PATTERNS OF NEW FIRM SURVIVAL AND GROWTH IN THE ITALIAN FINANCIAL INTERMEDIATION INDUSTRY*

by

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Abstract

This paper studies the post-entry evolution of two cohorts of entrants in the Italian financial intermediation industry. Using a comprehensive longitudinal database, it analyses the link between duration and growth of each newborn firm and its start-up size, as well as a series of industry-specific characteristics. It emerges that not only did regulatory reform in 1990 result in a process of branch proliferation and industry consolidation, but it also set in motion a pre-entry selection mechanism and rendered life after entry for newborn firms more difficult. Conversely, before completion of the regulatory reform, in 1989, entry was possible even for very small firms, and larger new entrants were able to resist longer periods of bad performance than their smaller counterparts before being forced to exit the market, and this independently of the features of spatial and structural competition.

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I. INTRODUCTION

Although the longevity of entrants has been observed to vary systematically across industries (Geroski, 1991, 1995; Audretsch, 1995), the recent literature on post-entry expansion has mostly focused on manufacturing, paying scant attention to the financial sector[1]. Nevertheless, the maturation process of new firms in the financial intermediation industry deserves closer consideration; especially so in Europe, where reforms in the regulatory system (cf. Dermine, 1990; De Cecco, 1993) have in most countries brought about a branching and restructuring process initially punctuated by the entry of non-banking intermediaries competing with banks in rapidly growing market niches (Barros, 1995; Santarelli, 1995). In Italy, such institutions have assumed an even wider role than in the other EC countries, in particular during the 1980s, when, entering the market as independent firms, they represented an alternative to the initial inertia of banks in adjusting their behavior to the overall process of financial innovation. Since the beginning of the 1990s their market share in consumer credit, leasing, factoring, and the management of investment funds has instead been eroded by banking groups pursuing an aggressive branching and diversification strategy.

The purpose of this paper is to analyze the post-entry performance of financial intermediaries of both banking and, mostly, non-banking type in Italy *vis-à-vis* the regulatory reforms of 1990. By using a comprehensive longitudinal database tracking their variation in employment at monthly intervals, the paper will compare the duration and growth of two cohorts of entrants: the first preceding (1989) and the second following (1990) removal of constraints on branching and entry. Section II surveys the most important regulatory reforms introduced in Italy over the last two decades. Section III summarizes the raw data on the two cohorts of entrants, while section IV presents an econometric analysis of new-firm duration. Section V contains a formal test of Gibrat's Law and, finally, in section VI some concluding remarks are made.

[1] With the main exceptions, to my knowledge, of the studies by Spiller and Favaro (1984), Amel and Liang (1990), Barros (1995), and Tschoegl (1996) on Uruguayan, US, Portuguese, and Japanese banking respectively. As regards application of Gibrat's Law to the banks, see Tschoegl (1983), Saunders and Walter (1994), and Vander Vennet (1998). In their analysis of the post-entry performance of UK companies also Dunne and

II. CHANGING REGULATORY ENVIRONMENT AND RESTRUCTURING IN THE ITALIAN FINANCIAL INTERMEDIATION INDUSTRY

Between 1936 - with the completion, by means of the "Banking Law", of a process of *regulation* begun ten years earlier (Toniolo, 1978) - and 1990 - with the implementation of the EC second banking directive[2] - branch expansion by incumbent banks and entry were subject in Italy to a wide range of restrictions. A more permissive attitude was instead adopted towards non-banking intermediaries.

The strict regulation of the 1926-1990 period shaped a financial intermediation industry in which *a)* the scope for competition was rather limited, and *b)* under-branching and the uneven distribution of branches across different areas of the country were salient structural features (Cassese, 1984). Before the implementation of the EC directive Italian regulation was therefore an example of what Breton and Wintrobe (1978, p. 210) define a system "which facilitates collusion among the commercial banks in exchange for their compliance with the goal of the central banks". The transition to a soft-regulated system and the gradual regulatory reform of the 1980s changed this pattern. It was in particular the implementation of EC directive no. 780 of 1977 which – through completion of branching de-regulation under the [3] and the liberalization of branching in March 1990 – broke the previous arrangement and permitted the opening of a great number of branches in marginal (mostly Southern) regions and gave rise to a significant consolidation process. As regards entry, most of the remaining restrictions were removed after 15 December 1989 in fulfillment of Law no. 350 of 1985, which subjected the creation of new banks only to possession of such requisites as a minimum amount of capital, the proven professionalism and trustworthiness of the capital holders, and required the submission of a detailed business plan to monetary authorities.

The impact of the regulatory reform is summarized in Table 1, which highlights the significant increase in the total number of branches (107 per cent over the 1980-1997 period),

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Hughes (1994) consider post-entry expansion in the financial sector, although they do so in a broad sense. On branch expansion by incumbent banks in Italy cf. Pisani (1993); De Bonis *et al*. (1994); Pittaluga (1994).

[2] Cf. Azzolini and Messori, 1995; Bruni, 1990; De Cecco and Ferri, 1994; Galli and Onado (1990); Passacantando, 1996; Sarcinelli, 1996.

