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On the evolution of the Italian bank branch distribution

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Abstract

The aim of this paper is to investigate the effects of institutional change on the evolution of the Italian bank branch distribution. As a consequence of the "liberalisation" of the late 1980s and early 1990s, banks were free to open new branches in their preferred locations, without the administrative control of the Bank of Italy operational until 1989. Another major consequence of the regime change has been a significant wave of consolidation events among banks. Our hypothesis is that these fundamental changes can account for the emergence of a power law tail as the outcome of self-organisation in a deregulated environment. From a methodological point of view, we follow a "systemic" approach with a focus on statistical properties of bank branch distribution identifying the banks' collective reaction to the changing institutional setting.

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1 Introduction

This paper is aimed at investigating the effects of regime changes on the evolution of the Italian bank branch distribution, searching for the emergence of power law, as the response of banks' collective behaviour to an institutional change, from a planned system towards a deregulated one.

As a consequence of the 1930-31 banking crisis following the Great Depression, in 1936 Italian Government approved a banking law by which credit activities were subjected to the supervision of the Bank of Italy and a government committee, the CICR ("Comitato Interministeriale per il Credito e il Risparmio", that is Inter-ministry Committee for Credit and Saving). With this major intervention and the successive one by the CICR in 1938, banks were set under control in extending credit and entering new markets. There was, therefore, a limitation of competition among banks operating through the control of public authorities. The motivation of these legislative acts was to defend the banking system from market failures and financial instability.

Only from the mid 1980s there was a tendency of the legislator to diminish the central control on credit activities and a gradual application of European Directives aimed at deregulating the banking system, increasing the degree of competition among credit institutions. This period was also characterised by a transition from public to private control on banks' capital and governance, that is a "privatisation" phase mainly based on a 1993 legislative act.

Until the reform of 1990s, banks willing to open new branches needed an administrative authorisation of the Bank of Italy. With the 1936 banking law each bank was assigned a zone of competence, that is one or more provinces, according to its geographical distribution in 1936. Then, the 1938 CICR act regulated in a differentiated way the geographical expansion of bank branch networks: "national" banks could open branches only in large cities; "co-operative" and local "commercial" banks could open branches only within the boundaries of the province they operated in 1936; "saving" banks could open branches only within the boundaries of the region (a set of provinces) they operated in 1936; in addition, banks were requested to close branches outside their zone of competence (Guiso et al. 2006).

This mechanism resulted in a centralised architecture aimed at managing the distribution of branches across banks and locations (Ciocca et al., 1974). From 1970s the Bank of Italy arranged "branch plans" to design a distribution of branches matching the needs of different locations and minimising costs related to the supply of banking service. According to this framework, the Bank of Italy collected information about the intent of banks to open a branch in certain locations and decided whether to authorise or not these operations in order to avoid the concentration of an excessive number of branches with respect to the extent of local markets. The philosophy of "branch plans" created a situation in which banks did not strategically manage their geographical expansion that, instead, was governed by the Bank of Italy on the basis of the "desired" number of branches in local markets resulting from the central planning activity. Accordingly, the central authority of the banking system was also responsible for avoiding overbranching situations (Comana, 1990).

Starting from 1986 the administrative control on branch opening was weakened, because the authorisation to open a new branch was considered given in the case of no opposition of the Bank of Italy in a period of 60 days. After this intermediate regime, in 1990, the branch

opening process was completely liberalised. In this decentralised setting there are no central coordination mechanisms and banks are free to open new branches in preferred locations. In the years after the "liberalisation" there was a collective phenomenon of branch opening that more than doubled the total number of branches of Italian banks, from about 15000 in 1989 to more than 30000 in 2005.

Furthermore, there was a remarkable increase of consolidation events (i.e. mergers and acquisitions) as a consequence of the changing institutional environment of late 1980s and 1990s. This process is a part of an unprecedent wave of consolidation which has characterised the recent evolution of many industrialised countries, in response to fundamental changes in regulation and technology (Amel et al., 2004). The deregulation process has promoted consolidation processes, in different sectors and countries, through the introduction of cost-saving technologies and organisational practices to improve efficiency. Important sources of changes in the banking sector, as well as in other industries, has been due to the exploitation of economies of scale and of scope. "However, the extent of exploitable scale and scope economies might be smaller than commonly thought, and efficiency gains resulting from better management might be elusive in large, complex institutions" (Amel et al., 2004, p. 2494).[1]

We focus on the relationship between regulatory regimes (e.g., the degree of decentralisation) and the statistical properties of industrial and spatial distribution of bank branches. We will see that there is a significant relationship between the way systems are arranged (centralisation vs. decentralisation) and the structural characteristics of distributions. In particular, we will concentrate on the possible emergence of power law after deregulation as a characteristic of banks' collective behaviour adapting their strategies to a self-organising environment. In general, it seems that a power law distribution has emerged as the banking sector evolved from a planned to a market-oriented system, that is as a consequence of increasing competition among banks that produced two fundamental episodes: (i) many openings of new branches, mainly in the early 1990s, and (ii) a wave of consolidation events with a consequent increase of "industrial concentration" in the banking sector.

