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Bank Efficiency and Banking Sector Development: the Case of Italy

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Abstract

The paper illustrates the efficiency features of the Italian banking system through a review of the most important empirical studies over the last fifteen years. Particular emphasis is given to DEA (dynamic envelopment analysis) studies and to their capability to investigate economies of scale and geographical differences. The role of mergers – which are, as a matter of fact, a crucial feature of several systems, including Italy – is stressed. The Italian experience is compared to the one of old EU member countries.

The paper concludes that there seem to be economies of scale at the beginning of the period, while they do not seem to characterize more recent years.

1 Introduction

The aim of the paper is to trace out the most important efficiency features of the Italian banking system, as they were investigated in the literature in the last fifteen years.

In that period, the Italian banking system has had to face the unification process of European markets. Actors operating in Italy have been forced to compare themselves to foreign ones and to compete with them. In this sense, some efforts have been done to evaluate how the sector performs with respect to results achieved by the systems of other countries.

The first research papers computed the level of efficiency reached by Italian banks and aggregated the results to give indicators of efficiency for the overall country system. An analysis of the situation at the beginning of the Nineties was made and the determinants of efficiency, the presence of scale inefficiencies

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and regional disparities were investigated (Favero-Papi, 1995 and Resti, 1994, 1997). Later, some Italian and other European authors began to compare the results obtained in different countries (Lozano-Vivas, 1997). More recently, given the phenomenon of financial conglomeration, which has been one of the most important features of the financial development also in Italy, the problems of scale and scope economies and of the efficiency of conglomerates have been widely investigated (Casu and Girardone, 2002a,b,c).

Two different techniques are used to evaluate efficiency of banks (and of firms in general): parametric methods, like the Stochastic Frontier Analysis (SFA), and non-parametric ones, mainly Data Envelopment Analysis (DEA). The debate on which approach suits better the problem of analyzing the efficiency of the banking sector is still open and has been the subject of many applied works. Resti (1997), for example, compares the results obtained by DEA and SFA on Italian data.

DEA, which is the technique chosen by the authors of the works analyzed in this paper, is based on linear programming. It is judged in many studies to be the most effective way to evaluate efficiency and it has been largely used in many applied works since its development. Although subject to some criticism, the method has no need for assumptions on the form of the production function. At the opposite, parametric models need them: indeed, this is their most questionable feature. The detractors of DEA, however, base their diffidence on the absence of a term capturing measurement errors.

The paper is structured as follows: in the first section the presence of economies of scale and geographical differences in the Italian banking system is investigated through the works of Favero and Papi (1995) and Resti (1994,1997). Other possible determinants of efficiency are also tested. In the second section, some cross-border studies including Italian data are presented and analyzed. In the last part, the effect of mergers and acquisitions processes and deregulation is shown, addressing the Italian case (Casu-Girardone, 2002a,b,c) and confronting the results with those obtained in other country studies (Vander Venet, 2002).

2 Determinants of efficiency and the presence of economies of scale.

The number of Italian studies about efficiency in the banking system is not so high. There are three important works referring to data on the period between the end of the Eighties and the beginning of the Nineties: Resti (1994,1997) and Favero-Papi (1995). The aim of these papers is to investigate the level of efficiency reached by Italian banks, to analyze its determinants and above all the presence of economies of scale.

The period taken in exam was one of great changes in the Italian system: home banks began to be in real competition with their foreign counterparts, because of the higher and higher integration of European markets. The low number of listed societies and the relatively backwardness of the national stock

exchange market made banks the main source of funding for those firms who were not quoted yet. For the first time, the typical Italian commercial bank had to compare itself to the larger universal banks, which represented the standard model in most European Union countries. In this context, the analysis about the presence of economies of scale became a central theme. The main question to be addressed was whether larger banks had an efficiency advantage, when compared to smaller ones.

To give an answer to this question, the two papers quoted above used a non-parametric, DEA approach. In this framework, in order to investigate whether the efficiency score is affected by the presence of scale efficiencies, the first step consists in running a standard DEA model under the hypothesis of constant returns to scale (CRS). The efficiency scores obtained are then compared to the ones evaluated through a modified primal problem, which accounts for variable returns to scale (VRS):

$$\begin{aligned} & \max \sum_{r=1}^t u_r y_{r0} + \mu_0 \\ & \text{s.t.} \sum_{i=1}^m v_i x_{i0} = 1 \\ & \sum_{r=1}^t u_r y_{rj} - \sum_{i=1}^m v_i x_{ij} + \mu_0 \leq 0 \quad j = 1 \dots n \\ & u_r > 0, v_i > 0 \quad r = 1 \dots t; i = 1 \dots m \end{aligned}$$