[3] Plans I (1978) and II (1982) were designed to promote the opening of new branches and the re-location of existing ones (1,522 in total) in order to foster competition among incumbent banks and to reduce market segmentation, whereas Plan III (1986) sought to stimulate leading banks to open new branches in the Southern regions.

the simultaneous contraction in that of banks (-12.5 per cent)[4], and the growth in the average number of branches per bank (from 14 units in 1989 to 17 in 1990, corresponding to a 16 per cent growth rate, with a 137 per cent growth rate over the 1980-1997 period). Remarkably, in the first half of the 1990s the seven leading Italian banking groups increased their total number of branches by 4,252 units (Bank of Italy, 1996), and extended their control over more than 35 per cent of the domestic market in terms of number of branches. The simultaneous increase in the number of banks with more than 10 branches (10 per cent between 1989 and 1993) confirms that the regulatory reform set a consolidation process in motion**,** mostly via mergers and acquisitions**,** which rapidly reduced the room for smaller banks.

- Table 1 about here -

Regulation of entry and expansion by non-banking intermediaries has been traditionally less rigid, at least before the regulatory reform completed in 1990. This favored rapid market growth during the 1980s, when such firms represented an alternative to banks. Particularly in those Southern regions characterized by credit constraints and an underdeveloped banking structure (cf. Bank of Italy, 1989). In that period, the only important regulatory reform that came into force introduced investment funds, the management of which has since been subject to possession of the usual requisites of professionality, as well as the availability of a minimum amount of capital.

Besides the de-regulation depicted above, relaxation of restrictions on the joint issue of short and long-term credit by banks in February 1990, and the "New Banking Act" (no. 385 of 1993) further changed the structure of the Italian financial intermediation industry, indirectly hampering expansion by independent intermediaries of non-banking type. In effect, the dualistic market structure composed of a relatively stable share of firms (banks in the strict sense) and a fringe of firms operating in market niches (other financial intermediaries) characterized by high growth rates, which partly typified the industry until the end of the 1980s, disappeared, with banks entering (directly or with their subsidiaries) the once marginal portion of the market. It is likely that this consolidation process created a strong deterrent against entry by those potential entrants of non-banking type which preferred to adopt an entry strategy of the "try and see" type during the early stages of development of the financial intermediation industry in the 1980s.

[4] Which was also due to a wave of mergers and takeovers encouraged by the fiscal incentives granted under

In a more homogeneous market environment, with only a few clusters of firms in close competition, the high entry rates that typify the early stages of the product life-cycle tend to disappear as an industry reaches the maturity stage (Gort and Klepper, 1982). Accordingly, new, independent non-banking intermediaries probably face increasing competition from incumbent banks pursuing an aggressive diversification strategy in the markets for consumer credit, leasing, factoring, and the management of investment funds. As Winton (1995) has demonstrated theoretically, in a market characterized by free entry, portfolio diversification - which increases with bank size (Boyd and Runkle, 1993) – helps (large) banks to dominate either direct or indirect (leasing, factoring, etc.) lending, thereby encouraging their rivals of the non-banking type to exit from the industry. Comparison between the post-entry behaviors of two cohorts of entrants, which started business respectively in the last year before (1989) and the first year after (1990) completion of entry and branching liberalization, may provide empirical evidence in support of this hypothesis[5].

III. ENTRY, SURVIVAL, AND GROWTH: A DESCRIPTIVE ANALYSIS

The longitudinal database used here has been taken from the National Institute for Social Security (INPS). It contains all new firms in the industry[6], with at least one paid employee, born during each month in 1989 and 1990, and tracks their post-entry performance (employment[7]) at monthly intervals until December 1994 and December 1995 respectively.

Law no. 218 of February 1990.

[5] The use of cohorts from consecutive years renders the comparison of post-entry behavior somewhat questionable. Unfortunately, individual tracks of the kind used here have not been released by INPS for any other cohorts before 1989, whereas Law no. 675 of 1996 on the confidentiality of personal and firm-level information has prohibited disclosure of these kinds of data since it came into force.

[6] The original file also included 14 purported insurance firms (9 in the 1989 cohort, 5 in the 1990 one). However, these proved to be local agencies (units) of incumbent companies rather than independent firms. For this reason, and because in Italy insurance companies are mostly engaged in activities (e.g. third party insurance) not directly related to financial intermediation, I decided to exclude them from the analysis.

[7] The use of number of employees, like any other measure of firm size (assets, sales, market value, value added, etc.), has several shortcomings. For example, since fractions of employees are usually not recorded in firm level data, it creates problems when measuring the size of firms in the smallest size classes. Besides, although the size distributions of business firms have in most industries similar shapes irrespective of the measure used, the different measures are not equally interchangeable (Smith, Boyes and Peseau, 1975). In the case of the Italian financial intermediation industry, in which employment is likely to shrink substantially over the next few years, the number of employees is a measure of firm size which proves even more inadequate than for other industries. These problems notwithstanding, I tend to agree with Tschoegl (1996), who takes the number of employees as the most suitable measure of the size of the firm in investigations of Gibrat's Law, and, in

The database covers 110 (18 banks) firms for the first period and 72 (18 banks) for the second one, with information on the average number of workers employed in each month, and the sub-sector of activity**.** Among entrants of the banking type, 1 in the first cohort and 6 (5 of which survive to the end of the period) in the second one are foreign[8]. The other 92 entrants in 1989 are rather heterogeneous: 5 specialize in leasing, 2 in factoring, 7 are foreign exchange agents, 3 are stockbrokers, whereas the remaining 73 are financial intermediaries in the broad sense (not otherwise specified). As far as the 54 non-banking intermediaries in the 1990 cohorts are concerned, it was possible to identify 2 leasing firms, 1 firm specializing in factoring, 9 foreign exchange agents, 6 stockbrokers, and 36 financial intermediaries not otherwise specified.