Recent advances in the physics of collective phenomena have stressed an important aspect of power law distributions as a symptom of self-organisation of a system composed by many agents. In particular, this feature has been analysed in the study of self-organising criticality (Bak, 1996): a power law distribution emerges in a system that self-organises in a critical state. In a social context, the existence of power law distributions is associated with the evolution of collective phenomena as in the case of wealth distribution (Pareto, 1897), firm size distribution (Axtell, 2001; Delli Gatti et al., 2005), stock market returns (Mantegna and Stanley, 2000; Johnson et al., 2003) or Zipf's law of city size distribution (Gabaix, 1999).

The power law behaviour was firstly discovered by Vilfredo Pareto, with his seminal contribution at the end of XIX century (Pareto, 1897), who detected an important regularity in the income distribution of different countries: he noted that the distribution of personal incomes above a certain threshold y_0 followed a particular heavy-tail distribution. He found

[1] In a recent paper, we show that a possible consequence of this transition for the banking system is the occurence of overclustering episodes as the result of "excessive entry" in local markets (Russo, 2009). Depending on the relevance of this phenomenon, the "locational overlapping" of branches may rise the costs of banking services. Accordingly, a cost-benefit analysis of the effects of consolidation processes and new openings on the evolution of the banking system should consider these aspects.

that the probability of observing an income Y greater than or equal to y was proportional to a power of y, that is $Pr(Y \geq y) \propto y^{-\alpha}$, with α close to 1.5.[2]

Marsili and Zhang (1998) maintain that countries with different cultural, social and economic structures collectively self-organise to obey Zipf's law while "countries with a unique social structure, as the former USSR or China, do not follow Zipfs law" (Marsili and Zhang, 1998, p. 2741). Accordingly, centralised systems should not display power law distributions of relevant variables due to the lack of decentralised interaction among agents. Analysing the wealth distribution in China, Ding and Wang (2007) find that data on richest people follows a pattern similar to that of developed countries, that is a power law. The authors relate this fact to the strong effect of economic reforms governing the transition from a planned to an open-market economy in China. In what follows we will investigate a similar phenomenon: the effects of deregulation on branch banking dynamics as reflected by the properties of the distribution of relevant variables.

In order to ascertain whether the bank branch (tail) distribution follows a power law, we apply a Kolmogorov-Smirnov (K-S) test on the form of distributions and estimate the location and shape parameters of the supposed power law distribution with maximum likelihood estimation (MLE). We apply this procedure to the distribution of branches per bank and to the distribution of branches per location. The details of this procedure will be explained in the following pages. However, as result of our analysis we expect to discover a power law pattern after 1990 as a consequence of the collective phenomenon of bank branch opening and consolidation events which took place after the liberalisation. Until the 1980s the bank branch distribution should be structurally different with respect to what emerged after 1990 given that it represented a centralised configuration of bank branches drawn up by the Bank of Italy. As we will see the emergence of a power law tail in the bank branch distribution has been a gradual phenomenon. The analysis of the spatial distribution of bank branches provides similar results.

The paper is organised as follows. The next section provides a brief discussion on theoretical and methodological issues. In sections 3 we describe and analyse data on bank branches: subsection 2.1 focuses on the evolution of the number of branches per bank, that is the "industrial" bank branch distribution, while in subsection 2.2 we analyse the evolution of the "spatial" bank branch distribution. Section 4 concludes.

2 Theoretical and methodological issues: a sketch

In this section we provide a brief discussion on some theoretical and methodological issues which may clarify the motivation of our approach to the analysis of branch banking dynamics and, in general, to the study of collective behaviour in economics.

Although we study sector dynamics and not macroeconomics, we follow the Keynesian tradition of investigating aggregate regularities as the result of the behaviour of the system as a whole. In this sense, our approach is "systemic" and "anti-atomistic" (Togati, 2001).

[2]Although Pareto maintained that different (European) countries followed a power law with similar parameters, recent investigations show that power law is an invariant property of decentralised economies but also that the slope of distributions varies across countries and time (e.g Clementi and Gallegati, 2005a,b; Drägulescu and Yakovenko, 2001; Nirei and Souma, 2007; Souma, 2002).

According to this perspective, the banking sector and, in general, the economy is considered as a complex system in which aggregate dynamics emerges from the bottom-up, through the interaction among heterogeneous agents. This is not an entirely new approach in economics given that Keynes proposed a similar interpretation of collective behaviour in this complex systems perspective (Foster, 2004).