where r is the number of outputs, y_{r0} is the output of the firm whose efficiency we want to evaluate, m is the number of outputs, u_r and v_i are the weights attributed to the r -th output and to the i -th input. The sign of μ_0 gives a signal of the presence of scale economies or diseconomies. If we find that $\mu_0 > 0$, then there is evidence of scale economies; if $\mu_0 < 0$ we are pointing out the existence of scale diseconomies. This has an interpretation in terms of peers, i.e. firms which are combined to give the benchmark for each firm or, more precisely, the efficient banks which enter in the linear combination which constrains each firm's output in the dual DEA. If $\mu_0 > 0$, the size of the peers is greater than the one of the firm of which we are evaluating the efficiency: the conclusion is that economies of scale exist¹. The opposite for $\mu_0 < 0$.

This method, proposed by Banker, Charnes and Cooper (1984) is the most used in this kind of analysis, although it is subject to some criticism. As Resti (1994) suggests, under the assumption of equidistribution of efficient firms with respect to size, it is indeed more likely to find economies of scale for smaller firms and diseconomies for bigger ones, because the former set is compared to a

¹Indeed, if $\mu_0 < 0$, the dual of the problem is the standard dual of a DEA model, with the addition of a constraint imposing that $\sum \lambda_i < 1$. This means, in the classical interpretation of the dual, that the weights used to construct the linear combination which represents the firm sum to a value lower than one. It has the interpretation in terms of peers in the text: if $\sum \lambda_i < 1$, the size of the peers is greater than the one of the firm of which we are evaluating the efficiency. The fact that efficiency is raised by the comparison between the firm and larger peers is interpreted as an evidence of diseconomies of scale.

large number of bigger firms, while the latter set is compared to a low number of even bigger ones. This is called the "sample size effect". It is then wise to use this method only with a big sample size and not to take into account the results obtained for the firms whose size is extremely high or low. Moreover, the method can give different results for firms having exactly the same size, but whose peers are different.

Favero and Papi (1995) used a sample consisting of 174 Italian banks, representing the 80% of total deposits, with cross-sectional data referring to 1991. In their analysis about the determinants of efficiency, they tried to single out which of the two DEA models, the constant returns to scale or the variable returns to scale one, better fitted the efficient frontier of the Italian banking system. They found a statistically significant difference between the efficiency scores given by the two formulations of the problem² and so they concluded that scale inefficiencies exist. A variable returns to scale model seems more appropriate to describe the envelope form than the constant returns to scale (CRS) one; however, according to the two authors, there is no evidence of increasing returns to scale on the envelope: for some banks the model features increasing returns to scale, for some others it depicts decreasing returns to scale, without a direct correlation with their size.

Resti (1994), whose sample consists of 45 banks with data referring to years from 1988 to 1991, proposes an "index of economies of scale" (IES), equal to the percentage increment of the efficiency score from the CRS to the VRS model³, with the sign of μ_0 :

$$IES = \left(\frac{\theta_{VRS}}{\theta_{CRS}} - 1 \right) \frac{|\mu_0|}{\mu_0},$$

where θ_{CRS} is the efficiency score obtained by the CRS model and θ_{VRS} by the VRS one.

For each element of the sample, we can analyze the effect on the efficiency score of μ_0 s of different signs. If we find that the value of θ obtained with respect to both different settings is always equal to one, then the bank is always efficient. If the scores obtained under the hypothesis of constant returns to scale and under the modified problem are different, then we have to check whether the efficiency of the firm increases when compared to smaller *peers*. If we find that $\mu_0 > 0$, as pointed out above, there is evidence of economies of scale.

Resti's analysis⁴ shows the possible existence of scale efficiencies both for the smallest banks - those with a deposit amount smaller than 10.000 billions

²This statement was proved by regressing the ratio between the two values on a constant.

³The DEA models contained 3 outputs (loans, deposits, non-interest income) and 2 inputs (labour, defined as the total number of employees, and capital, given by a measure of net fixed assets).