Since firms are identified according to their VAT registration number, the database forestalls problems arising from the distinction between "true" entrants and movers from other industries (e.g. producer services, insurance, etc.) and/or geographical areas in the country[9]. As regards exits, which can be consequent upon either failure or take-over, the database shows different patterns of behavior for banking and non-banking intermediaries. Among banks, in two out of three cases of exit identified in the file (all in the 1990 cohort), cancellation from the INPS archives indicates that the firm (in both cases a rural bank) has been taken over[10]. Conversely, in the case of non-banking intermediaries none of the firms which exited before the end of the period had been involved in take-overs or mergers.

I applied a cleaning procedure to the original INPS file, in order to identify entry and failure times correctly and to detect inconsistencies in individual tracks due to administrative reasons, and cancellations due to firm transfers. This cleaning procedure reduced the total number of firms included in the database from 229 to 182[11].

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general, with Hart and Oulton (1996), who recognize that the choice of measure is ultimately governed by the data available.

[8] Representative offices of foreign banks (1 in 1989 and 5 in 1990) have been excluded from the analysis, since by definition they are not involved in financial intermediation activities of any kind.

[9] In this connection, foreign-owned banks establishing subsidiaries in the Italian market are taken to be "true" entrants, although irrespective of their start-up size they are not small in the same sense as totally new firms.

[10] The third case of exit is that of a foreign bank which remains in the market for less than three years with 2 paid employees.

[11] This 20.52% reduction in the total number of firms included in the database is consistent with the 16.89% reduction resulting from application of the same cleaning procedure to the INPS file on Italian manufacturing used by Audretsch *et al*. (1998). The structure of the INPS file facilitates the cleaning procedure. In effect, when a new firm is registered as "active" in the file an entry can be identified, while a firm cancellation denotes that it stopped paying national security fees. Sometimes - for administrative reasons - cancellation is

Information on entry and survival, as well as the hazard rates computed for the two cohorts of single firms, are summarized in Table 2 and in Figures 1-4, which report the slopes of the *empirical* survival and hazard functions computed by the Kaplan and Meier (1958) product limit estimator. In general, entrants face a high risk of failure, since for both cohorts less than half of new firms survived until the end of the *follow-up* period[12].

- Table 2 about here –

The hazard rate, defined as the risk of failure in each year subsequent to start-up, on the condition that the firm had survived until the previous year, increases markedly during the first three years for both cohorts and tends to decrease non-monotonically afterwards for the 1990 cohort, whereas there is a significant increase in the five year hazard rate for the 1989 cohort. Application of a t-test for paired samples shows the means of the hazard rates for the two cohorts to be statistically different at the 95% significance level.

The six-year hazard rate is 3.85 percent for the first cohort and 0 percent for the second one. For both cohorts there therefore emerges from Figures 3 and 4 – consistently with the results of previous studies carried out for different industries/countries - a distribution for which the likelihood of failure at time *t*, conditional upon duration up to time *t*, is initially increasing (positive duration dependence) and then decreasing (negative duration dependence) in *t*. In the present case, the (very low or 0) value of the six-year hazard rate suggests that, at the end of the follow-up period, surviving firms in both cohorts have become part of the relatively stable share of firms with a low likelihood of "unexpected" exit.

As regards the evolution of the total number of employees in the new firms, Table 2 shows that the decline of employment in each cohort due to exiting firms is largely offset by the growth of survivors in the same cohort: the total number of employees grew by 20.20 percent for the 1989 cohort, and 24.32 percent for the 1990 one. However, inspection of the growth patterns in Table 3 shows that those of surviving entrants are rather heterogeneous. About 15 percent of all survivors in the first cohort, and 5 percent in the second one, did not grow at all,

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preceded by a period during which the firm is logged as "suspended". The present paper considers suspended firms of this kind to have exited from the market at the moment (month) of their transition from the status of "active" to that of "suspended". Of course, firms which have suspended operations only temporarily (for one or a few months) after start-up and are "active" at the end of the relevant period have been considered to have survived (the same procedure is followed in Santarelli, 1998).

[12] The follow-up period is the given interval between t = 1 and t = T during which N firms are observed. If a firm exits the market at any given time between $1 \leq t \leq T$ its death (*failure time*) is correctly reported; otherwise the only possible finding is that its duration exceeds a given threshold corresponding to T.

but had fewer employees respectively in 1994 and 1995 than at start-up time. Conversely, more than 55 percent (cohort 1989) and 51 percent (cohort 1990) of all survivors more than doubled in size during the six years following start-up, whereas 37 percent in the first cohort and 27 percent in the second one grew more than threefold.