Moreover, as noted by de Cecco (1990), the suggestion of abandoning an analysis of economic systems that starts at the level of the isolated individual, thus describing aggregate consumption or production by the behaviour of a single individual or firm (Kirman, 1992), was one of the central message of Keynes. He clearly stated that the atomistic hypothesis which worked well in physics may do not work in other domains, when the whole is not equal to the sum of parts, small changes produce large effects, and the conditions for assuming a homogeneous and uniform behaviour are not satisfied (de Cecco, 1990).[3]

As a matter of fact, a central feature of power law distributions is the relevance of agents' heterogeneity and the consequent impossibility of explaining the dynamics of the system through the knowledge of an "average" (or "representative") behaviour. Accordingly, "methodological individualism" could be inappropriate when analysing complex systems potentially leading to power law distributions. Instead, studying the evolution of the system as a whole through the analysis of its statistical properties at the aggregate level can be more profitable in understanding collective phenomena.

The focus on distribution dynamics is then the consequence of our economic methodology aimed at understanding collective behaviour. In particular, we are interested in the adaptation of the banking system to a deregulated environment (from branch liberalisation to the removal of control on credit activities and privatisation) potentially leading to the emergence of a power law. Applying concepts and tools coming from the physics of collective phenomena, as the emergence of power law in self-organising systems, we investigate how the banking system *collectively* organises in a deregulated environment, and whether it evolves towards a a hierarchical organisational structure, similar to the wealth distribution following a Pareto law. Then, in the specific case of the Italian banking sector, our aim is to discover whether an unequal (power law) distribution of relevant variables emerges as a consequence of the processes of branch openings and of consolidation followed to deregulation.

3 Bank branch distributions

We use a dataset on Italian bank branches with the following characteristics: about 8200 city locations (Italian municipalities), 2000 banks (some of which operating only in a limited number of years), and a time span of 70 years, from 1936 to 2005.

Figure 1 shows the evolution of openings and the total number (e.g., the stock) of bank branches from 1936 to 2005. We observe two dynamic regimes simply looking at the different

[3]In the Preface to the French Edition of the General Theory, Keynes was very clear in explaining his approach: "I have called my theory a general theory. I mean by this that I am chiefly concerned with the behaviour of the economic system as a whole - with aggregate income, aggregate profits, aggregate output, aggregate employment, aggregate investment, aggregate saving rather than with the incomes, profits, output, employment, investment and saving of particular industries, firms or individuals. And I argue that important mistakes have been made through extending to the system as a whole conclusions which have been correctly arrived at in respect of a part of it taken in isolation" (Keynes, 1936, xxxii).

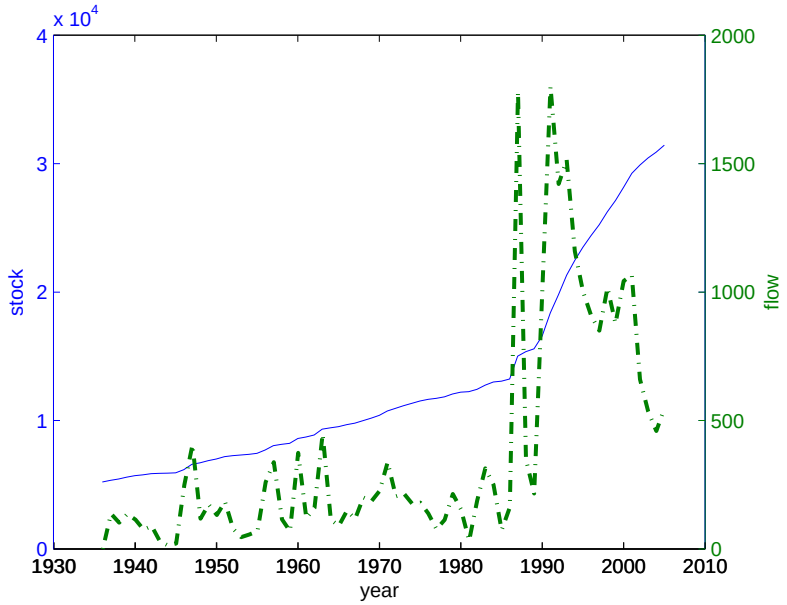

Figure 1: Total number (*solid line*) and openings (*dash-dot line*) of bank branches for each year from 1936 to 2005

trend followed by the evolution of the stock: the slope of the curve increases after the 1990 liberalization as a consequence of a large number of branches opened after that event,[4] and the number of branches in Italy becomes equal to more than 30000 in 2005, starting from about 15000 in 1989.

