/1995	5,723	2,890	1,927
	1997/1996	6,676	5,762	7,356
	1998/1997	-0,921	-2,709	-2,175
	1999/1998	0,965	0,296	2,466
	2000/1999	4,034	3,915	6,810

TABLE VI

Concentration indexes for the three variables (Panel). C4 and C50 are the sums of market shares of the top 4 and 50 district firms respectively

Year	TA			2000 price sales			2000 price AV		
	Gini	C4	C50	Gini	C4	C50	Gini AV>0	C4	C50
1994	0,641	0,052	0,358	0,625	0,045	0,328	0,608	0,056	0,335
1995	0,637	0,059	0,359	0,622	0,046	0,325	0,603	0,058	0,327
1996	0,627	0,059	0,343	0,608	0,044	0,309	0,592	0,056	0,322
1997	0,629	0,060	0,346	0,613	0,046	0,316	0,612	0,061	0,341
1998	0,630	0,059	0,346	0,625	0,048	0,324	0,624	0,061	0,363
1999	0,630	0,057	0,345	0,630	0,047	0,327	0,622	0,059	0,368
2000	0,641	0,055	0,354	0,634	0,051	0,329	0,609	0,059	0,357

TABLE VII

Growth rate median by Sales (2000 prices) on three firms groups determined by tertiles (panel)

2000 price Sales	Year	Small	Medium	Large
Growth rates median	1995/1994	-0,680	-2,740	-0,035
	1996/1995	0,405	-1,332	-6,763
	1997/1996	6,386	4,404	7,028
	1998/1997	-7,705	-8,015	-6,497
	1999/1998	-2,971	-2,817	-4,371
	2000/1999	6,194	8,962	6,743

TABLE VIII

Goodness of fit tests results for Lognormal and Pareto distribution (universes)

Universes	n. of tests (max 5) which do not refuse the distribution (Pareto or Lognormal) on the indicated variable, at the 5% level					
	TA		2000 price Sales		2000 price AV(>0)	
Year	Pareto	Lognormal	Pareto	Lognormal	Pareto	Lognormal
1994	3	5	4	0	5	0
1995	4	5	4	3	5	0
1996	4	5	3	0	5	0
1997	4	5	5	0	5	0
1998	4	5	3	0	5	0
1999	4	5	4	0	5	0
2000	4	5	4	0	5	0

TABLE IX

Demography in terms of numbers of firms, percentage rate on the existing population and median size measured by AV

Year	Entries			Universes			Exits		
	n.of firms	%	Median	n.of firms	1 quart	Median	Median	%	n.of firms
1994	149	13,105	167,588	1137	145,465	469,01	26,036	0,352	4
1995	156	12,411	199,406	1257	187,345	506,277	120,676	2,466	31
1996	151	10,626	73,653	1421	117,713	372,608	1777,631	0,493	7
1997	176	12,334	71,121	1427	104,827	361,594	77,005	7,919	113
1998	70	4,670	49,682	1499	78,877	281,588	81,57	5,203	78
1999	83	5,500	25,666	1509	67,176	249	3,668	3,844	58
2000	93	6,059	39,542	1535	85,66	296,863	24,184	4,560	70
geom m	-	8,553	-	-	-	-	-	2,271	-
Mean	125	-	-	1396	-	-	-	-	52

TABLE X

Total AV percentage explained by entries and exits

Year	Entries			Exits		
	n.of firms	AV	Total AV %	n.of firms	AV	Total AV %
1994	149	75851,988	7,040	4	995,727	0,092
1995	156	126960,934	8,889	31	8338,402	0,584
1996	151	29531,960	2,454	7	15210,35	1,264
1997	176	49449,433	4,657	113	44791,491	4,218
1998	70	14036,462	1,164	78	40836,531	3,387
1999	83	10521,038	1,115	58	12237,917	1,297
2000	93	12331,835	1,185	70	18627,165	1,790

TABLE XI

Concentration indexes based on constant price AV, universe firms

Year	Gini AV>0	C4	C50	Pareto coeff
1994	0,624	0,050	0,298	2,31
1995	0,636	0,054	0,295	2,15
1996	0,636	0,050	0,280	2,13
1997	0,648	0,050	0,292	1,93
1998	0,656	0,046	0,296	1,82
1999	0,654	0,045	0,299	1,82
2000	0,642	0,047	0,284	2,05

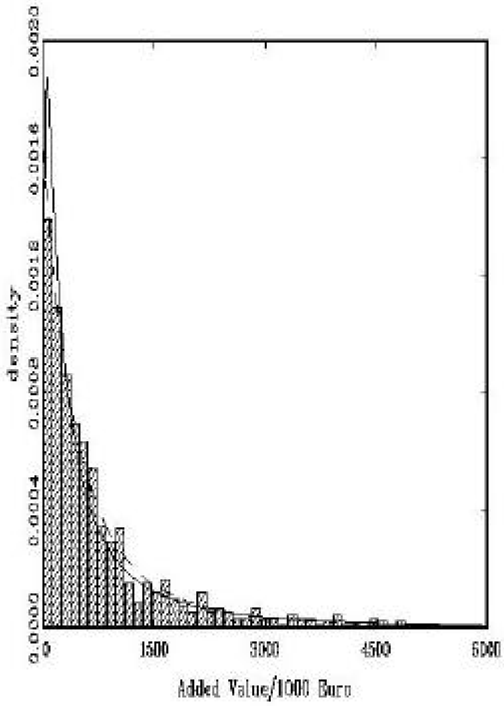

Figure 1: fitting of Pareto distribution (dotted line) and of Lognormal distribution (solid line) to constant price AV distribution (panel, 1997)

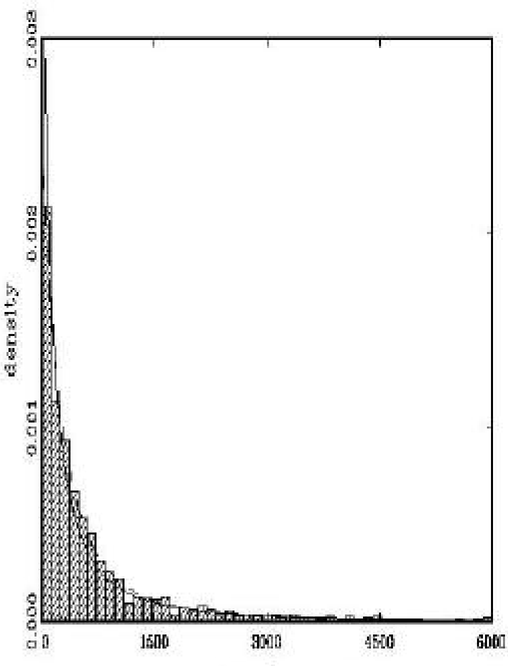

Figure 2:fitting of Pareto distribution (dotted line) and of Lognormal distribution (solid line) to constant price AV distribution (universe, 1997)