- Table 3 about here -

Significantly, (Table 2) the total number of entrants diminishes by nearly 35 percent between 1989 and 1990, and the average start-up size of new firms in 1989 is less than half that in 1990[13]. This suggests that in 1989**,** before the regulatory reform**,** the industry was still experiencing a process of entry of the "try and see" type – one in which sunk costs are presumably low – whereas in 1990, after the introduction of significant regulatory changes**,** it was characterized by a pre-entry selection process which selected only firms with a more developed organizational structure and a larger start-up size.

- figures 1, 2, 3, 4 about here -

According to this preliminary analysis of post-entry performance, although one cannot exclude *a* priori a prevalent positive start-up size/survival nexus and a prevalent negative start-up size/growth nexus, regulatory reform in 1990 is likely to have affected the nature of entrants in the industry. However, even though larger scale entry induced by regulatory reform renders the nature of 1990 entrants different from that of 1989 ones, it cannot be excluded *a priori* that the likelihood of survival and post-entry growth depends on start-up size for both cohorts. This would entail that the likelihood of survival is positively affected by start-up size, and/or that post-entry growth rates of surviving firms are negatively related to their initial size (Audretsch *et al*., 1998), with smaller new firms being less likely to survive unless they grow faster than larger ones. At this point, further investigation of the start-up size/industry structure/survival relationship, as conducted in section IV, and the empirical test of Gibrat's Law of Proportionate Effect carried out in section V will shed clearer light on these matters.

IV. FIRM SIZE, SPATIAL COMPETITION, INDUSTRY CONCENTRATION, AND THE LONGEVITY OF ENTRANTS

[13] Although higher values of the standard deviation signal a more skewed distribution in 1990.

Since the INPS database tracks post-entry performance of new firms only to the end of their sixth year of life, when not all of them have failed, the data employed for the present analysis are characterized by (right) censoring. Accordingly, the variable of interest is the length of time that elapses from start-up until the measurement is taken. This implies that, since duration is measured in terms of total months survived until the end of the period for which data were forthcoming, firms which entered the market at the end of the initial year and survived until the end of the follow-up period remained in the market for a shorter time than did firms which started at the very beginning of the initial year and exited a few months before the end of the follow-up period. In the presence of this censored distribution, conventional econometric OLS procedures are ill suited to duration analysis, because they would produce biased and inconsistent estimates (cf. Cox and Oakes, 1984). With regard to the slope of the hazard functions reported in figures 3 and 4 above, estimation of a Cox Proportional Hazards Model (PHM) seems therefore to be the most appropriate procedure (Cox, 1972). In this connection the hazard function *h(t)*, depicting instantaneous escape from operations, is

$$h(t) = \lim_{\Delta t \to 0^+} \frac{P(t \le T \le t + \Delta t \mid T \ge t)}{\Delta t} = \frac{f(t)}{S(t)} \qquad (1)$$

where *T* denotes the firm's life duration, and *f(t)* and *S(t)* represent the probability density function and the survival function respectively. For the purpose of investigating the influence of a series of covariates on the probability of survival, the PHM is the most common specification of a multivariate model of the life duration of firms, representable as

$$h(t) = e^{-\beta' x t} h_0(t) \qquad (2)$$

where *h(t)* denotes the hazard rate for each newborn firm, $h_0(t)$ is the baseline hazard function, $\mathbf{X}$ represents a vector of covariates, and β is a vector of parameters. The main advantage of Cox's partial likelihood estimator is that it provides a method for estimating β without requiring estimation of $h_0(t)$. In this model, since the baseline hazard function equals the hazard function for $\mathbf{X} = 0$, the effect of a unit change in a covariate is a constant proportional change in the hazard rate.

For the purposes of the present paper, the PHM has been employed to control for firm-specific and industry-specific characteristics which are likely to affect the duration of new firms in each cohort. As regards the most important observable characteristic specific to the firm, its START-UP SIZE, this is measured by the total number of paid employees in the first month of activity. This variable is taken to be a major factor in a higher likelihood of survival, on the assumption that those entrepreneurs who have easier access to better information and are less finance-constrained are more likely to choose a larger initial size. Thus, a continuous variable for start-up size that correlates positively with survival is consistent with a Gibrat process such that for any given mean and variance of growth rates the expected first passage time to failure correlates negatively with the distance of the starting point from zero.

A second firm-specific characteristic is denoted by a dummy variable (CRED) which captures the nature of the intermediaries comprised in the database: it is equal to 1 for banking firms in the strict sense, and equal to 0 for non-banking firms specialized in consumer credit, leasing, factoring, the management of investment funds, etc. This variable allows one to take account of the behavior of banking firms, which not only display a higher likelihood of survival than their non-banking counterparts, but (as already explained in section 3 above) when exiting the market in two cases out of three do so because they have been taken over by incumbents[14].