It is worth to note that in 54 years, from 1936 to 1989, 11089 branches were opened, with an average yearly growth rate of 2.03%. From 1990 to 2005, a period of 16 years, the number of branches opened was equal to 18347, with an average yearly growth rate of 4.39% (see Table I).

Table II. Growth rates of bank branches

years	average growth rate
$1936-1949$	2%
$1950-1959$	1.8%
$1960-1969$	2.1%
$1970-1979$	1.7%
$1980-1989$	2.6%
$1990-1999$	5.5%
$2000-2005$	4.4%

[4]The year 1987 is one of the last year characterised by the centralised control of the Bank of Italy, although in a phase of an initial weakening of it (as explained in the introduction). This is a particularly important year because of the large number of branches opened, mainly in "working locations " (such as hospitals, tribunals, public offices, etc.). Many of these were closed in following years. Thanks to Giacomo Cau for useful suggestions on this point.

As said above, the change in fundamental factors as regulation and technology (in particular, advances in the information technology and intenet-based services) has promoted a relevant process of consolidation, through mergers and acquisitions, which is the other fundamental factor at the basis of bank branch distribution dynamics. The M&A wave started at the beginning of 1990s leading to a decrease of the number of rival banks from more than 1000 in the early 1990s to about 700 in recent years. Table II shows the number of active and passive banks involved in M&A events from 1990 to 2004. To sum up, the number of M&A events and the reduction of rival banks signals an important role of these operations in shaping the distribution of bank branches, as a consequence of the generalised process of deregulation of the 1990s.[5]

Table II. M&A events among Italian banks: 1990-2004

year	active banks	passive banks
1990	16	25
1991	33	49
1992	33	43
1993	36	39
1994	49	59
1995	59	62
1996	47	55
1997	36	34
1998	34	71
1999	51	98
2000	45	86
2001	33	45
2002	35	63
2003	37	48
2004	23	23

In what follows we focus on the industrial structure of the banking sector. Accordingly, we investigate the evolution of the number of branches per bank over time to analyse the shape of the distribution and to see whether a structural change occurred after the 1990 liberalisation. We firstly describe the phenomenon, showing graphically the main characteristics of distribution dynamics, and then proceed with a quantitative analysis to assess the relevance of the phenomenon in statistical terms. After that, we will analyse the same phenomenom from a spatial perspective.

3.1 The "industrial" bank branch distribution

Figure 2 displays the long-run evolution of the size distribution of banks in terms of the number of branches. We plot the logarithm of bank size on the x-axis (in terms of the

[5]To calculate the number of banks involved in M&A events we used data reported in Beretta and Del Prete, 2007.

number of branches) against the logarithm of the rank of banks (from the biggest bank to the smallest one, according to the number of branches). In other words, we describe the distribution of bank size with a Rank-Size plot of bank branches. From the observation of the figure we can infer that the distribution shifts toward right in recent years. Until the end of 1980s, the bank branch distribution (BBD henceforth) exhibits a similar shape with a fast decaying tail, while a power law tail seems to emerge in the following years.[6]

Figure 3 illustrates the evolution of BBD starting from 1989 to better understand the shift of the tail as a consequence of the reform. It results that the emergence of the power law tail is a recent phenomenon but also that the shifting behaviour of BBD tail begins in the earlier years following the reform. In early 1990s there was a strong effect of openings on the shape of BBD. In successive years the emergence of the power law tail tends to continue due, in particular, to mergers and acquisitions.[7]

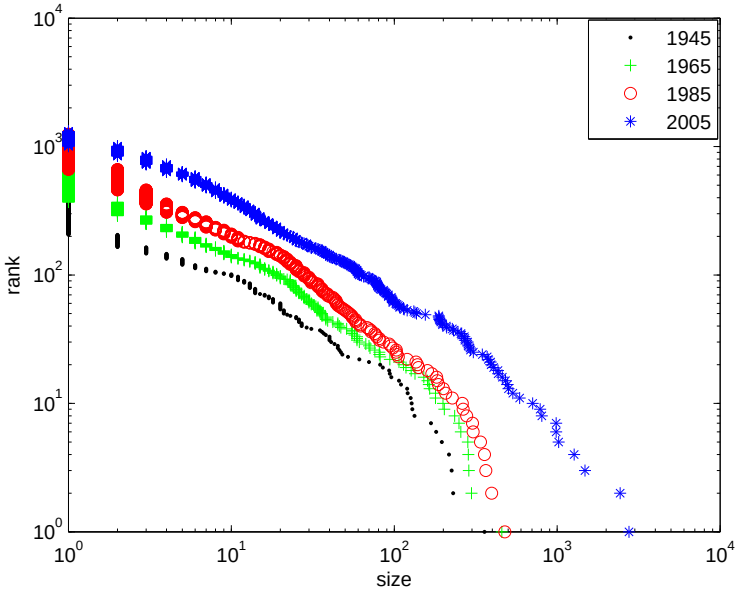

Figure 2: Long-run evolution of BBD

To have a more precise response to the question about the structural differences between distributions before and after the reform we first apply a two-sample Kolmogorov-Smirmov (K-S) goodness-of-fit hypothesis test with no a priori on the distribution function.