⁴The analysis in the paper is conducted by imposing some constraints on the weights given to the variables in the D.E.A. model. This method is useful to give more realism to the relative importance of each variable included in the linear program and to treat better the joint presence of physical and monetary quantities.

of Italian Liras - and for the biggest ones, which have a deposit amount greater than 40.000 billions of Italian Liras. This is an interesting result, since the Italian system is made up by a large number of small institutions. However, the first result can be biased by the "sample size effect". The second fact is instead contrasting with that effect, since biggest banks are obviously compared mainly to smaller ones. The finding of an IES positive for most of the major banks is interpreted by Resti as a clear evidence of increasing returns to scale for banks over a certain size (30-40 thousands of billions of Italian Lire). The value of the index is higher than zero for all the banks, ranging from 1% to 16%, with the exception of just one element of the sample, which has a negative IES. In later researches, Resti (Resti, 1997) finds more support to this results by confronting mean efficiency scores obtained for different groups of banks divided by size: under the hypotheses of variable returns to scale major banks reach a general level of efficiency of around 90%, while minor ones hardly pass 70%. The sample was made up of 270 Italian banks, each one considered for 4 or 5 years (data range from 1988 to 1992).

In the same paper (Resti,1997), the author presents an analysis on whether geographical localization influences efficiency or not. The results, obtained by dividing a large sample of banks into subgroups and computing each group's mean efficiency, show higher scores for North-Western banks, while the Southern ones reach the lowest value. Running a CRS model, the mean efficiency of North-Western banks between 1988 and 1992 is about 71%, while the Southern ones reach 65%. The highest value in the VRS DEA model is obtained by banks scattered among the territory (about 82%), but banks located in the North-West outperform Southern ones (79% vs. 70%). This effect holds for all the years taken into exam.

Favero and Papi (1995) obtained the same result by regressing the scores on a dummy which could discriminate between banks mainly located in the North, in the Centre or in the South of Italy; they found evidence of less efficiency linked to banks operating in the latter region.

Moreover, after finding evidence of variable returns to scale as mentioned above, they tried to identify some factors influencing the efficiency scores. Similarly to what they did for geographical localization, they regressed the scores obtained through a VRS DEA model on the values of some possible determinants and tested the statistical significance of the OLS coefficients. They regressed efficiency on a dummy for size, on an indicator of productive specialization, on the type of ownership. They found that the variance explained by each of these variables was low; however there was some evidence about the negative effect of being smaller and the positive one of specialization. This means that banks whose profits are mainly generated by non-traditional banking services and who are big show greater efficiency. The results are consistent with different choices of inputs and outputs, relating to the Intermediation and to the asset approach⁵.

⁵According to the Intermediation Approach banks are seen as the intermediators, whose function consists in transferring resources from units in surplus to units in deficit. The Asset Approach is a variant of the Intermediation approach; outputs are defined by assets and loans, inputs are essentially labour, capital and deposits. In the Intermediation approach, instead,

An interesting analysis about the influence on efficiency of a measure of riskiness of loans issued by banks, although quite preliminary, was carried out by Resti (1997). He included the ratio of "bad" loans on total loans (BTL) in the DEA model as a non-discretionary variable⁶. He found evidence of a link between credit quality and efficiency: inefficient firms do not improve their score when the BTL ratio is included in the model. Indeed, there is a negative and significant correlation (-27.5%) between inefficiency evaluated with a standard VRS model and the difference between this score and the one obtained running a model without the inclusion of the BTL ratio. From this analysis it is possible to conclude that extra-costs in which inefficient firms incur do not seem to be generated by a more expensive but effective monitoring of loans.

3 The Italian case in the European Union

>From the works of Favero-Papi (1995) and Resti (1997) we can get an idea of the general level of efficiency of Italian banks. The mean level of efficiency in the years between 1988 and 1991 is around 70-75% through a CRS model and around 75-80% under a more realistic hypothesis of variable returns to scale. Resti, who compares the scores obtained in different years, shows that there is no improvement in the general level of efficiency during the period.

The creation of an integrated European market and the progressive enlargement of the European Union increased the competition between the banking systems of many different countries. In this context, cross-country comparisons became more and more important in order to find out which of these systems reached the higher level of efficiency.

Many papers have then explored this field, starting from the beginning of the literature on banking efficiency (see for example Berg et al. (1993), Pastor et al. (1997)).

>From the period immediately before the introduction of the Euro up to nowadays, some applied works tried to measure the general level of efficiency of the different European countries⁷. The need for a more complete analysis about the general situation in the European Union became indeed greater after the year 2000, when the integration process for the market had already walked a long path. In this context, which is still today's one, deregulation is increasing integration and thus encouraging the cross-border activity of European banks.

Lozano-Vivas, Pastor and Hasan (2001) analyzed bank performances of some of the EU member countries, in order to compute the general level of efficiency of their banking systems. They obtained results based on 1993 data on 10 European countries, running two different models: a basic one and another one

deposits (current accounts and saving deposits) shift from the input side to the output one.

⁶Non-discretionary variables are not under the control of management: they cannot be directly controlled by the firm in the short term. They appear in the constraints, to ensure that each firm is compared with the ones having the same properties.