The two industry-specific characteristics identify local-market/industry features: the ratio of resident population to the total number of branches within each local (municipal level) market in June 1994 (BRANCHPOP) is an index of spatial competition commonly employed in analysis of the financial intermediation industry; the value of the Herfindhal index (HERFINDHAL) measured in terms of number of branches is instead taken as a proxy for structural competition (consolidation) in the industry (municipal level) in June 1994[15]. BRANCHPOP is an inverse measure of density of branches in the market, and it is expected to influence the hazard rate negatively (i. e. the likelihood of duration positively), since a high value of this variable denotes low spatial competition and the inadequacy of the total services

[14] In this case, a possible alternative is estimation for each year of two separate hazard equations for the two types of firms (banks and non-banking intermediaries). However, in order to obtain an acceptable sample size (as already specified, only 18 entrants in each cohort are of the banking type), I preferred to include a dummy variable to account for differences.

[15] The original data are taken from Corbellini (1995), and relate to individual local (municipal level) markets. They refer only to 1994 because it was not possible to obtain the municipal level data needed to construct the same variables in relation to the other years during which each cohort of new entrants was observed.

supplied by banks with respect to the potential requirements of the resident population in each municipal market. HERFINDHAL is computed with the usual formula

$$H_j = \sum_{i=1}^{m} (S_{ij})^2 \qquad (3)$$

in which j = 1, 2, ..., n denotes the *n* local (municipal level) markets, i = 1, 2, ..., m stands for the *m* banks in each local market, and S represents the share of total branches by each bank. Accordingly, a high value of the HERFINDHAL concentration index may positively influence the hazard rate (i.e. negatively influences the likelihood of survival), because it denotes the presence of a few large-scale banks in *j*, and these are likely to impose barriers to entry and survival for newborn firms in the local (municipal level) market.

As was expected, the results obtained from estimating the PHM, which are presented in Table 4, suggest a different behavior for the two cohorts of entrants. In the first column of Table 4 the model is estimated with account taken of the direct effect of firms' start-up size on survival as regards the 1989 cohort. The negative and significant coefficient of the initial size variable confirms that larger units have lower risks of early exit. Estimation of the complete model in column II, besides confirming the influence of start-up size, shows that, as already known from preliminary inspection of data (cf. section III above), banking firms in a strict sense display a much higher likelihood of survival. Conversely, there is no evidence that the (low) number of resident population per branch and the level of industry concentration significantly affect the hazard rate. The same interpretation arises from column III, in which the direct effect of firms' initial size is ignored.

The picture changes significantly if one focuses on the 1990 cohort. The impact of initial size on the instantaneous failure rate is not as marked as in the case of the 1989 cohort, since the estimated coefficient of the START-UP SIZE variable in column IV is much lower than that obtained in the previous case (column I) and significant only at the 95 per cent level of confidence. Estimation of the complete model in column V shows that also a low value of BRANCHPOP, besides CRED, affects the hazard rate, whereupon the effect of firms' start-up size becomes even less marked. Finally, when START-UP SIZE is excluded from the estimated model (column VI), both BRANCHPOP and HERFINDHAL exhibit a positive

coefficient. Thus, in local markets in which the level of branch density is higher and large-scale banks have a larger market share the likelihood of survival for new entrants tends to be lower[16].

- Table 4 about here -

Comparison of the results obtained for the two cohorts with those of the descriptive analysis in section III suggests that, the overlap in the periods under consideration notwithstanding, there is a significant difference between the firms founded in anticipation of deregulation and those founded after deregulation has started and its first impact has made itself felt[17]. In particular, it turns out *a)* that post-entry performance is shaped by firm-specific characteristics; and *b)* that after 1990 branch proliferation and industry consolidation acted as entry deterring features associated with a more difficult life after entry for newborn firms. Thus, although newborn firms of the non-banking type offered consumer credit, leasing, and factoring services in 1989 as well as in 1990, they were likely to do so in different portions of the market: whereas those in 1989 served mostly the marginal fringe of the market, those in 1990 entered its more developed portion, in which they faced competition from banking groups undertaking diversification strategies. Even though no information is forthcoming from the database concerning the customers of each newborn firm, the fact that the average start-up size of entrants more than doubled between 1989 and 1990 (cf. Table 2 above) is consistent with this interpretation. Accordingly, it is reasonable to conclude that in 1990 non-banking intermediaries with an average start-up size of more than seven paid employees (plus family workers) *did* possess the organizational structure required to do business in the more developed portion of the market. In the competitive environment created in that year by branching and the liberalization of new bank formation, incumbents protected existing rents by increasing efficiency and introducing organizational innovations. Accordingly, larger scale entry, which signals greater *a priori* expectations of success[18], does not always and necessarily render new firms immune to instantaneous probability of exit, because incumbents have more room to react, which makes life harder for new entrants.

[16] When foreign banks are omitted from the regressions, the results do not change significantly.

[17] Although it remains true that differences in estimation results between 1989 and 1990 may be due to differences in the percentage of entrants that are banks and in the type of non-bank entrants rather than to regulatory changes.