The K-S test tells us that 1989 and 2005 BBDs differ significantly. This is not so surprising because of the considerable number of elapsed years. We can understand something more confronting distributions year by year. In this way we notice that the emergence of the BBD

[6]We are particularly interested in the change of the right tail of the distribution given that it contains a very high fraction of bank branches. In the following we will report some statistics on this aspect.

[7]It is worth noticing that the growth rate of bank branch is lower in the period 2000-2005 than in the period 1990-1999. This fact suggests that branch openings have had a stronger impact on BBD's changes in a first phase, in particular in the years immediately after the liberalisation, while mergers and acquisitions have had a major role in shaping BBD evolution in the following years, when the growth rate of bank branches decelerates. Thanks to Riccardo De Bonis for useful suggestions on this point.

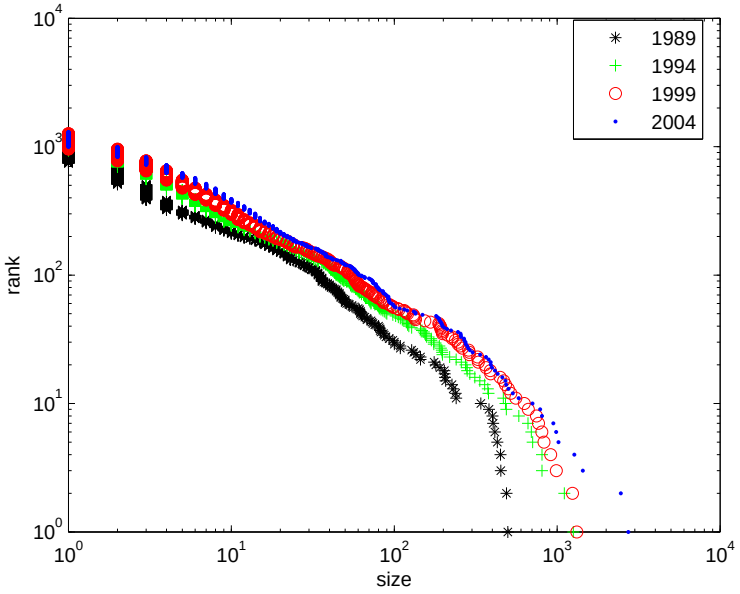

Figure 3: The evolution of BBD in recent years

tail is a gradual phenomenon: if we apply the K-S test in an iterative way, confronting each year with the previous one, we obtain that only in 1991 the BBD differs significantly from the 1990 distribution; in all other cases distributions are alike.[8] Therefore, the structural change of BBD has happened gradually, although a big change occurred immediately after the 1990 reform. Finally, if we consider 1989 as a starting point, we can also apply the K-S test to evaluate the divergence of BBDs as years elapse. It results that, from 1991 to 2005, distributions differ significantly from that of 1989.

Then, we propose a procedure based on the application of the one-sample K-S test and the maximum likelihood estimation of distribution tail in 1989 and 2005 to verify whether a power law tail emerges after deregulation. For each percentile in the distribution we calculate the Hill (or maximum likelihood) estimator (Hill, 1975) of the shape parameter, k (which measures the slope of the BBD tail) for different values of the location parameter, x_{min} (that is, the point on BBD in terms of the number of branches per bank from which successive observations follow a straight line in the double logarithmic space); then we apply the K-S test on the supposed power law distribution.[9]

The location parameter of the power law distribution is

$$\hat{x}_{min} = min_i \, x_i \tag{1}$$

[8]In fact, in 1991, the year after the branch liberalisation, there was a remarkable number of branch openings. Only in 1987 there was a comparable number of openings. The fact that the 1988 distribution does not differ significantly from that of 1987 can be ascribed to the underlying mechanism of centralised control used by the Bank of Italy.

[9]More advanced techniques could be applied to data, for example the one proposed by Clementi et al. (2006) based on bootstrapping method. However, we think that for our purposes, not addressed to a deep numerical analysis of estimations, the proposed procedure provides a sufficiently clear response to the research hypothesis, that is to asses whether or not a power law emerges from data.

while the maximum likelihood estimator of the shape parameter is

$$\hat{k} = \frac{n}{\sum_i (ln\, x_i - ln\, \hat{x}_{min})} \tag{2}$$

where x_i is the generic element of the sample $x = (x_1, x_2, ..., x_n)$ and n is the size of the sample.