⁷An example of one of these works is Hollò-Nagy (2006), which carries out an econometric X-efficiency analysis on the 25 countries included in the European Union until 2006.

including environmental factors. In the first case, they computed the mean efficiency score (θ_b) obtained by each banking system running a model containing labor and capital as inputs and loans, deposits and other earning assets as outputs. The scores, which are reported in the first column of figure 1, are low compared to those obtained in single country studies. This is due to the fact that a common frontier, pooling all the banks in the sample, is estimated: only the best firms among all the countries will be efficient and some firms on each single country's frontier will become inefficient when compared to foreign ones. It is then obvious that the mean efficiency scores will be lower. According to this model, Italy ranks 5th among the countries present in the sample.

However, the analysis conducted in the paper of Lozano-Vivas et al. states that, if we take into account the environmental differences between the EU members, Italian banks are the least efficient ones. Indeed, the second column of figure 1 reports the scores (θ_c) obtained running a DEA model modified with the inclusion of four environmental non-discretionary variables which reflect the main economic conditions in which banks operate⁸. The results are considerably different from those obtained with the basic model. Countries occupying the last positions of the ranking based on the basic model, such as Spain, Portugal and Denmark, seem to show the highest levels of mean efficiency. Adding the non-discretionary variables permits to "level the field" and compare firms belonging to different countries as if they were operating in the same conditions. This procedure always increases the efficiency scores, and we can expect that they will increase more for the banks operating in worse environments. The ratio between θ_b and θ_c can be considered as a measure of the goodness of the environmental conditions of the country (the higher the ratio, the better the environment).

Country	θ_b	θ_c
Belgium	42.20	79.32
Denmark	19.91	75.45
France	24.23	40.98
Germany	26.67	57.87
Italy	25.43	33.10
Luxembourg	49.49	62.30
Netherlands	37.38	51.75
Portugal	15.99	79.87
Spain	18.91	82.14
U.K.	22.08	58.65

Table 1: efficiency scores for EU member countries, without and with the inclusion of environmental variables

Italy is considered a country with one of the best economic and social backgrounds (its value of θ_b/θ_c is second only to Luxembourg's one), but its efficiency score θ_c is the lowest in the sample. According to this analysis, Italy

⁸These variables, selected among a set of 9 variables with a forward procedure, are the density of demand (deposits per square kilometer), a measure of the average capital (equity over total assets), the income per branch and the salary per capita.

seems to be an attractive market for foreign banks, who could use their greater level of efficiency to exploit such an inviting environment.

According to data referred only to large banks (more than 27 millions of assets), it seems that, also for later years, Italian banks reached a lower level of efficiency with respect to the other European ones. Casu and Girardone (2002b), find that, constructing a common VRS frontier pooling English, French, Spanish, German and Italian institutions, the last ones are the least efficient. Moreover, while cost efficiency scores for the other four countries' system increase during the period taken in exam (from 1993 to 1997), Italian scores do not.

4 Do conglomerates have a competitive advantage?

Since the adoption of the Second Directive (1989), the European Banking system has deeply changed. Deregulation and the increasing importance of universal banks gave incentives to commercial banks to expand themselves or to merge in order to consolidate their positions in the market.

Given this situation, the number of banking groups increased regularly during the last decade. The Italian system, which was very fragmented and localized at the beginning of the Nineties, reacted to the new challenge of a Single European Market moving towards higher and higher concentration: between 1993 and 2002 there were about 500 M&A operations. The number of banks decreased by 20% in that period, and the average number of branches, which can be interpreted as an indicator of size for banking institutions, almost doubled. This concentration process led in 2002 to a situation in which the first five groups held the 55% of the total assets. The push towards consolidation has not yet come to an end: in 2006 one of the biggest mergers in the Italian history took place, when two of the largest banking institutions, San Paolo IMI and Banca Intesa, gave birth to a unique group.

According to Vander Venet (2002), there is a methodological distinction between financial conglomerates and universal banks. The former are institutions whose activity on the market is diversified and which act at least in two of the following three fields: insurance, traditional banking and securities-related activity; the latter have the same characteristics but do also hold equity in non-financial companies.

The usually mentioned advantages of a banking group, as compared to individual institutions, are:

1. the capacity of a group to diversify risks;
2. the easiness of alliances with other businesses;
3. the better organizational flexibility;
4. the possibility of exploiting scale and scope economies.

While the first two advantages are quite intuitively true, the last two could be not so likely. Indeed, it is possible that the creation of a group does not lead to a more flexible organization, but to a more complex and maybe costly structure, at least at early stages. Moreover, in the applied works there is no clear evidence on the better performance of banking groups compared with individual institutions.