[18] In which case several periods of bad performance will be needed for *ex ante* positive profit expectations to disappear and force newborn firms to exit the market (Frank, 1988; Mata *et al*., 1995)

V. AN EMPIRICAL TEST OF GIBRAT'S LAW

While there are various interpretations of Gibrat's Law of Proportionate Effect (Gibrat, 1931; cf. Chesher, 1979; Sutton, 1997; Geroski *et al*., 1997), the most common view is that firm's growth is independent of firm's size, or that the "probability of a given proportionate change in size during a specified period is the same for all firms in a given industry - regardless of their size at the beginning of the period" (Mansfield, 1962, pp. 1030-1031). However, "size at the beginning of the period" can be measured in three different ways:

1) start-up size; in this case the law should be taken to hold for both *all* the newborn firms included in the cohort and firms that have survived over the entire period alone (Hart and Prais, 1956);
2) "previous size"; denoting established firms size at a certain point in time (Mansfield, 1962). In this case the law should indifferently apply to all firms and those surviving to the end of the period.
3) "previous size" of firms large enough to exceed the minimum efficient scale (MES) level of output (Simon and Bonini, 1958; Hall, 1987); with the law applying to either newborn or already established firms.

Independently of assumptions concerning "size at the beginning of the period", one may represent Gibrat's Law as a first order Galton-Markov process allowing previous size, $y_i(t - 1)$, to influence current size $y_i(t)$ (cf. Dunne and Hughes, 1994):

$$y_i(t) = \beta y_i(t - 1) + \varepsilon_i(t) \qquad (4)$$

Log transformation and adaptation of equation (4) to the INPS data used in the present paper (with $y_i(t - 1) = y_i(\text{Start-up size}) = y_i(t - 6)$) yields the testable specification representing the compounded growth rate

$$\log S_{it} = \beta_0 + \beta_1 \log S_{it-6} + \varepsilon_i \qquad (5)$$

where S_{it} is the size of the ith firm at time t (December 1994 for surviving firms in the 1989 cohort, and December 1995 for those in the 1990 one), S_{it-6} the start-up size of the ith firm (i.e. size during its first month of activity in 1989 for the first cohort and in 1990 for the second one), and ε is a random variable distributed independently of S_{it-6}. The slope coefficient of the above model can be estimated by a cross-section regression across *i*, with a value of $\beta_1 < 1$ showing that employment grew in small firms more quickly than in large ones during the follow-up period, whereas the opposite will be true for $\beta_1 > 1$ (cf. Hart and Oulton, 1996). Accordingly, Gibrat's Law will be confirmed if and only if β_1 is not statistically different from 1. Using the database described in section III, I therefore tested the first version of Gibrat's Law outlined above. The regression analysis consists of a series of within-industry cross-sections in which the number of firms in the industry represents the relevant observations.

A viable alternative approach consists in estimating a Gibrat equation annually by regressing the percentage change over a period on the starting size. In this connection, Tschoegl (1996) - in his study on managerial (dis)economies of scale in Japanese regional banks – makes use of thirty-nine annual observations to estimate a logarithmic and a percentage model, each of which incorporates the possibility of serial correlation of growth rates in the equation.

However, due to the shortness (6 years) of the period for which Italian data were forthcoming, I preferred OLS estimation of the log-log lagged dependent variable model presented in equation (5) for *all* and *surviving* firms in each cohort. Since taking into account firms that exited from the industry raises the problem of the logarithmic transformation of a final size which is equal to 0, I augmented the original series by 0.1 for all firms (failed and unfailed alike).

Regrettably, it was not possible to test the second and the third interpretations of Gibrat's Law discussed above, owing *a)* to the availability of data regarding only the growth rates of new-born firms and not those of incumbent ones as well; and *b)* to the impossibility of correctly identifying the MES level of output for the financial intermediation industry, since the data available concerned only firms born in 1989 and 1990, with no information on the other participants in the industry. Table 5 reports the regression results from estimating equation (5) in relation to the first interpretation.

- Table 5 about here -

Based on the Wald Test for the hypothesis that $\beta_1 = 1$, the two estimates conducted for *all* firms provide empirical evidence that is consistent with Gibrat's Law. In effect, in this case the behavior of the very small and the larger firms is *not* significantly different, since the stability of coefficients cannot be rejected. Estimates conducted only for *surviving* firms lead instead to rejection of Gibrat's Law for both cohorts. In this case the behavior of smaller and larger firms is significantly different: the stability of coefficients is indeed rejected. However, the null hypothesis $\beta_1 = 1$ can be rejected at the 99 per cent level of confidence for the 1989 cohort, but only at the 90 per cent level for the 1990 one. This result is consistent with what emerged from estimation of the Proportional Hazards Model (cf. section IV above): firms with a small start-up size are disadvantaged *vis-à-vis* their larger counterparts, unless they are able to grow rapidly, and this is even more evident for the 1989 cohort[19]. Thus, as in Jovanovic's (1982) model of noisy selection, those new entrants which discover that they are based on a viable idea, *grow* and ultimately survive, whereas those that learn that their idea is not viable *tend to stagnate* and ultimately exit from the market.

VI. CONCLUSIONS

This paper has examined the post-entry performance of two cohorts of entrants in the Italian financial intermediation industry, the first preceding (1989) and the second following (1990) removal of constraints on branching and new bank formation. In general, the instantaneous probability of exit decreases, although non-monotonically, over time, and surviving firms grow significantly during the follow-up period. Six years after start-up, the average size of new firms is two and half times larger than their initial size.