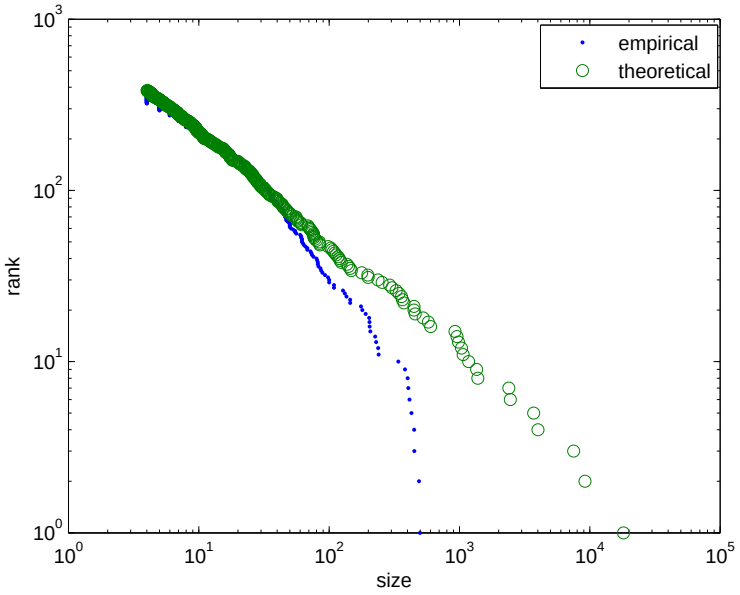

Figure 4: BBD tail: year 1989

The results of the proposed procedure are the following. The 1989 BBD significantly differs from a power law for all the considered samples of the distribution (in terms of percentiles). Figure 4 shows this result for the 70^{th} percentile, highlighting the fast decay of the empirical distribution with respect to the theoretical one.[10] Instead, the 2005 BBD exhibits a power law pattern in the tail (Figure 5): the value of the shape parameter k, for which the K-S test fails to reject the null hypothesis of the existence of a power law tail, is around 0.8. The number of observations of the distribution tail (70^{th} percentile) are equal to 383 with $x_{min} = 4$ for 1989 and 400 with $x_{min} = 10$ for 2005. If we reduce the size of the sample representing the tail of the distribution, for example, until the 90^{th} percentile (127 observations with $x_{min} = 26$ for 1989 and 131 observations with $x_{min} = 46$ for 2005), we verify that even for higher values of x_{min} the 2005 BBD shows a power law tail with a slope around 0.8.[11]

All in all, the deregulation wave of late 1980s and early 1990s has generated a structural

[10]The random samples for the theoretical power law distribution corresponding to the empirical one is generated by inverse transform sampling: given the random sample U drawn from a uniform distribution in the interval $[0, 1]$, the variate $T = x_{min} U^{-(1/k)}$ is Pareto distributed.

[11]This implies that, in 2005, more than the 40% of branches belonged to the 10 largest banks, while more than the half of all branches belonged to the 20 largest banks. For instance, the fraction of branches of the largest 10 banks in 1989 was smaller than 30%.

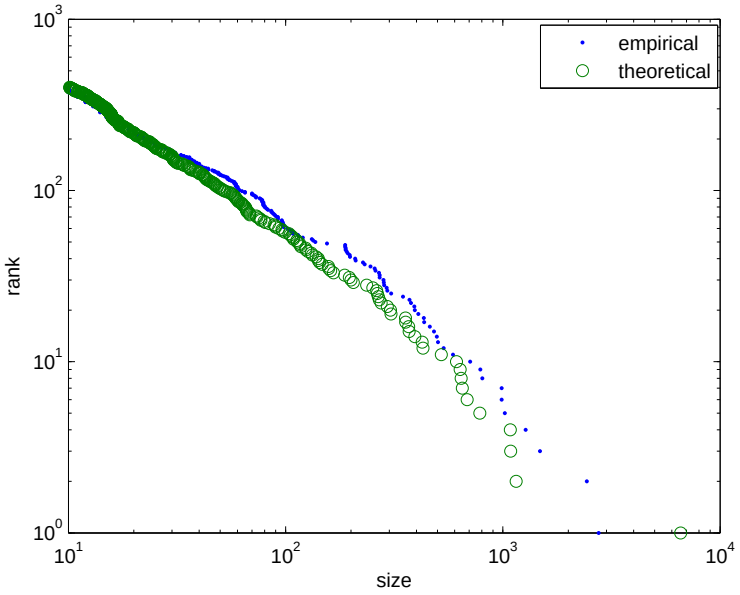

Figure 5: BBD tail: year 2005

change of BBD with the emergence of the power law shape. We interpret this fact as the consequence of a collective phenomenon of branch openings and consolidation events, with banks adapting their strategies to an evolving institutional framework promoting self-organising processes.[12]

3.2 The "spatial" bank branch distribution

Figure 6 shows the long run evolution of the bank branch spatial distribution. Analysing the shape of the spatial distribution of bank branches we can see that the 2005 distribution seems to exhibit a power law pattern again. The recent evolution of the distribution, starting from 1989, is shown in Figure 7.