Vander Vennet (2002), for example, analyzed the efficiency of financial conglomerates and universal banks in Europe in the middle of the Nineties with econometric techniques on a sample of 2375 banks (176 conglomerates and 2199 specialized banks; 1066 universal banks and 1309 non-universal ones) and data on 1995 and 1996. He found that, while conglomerates seem to be more revenue efficient, they do not show evidence of higher cost efficiency⁹. Support to these results is given by Casu and Girardone's analysis (2002c) of the efficiency of Italian groups in the second part of the Nineties. Their sample is composed by all the banking groups registered in the *Albo dei Gruppi Bancari*: 36 in 1996, 40 in 1997, 44 in 1998, 48 in 1999¹⁰. Inefficiency scores range from 15% to 25%, consistently with the ones obtained for the previous years by Resti and Favero-Papi. They seem to be mainly due to technical efficiency rather than to allocative one: banking groups do not use the most efficient technology, but are more capable to choose input mixes close to the cost minimizing ones.

The years taken in exam constitute a period of increasing market concentration: the number of banking groups rises from 36 to 48. Efficiency, however, has a negative trend throughout the period if evaluated from the cost side, showing a clear decrease from 1996 to 1999. Profit efficiency, instead, is consistently and constantly improving¹¹.

Year	Technical efficiency	Allocative efficiency	Cost efficiency
1996	0.852	0.928	0.764
1997	0.884	0.837	0.706
1998	0.929	0.844	0.772
1999	0.742	0.758	0.578

Table 2: DEA efficiency scores of the Italian banking groups (1996-1999)

Casu and Girardone (2002a) applied a DEA non-parametric approach to study the efficiency of Italian banking groups. The sample is made by 110 observations and it is divided into two subsamples: the first one is composed by 32 banking groups, the second by 43 parent companies (the institutions leading the groups, taken individually) and 35 subsidiaries (banks which are part of the groups and whose capital is held by the parent for at least the 20%). The results show that banking groups reach a lower mean efficiency score than stand-alone banks, namely parent companies and subsidiaries taken individually.

⁹Universal banks are instead more efficient both on the profit side and on the cost side.

¹⁰The DEA model uses total loans and securities as outputs, deposits, labour and capital as inputs.

¹¹Scores are also regressed on some determinants. Efficient groups seem to be the ones that are more capitalized, follow a strategy of growth, have a lower incidence of labour expenses on gross income and have better quality of loans conceded.

Furthermore, they investigated the presence of scale economies, by evaluating the scale efficiency scores. They failed to find evidence of increasing returns to scale for groups.

	Banking Groups	Individual institutions
CRS	0.834	0.883
NDRS	0.839	0.895
NIRS	0.883	0.891
VRS	0.887	0.903

Table 3: Mean efficiency scores, obtained on Constant Returns to Scale (CRS), Non Decreasing Returns to Scale (NDRS), Non Increasing Returns to Scale (NIRS) or Variable Returns to Scale (VRS) assumption.

Moreover, efficient banks are distributed equally across each asset-based quartile. This means that there is no evidence of scale economies neither in the sample of groups, neither in the one composed by the parent and subsidiaries taken individually. However, using Stochastic Frontier Analysis, the authors find evidence of advantages in terms of economies of scope.

5 Conclusions

This paper has reviewed the determinants of efficiency of the Italian banking sector, mainly in order to single out economies of scale. Resti (1994, 1997) found evidence of a competitive advantage for larger banks in terms of efficiency at the beginning of the Nineties, while Favero and Papi (1995) found a generally higher level of efficiency for Northern banks and banks engaged in non traditional activities.

The last fifteen years have brought big changes in the banking activity and in the role of financial institutions. The creation of an integrated European Market put the banks of different countries into direct competition. The analysis of banking efficiency moved then to cross-countries comparisons and put into evidence a low level of efficiency of Italian banks. In general, the scale economies found by Resti at the beginning of the Nineties seem no longer to be supported by later data. It is likely that a more developed market has put institutions in a situation in which bigger banks have no advantages in terms of efficiency.

The last decade was characterized by a constant process of concentration. As explained in the last section, there is no evidence that this trend has helped banking institutions in becoming more cost efficient. A possible explanation of this fact is that, at least at early stages, the group is unable to exploit advantages in terms of organizational flexibility. Moreover, both Casu and Girardone (2002) and Vander Vennet (2002) do not find evidence of scale economies for conglomerates. Italian banking groups, as well as the other European ones, seem to have a competitive advantage over individual institutions not due to size, but to the possibility of exploiting diversification opportunities.

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