As regards the 1989 cohort, start-up size is identified as the main factor conducive to new-firm survival, whereas for the 1990 cohort the likelihood of survival is also sensitive to industry-specific (low branch density and low industry concentration) characteristics. With respect to the dynamics of firm's growth (change in employment), an empirical test of Gibrat's Law shows that, among surviving firms, smaller ones grew faster than their larger counterparts.

[19] Also in estimation of Gibrat's equations, omission of foreign banks does not alter the results.

In sum, regulatory reforms made to the Italian banking sector at the beginning of 1990 are likely to have enhanced a pre-entry selection process by which potential entrants are better equipped to face increased competition in the industry. Thus, whereas in 1989 the industry was still characterized by a process of entry of the "try and see" type, which took place in its marginal fringe, in 1990 entry involved firms with a larger start-up size, and it was more likely to occur in the more developed portion of the market. Here, however, incumbents protect existing rents by means of increased efficiency and organizational innovation, and this renders life after entry for the newborn firms even more difficult.

- appendix about here -

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Table 1

Banks and branches in Italy (1926-1996)

Year	No. of banks	No. of branches	Average No. of branches per bank	Annual growth rate (%) in the av. No. of branches per bank
1926	3,977	11,837	2.98	
1936	2,070	7,726	3.73	
1944	1,459	6,848	4.69	
1975	1,079	11,617	10.77	
1980	1,069	12,174	11.39	
1985	1,101	13,033	11.84	
1986	1,102	13,645	12.38	4.56
1987	1,109	15,365	13.85	11.87
1988	1,100	15,447	14.04	1.37
1989	1.085	15,577	14.36	2.28
1990	1,064	17,721	16.66	16.02
1991	1,043	19,080	18.29	9.78
1992	1,024	20,789	20.30	10.99
1993	1,037	22,133	21.34	5,12
1994	994	22,459	22.59	5.86
1995	970	23,440	24.16	6.95
1996	937	24,406	26.05	7.82
1997	935	25,250	27.01	3.67

Source: Bank of Italy, *Relazione annuale*, various years.

Table 2

Survival of new firms in the Italian financial intermediation industry (cohorts 1989, 1990)

	1989	1990	1991	1992	1993	1994	1995
[1]N. of survivors:							
Cohort 1989	110	87	73	63	52	50	
Cohort 1990		72	57	44	35	32	32
[2]Survival rate*:							
Cohort 1989	95.45%	79.09%	66.36%	57.27%	47.27%	45.45%	
Cohort 1990		88.89%	79.17%	61.11%	48.61%	44.44%	44.44%
[3]N. of employees:							
Cohort 1989	396	456	488	477	462	476	
Cohort 1990		518	571	519	561	569	644
[4]N. of employees per firm**:							
Cohort 1989	3.50	4.75	6.18	7.01	8.25	8.81	
	(7.77)	(7.27)	(10.33)	(12.15)	(14.41)	(15.91)	
Cohort 1990		7.19	8.78	10.59	14.02	15.38	17.41
		(13.11)	(14.79)	(17.87)	(22.21)	(24.74)	(30.80)
[5]Hazard rate***:							
Cohort 1989	4.55%	17.14%	16.09%	13.70%	17.46%	3.85%	
Cohort 1990		11.11%	9.38%	22.81%	20.45%	8.57%	0%

* Number of firms surviving in each year in the follow-up period, as a percentage of the total number of new firms established in the initial year.

** Standard deviation in brackets.

*** Ratio between firms exiting from the industry in each year following start-up and the average number of firms surviving during that year (mean of the absolute values at the beginning and the end of the relevant period).

Table 3

Heterogeneity of growth patterns among surviving new firms (cohorts 1989, 1990)

Growth rates of employment	Cohort 1989			Cohort 1990		
	N	%	cum. %	N	%	cum. %
[1]- 99.9% to -75.01%	1	1.85	1.85	1	2.70	2.70
[2]-75% to -50.01%	2	3.70	5.56	0	-	2.70
[3]-50% to -25.01%	4	7.41	12.97	1	2.70	5.41
[4]-25% to -0.01%	1	1.85	14.82	0	2.70	5.41
[5]0% to 24.99%	13	24.07	38.89	10	27.03	32.44
[6]25% to 49.99%	1	1.85	40.74	4	10.81	43.25
[7]50% to 74.99%	2	3.70	44.44	1	2.70	45.95
[8]75% to 99.99%	0	-	44.44	1	2.70	48.65
[9]100% to 199.99%	7	12.96	57.40	7	18.92	67.57
[10]200% to 299.99%	3	5.56	62.96	2	5.41	72.98
[11]300% and more	20	37.04	100	10	27.03	100
average rate of growth		*299.64*			*422.50*	
minimum rate of growth		*-96.92*			*-98.46*	
maximum rate of growth		*2066.67*			*5166.67*	

Table 4

The determinants of new-firm survival in the Italian financial intermediation industry: regression results from the Proportional Hazards Model