If we apply the two-sample K-S test in an iterative way, confronting each year with the previous one, we obtain that only in 1991, 1992, 1993 and 1998 distributions differ significantly with respect to that of the previous year. Considering 1989 as a benchmark year, we can also apply the K-S test to evaluate the divergence of distributions along time: only the 1990 distribution has the same shape of the 1989 distribution; from 1991 to 2005 distributions differ significantly from that of 1989. Then, the structural change in the distribution is quite a gradual phenomenon even in this spatial setting.

It is worth noticing that we obtain similar results analysing the industrial BBD. Accordingly, the industrial (number of branches per bank) and the spatial (number of branches per location) distributions are co-evolving aspects of the same collective phenomenon.

Starting from the 94_{th} percentile the K-S test does not reject the null hypothesis of a

[12]The recent tendency of the banking system towards consolidation events, two of which have created the major Italian banking groups (e.g., UnicreditGroup and IntesaSanPaolo), gives additional support to the hypothesis about the evolution of a power law shape in the BBD tail.

power law pattern in the 2005 distribution. The ML estimation of the shape parameter $\hat{k}$ is about 1.35 associated with values of the location parameter x_{min} equal to 13 (the number of observations involved in the ML estimation is equal to 359, that is the locations with a minimum number of branches equal to 13 in 2005). The Hill estimator oscillates around 1.35 for successive percentiles. Instead, considering the 1989 distribution, the K-S test does not reject the null hypothesis of a power law tail starting from the 97^{th} percentile, but the Hill estimator of the shape parameter increases for successive percentiles (the number of observations for 1989 is equal to 152). It is worth noticing that the values estimated for successive percentiles of the BBD vary from 1.28 to 1.43, that is we do not observe a convergence toward a stable value of the shape parameter in this case.

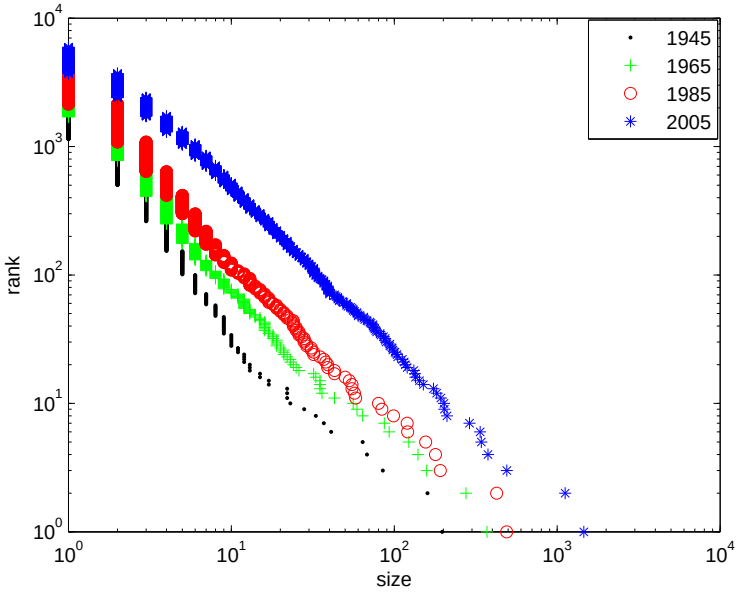

Figure 6: Spatial distribution of bank branches: long-run evolution

To sum up, according to the K-S test the 2005 distribution tail follows a power law starting from locations with 13 branches; in addition, the associated values of Hill estimator are quite stable. Instead, the K-S test for the 1989 distribution does not reject the hypothesis of a power law tail the 1989, but only starting from the 97^{th} percentile; in addition, differently from the 2005 distribution, the values of the Hill estimator is not stable, in contrast to what expected when the distribution clearly follows a power law (Hill, 1975).

Finally, the spatial BBD highlights a less pronounced change after 1989, with respect to the industrial BBD, although it is only after deregulation that a stable power law tail emerges. In general, the collective phenomenon of new openings as well as the wave of mergers and acquisitions are responsible for fundamental changes of branch bank distributions. Spatial dynamics leading to a power law in the geographical distribution of bank branches highlight the role of new openings, given that these processes are not directly dependent on mergers and acquisitions. It is worth noticing that, as emerged from the above analysis, the most relavant changes in the spatial BBD happens in early 1990s. This fact confirms that the wave of new openings has had a stronger impact on BBD evolution in the early 1990s, while

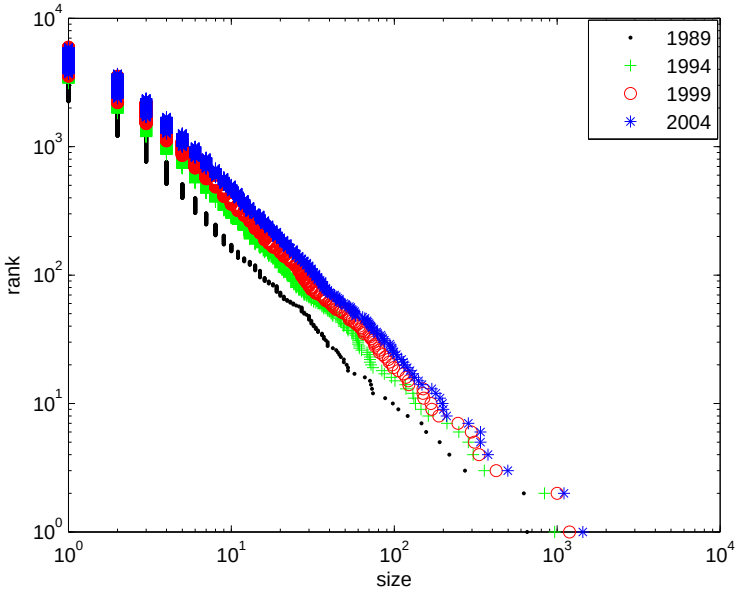

Figure 7: Spatial distribution of bank branches: recent years

consolidation events have strongly affected BBD dynamics in successive years.

4 Concluding remarks

In this paper we have analysed the effects of regime changes on the evolution of the Italian bank branch distribution. With the 1936 banking law and successive interventions, banks were set under the control of public authorities in both extending credit and entering new local markets. As a consequence, until 1989 banks needed an authorisation of the Bank of Italy to open new branches and BBD was the result of a centralised plan. After the 1990s reform, which removed the centralised control of the Bank of Italy, there was a collective phenomenon of branch opening, from about 15000 in 1989 to more than 30000 in 2005. In addition, as a consequence of relevant changes in regulation and technological factors (allowing cost-reducing strategies), a wave of mergers and acquisitions reduced the number of banks, resulting in a concentration of the sector. We interpret the emergence of the BBD power law tail as the response of banks' collective behaviour to a changing institutional setting, from a planned to a deregulated system, promoting self-organising processes.

Applying a procedure based on the K-S test and MLE techniques we found that there are considerable differences between the bank branch distributions before and after deregulation. Until 1989 the largest banks were characterised by a quite similar number of branches, thus deviating from a power law distribution. Instead, the 2005 distribution shows a power law tail with a shape parameter around 0.8 starting from a minimum number of branches per bank equal to 10. However, there was not a sudden change in the distribution as the analysis performed with the K-S test confirms: the structural change leading to the emergence of a power law tail after 1990 was a gradual phenomenon.

We obtain similar results analysing the spatial configuration of bank branches, even if differences between distributions are less marked in this case. This fact depends on the role of mergers and acquisitions that has strongly modified the industrial structure of the banking sector but does not affect spatial dynamics. In fact, the most relavant changes of the spatial BBD happened in the early 1990s, when there was an imponent wave of new openings.

From a general point of view, our interpretation is that the main force underlying bank branch dynamics has been "competition". The resulting wave of opening of new branches (mainly in the 1990s) and consolidation events leading to larger banking groups (which strongly affects the evolution of the banking sector in recent years) has modified the shape of BBD producing a power law tail. Accordingly, the current *shape* of the industrial and spatial distributions is the one "expected" on the basis of legislative interventions of late 1980s and early 1990s.

This paper represents a first step towards the understanding of the evolution of the Italian bank branch distribution and its interplay with diverse regulatory settings. Future work will be addressed to the improvement of statistical analysis through the application of more advanced estimation techniques to test the robustness of empirical findings. Furthermore, the realisation of a formal model could significatively improve the proposed framework, for instance, providing an explanation of the power law emergence due to the interplay between banks' behavioural rules and interaction mechanisms. Another interesting development of the proposed framework could be done through a comparative analysis of branch banking dynamics in Europe, given that a similar process of "liberalisation" and "privatisation" involved European countries in the 1980s or 1990s according to EU Directives, as well as countries outside Europe.[13]

[13]For instance, Ennis (2001) and Janicki and Prescott (2006) provides interesting evidence on the dynamics of the size distribution of US banks when the regulatory framework changes.

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