Variables	Cohort 1989			Cohort 1990		
	I	II	III	IV	V	VI
Start-up size	-0.817***	-0.725***		-0.419**	-0.391**	
	(0.286)	(0.280)		(0.176)	(0.176)	
Branchpop		-0.363	0.127		-0.570*	-0.600*
		(0.536)	(0.528)		(0.347)	(0.337)
Herfindhal		-0.118	-0.074		0.208	0.373*
		(0.278)	(0.268)		(0.230)	(0.217)
Cred		-2.407***	-2.547**		-2.750***	-2.875***
		(1.080)	(1.060)		(1.063)	(1.052)
-2logL	485.760	469.446	480.180	291.324	274.100	280.69
Chi square	8.479***	19.375***	11.878***	6.245**	19.369***	13.548***
N	110	110	110	72	72	72

Standard errors in brackets. * = significant at the 90% level of confidence; ** = significant at the 95% level of confidence; *** = significant at the 99% level of confidence

Table 5

The relationship between final and initial firm size in the Italian financial intermediation industry

Variables	Cohort 1989		Cohort 1990	
	All firms	Surviving firms	All firms	Surviving firms
Constant	-1.083***	0.493***	-0.906***	0.459***
	(-5.699)	(6.684)	(-3.774)	(4.114)
Start-up size	1.057***	0.425**	0.730***	0.686***
	(3.782)	(1.897)	(2.612)	(2.670)
White[a]	2.896**	3.022**	12.139***	3.226**
Wald[b]	0.0421	6.576***	0.931	1.497*
Adj. R^2	0.140	0.095	0.128	0.289
F	19.72***	6.56***	12.19***	15.63***
N	110	50	72	32

t statistics in brackets.

a = null hypothesis: homoskedasticity; in the case of heteroskedasticity (at least 90% significance level) a consistent covariance matrix has been used (White's correction); *b* = null hypothesis: β_1 (start-up size coefficient) = 1;* = significant at the 90% level of confidence; ** = significant at the 95% level of confidence; *** = significant at the 99% level of confidence.

APPENDIX

Table A1

Descriptive statistics for the independent variables (cohort identification year in brackets)

Variable name	Description	Mean	SD	N
Branchpop (1989)	Logarithm of the average number of resident population per branch	7,82	0.37	110
Herfindhal(1989)	Logarithm of the Herfindhal index (municipal level)	-2.06	0.84	110
Start-up size (1989)	Logarithm of employment in the firm (1989)	0.42	0.73	110
Start-up size (1989)	Logarithm of employment in the firm (1989) – firms still alive in 1992	0.27	0.39	50
Branchpop(1990)	Logarithm of the average number of resident population per branch	7.80	0.42	72
Herfindhal(1990)	Logarithm of the Herfindhal index (municipal level)	-2.05	0.95	72
Start-up size (1990)	Logarithm of employment in the firm (1990)	0.69	1.16	72
Start-up size (1990)	Logarithm of employment in the firm (1990) – firms still alive in 1993	0.41	0.54	32
S_{it-2} (1989)	Logarithm of employment in the firm (1992)	0.61	0.47	50
S_{it-2} (1990)	Logarithm of employment in the firm (1993)	0.94	1.24	32

Figure 1
Empirical survival rates: cohort 1989

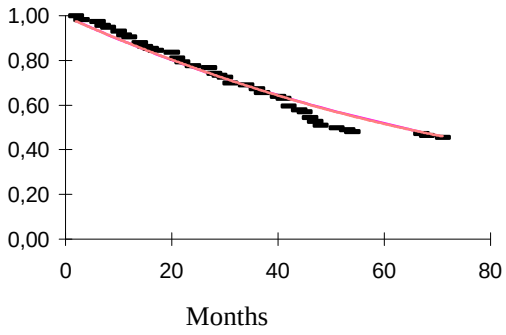

Figure 2
Empirical survival rates: cohort 1990

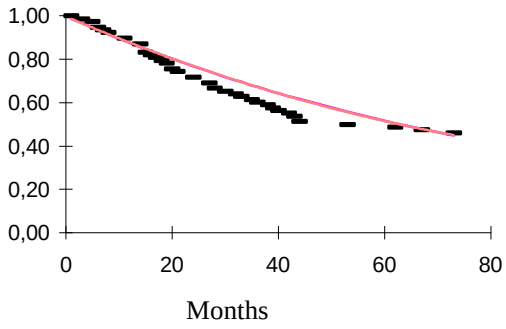

Figure 3
Empirical hazard rates: cohort 1989

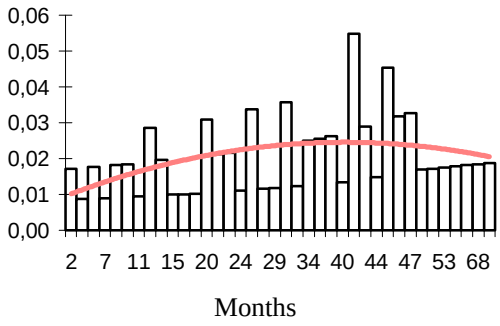

Figure 4
Empirical hazard rates: cohort 1990