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Regulation and the Crisis: The Efficiency of Italian Cooperative Banks

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Abstract
In this paper we analyse the impact of the current financial crisis on the determination of technical efficiency in a sample of Italian small banks, highlighting the interaction of the crisis with different regulatory regimes existing for cooperative banks (CB's) and other banks. We find that the crisis has a negative impact on efficiency, more so for CB's. This is to be expected, as the CB's principle of external mutuality and their branching regulations are likely to locate them in less performing areas. In accordance with this prior, the differential impact of the crisis attenuates or vanishes when we include in the production set some indicators of local environment (GDP per capita). Correspondingly, we find novel evidence in favour of the "bad luck" hypothesis suggested by Berger and De Young (Journal of Banking and Finance, 1997).

JEL classification:D24, G21, L89

Keywords: Cooperative banks, Technical efficiency, Local shocks, Territorial diversification.

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1. Introduction

In the literature concerned with the determination of bank efficiency the themes of regulation and proprietary forms have always enjoyed a prominent status (Berger and Humphrey, 1997; Berger and Mester, 1997). These themes have almost invariably been taken in account without explicit allowance for the socio-economic environment of banks and its changes. In this paper we carry out a frontier efficiency analysis of Italian small banks, focusing upon the effect of the current financial crisis on banks' performance, and analysing its interaction with different regulatory regimes existing for cooperative banks (CB's) and other banks. Indeed, comparing the outcome of the crisis on Italian CB's with that on other small banks is likely to shed novel light on the interaction between regulation and banks' socio-economic environment. Their mission in favour of the local community, as well as current regulations may in the end endow CB's with poorer locations vis-à-vis other banks, harming their relative efficiency. In accordance with this prior, our evidence shows that the negative impact of the crisis on efficiency is larger for CB's. Furthermore, this differential impact attenuates or vanishes when we include in the banks' production set proxies of local environment (GDP per capita).

We believe that our analysis may be of relevance because the impact of the current crisis on European banks' efficiency has not yet been widely analysed (see however Asmild and Zhu, 2012, for a rather different kind of analysis on a sample of large European banks). Moreover, Italian CB's are also a relevant topic of their own, having spurred considerable policy interest (see, for instance, Angelini, 1998; Fonteyne, 2007, Battaglia et al., 2010).

As will be made clearer below, the possibility to compare CB's with other banks' profit- (or even cost-) efficiency must be seriously doubted. Comparing their relative technical efficiency seems much more appropriate. Given this strong interest in technical efficiency, we estimate efficiency using a non-parametric method (DEA with variable-returns to scale: Banker et al., 1984), avoiding some well-known problems posed by the computation of technical efficiency in a parametric multi-output set-up (Greene, 1980).

Our analysis proceeds as follows. Section 2 examines the literature on the determination of bank efficiency, stressing the role of regulation and shocks. In Section 3 we introduce the reader to some features of Italian CB's and, more generally, of the Italian economy, which provide the backbone of our analysis. Section 4 describes our empirical set-up: the composition of the banks' sample and the other data sources used, as well as the different models we specified and estimated. Our key findings are set out in Section 5. Some concluding remarks close the paper, taking stock of our evidence and proposing avenues for future research.

2. The determination of bank efficiency: a short survey

For our purposes it is convenient to characterise the multi-faceted nature of the banking production process (Van Hoose, 2010) in the following manner: let $\mathbf{X} \in R^p_+$ denote the vector of inputs and let $\mathbf{Y} \in R^q_+$ denote the vector of outputs. Banks transform quantities of inputs into outputs, but some factors beyond the control of bank managers (at least in the short run) may affect this process. The correct measurement of bank efficiency hence requires allowance not only for the appropriate input and output set, but also for the right vector of exogenous factors $\mathbf{Z} \in \boldsymbol{Z} \subset R^r$. In this section we provide a short survey of the role of these factors, which are going to be crucial for our analysis. There are some already some well-known surveys in this field, the most notable being perhaps Berger and Mester (1997), Hughes and Mester (2008). Here we want to stress the role of regulation and shocks, as well as other issues of particular relevance for the analysis of bank efficiency across sub-national areas for European countries (such being the main focus of interest of this paper). We also pay greater attention to relatively recent studies.

The impact of regulation and regulatory reforms on bank efficiency has undergone a substantial treatment in the literature. Yet, it ought to be noticed immediately that the label of regulation covers various issues, not fully consistent with each other. These issues include the nature and modus operandi of the regulatory authority, as well as the application or withdrawal of restrictions on price and quantity decisions (including decisions about reserves and capitalisation), geographic diffusion (branching rules), lines of trade, market entry. The latter issues, of high interest for us, have often been linked to the analysis of output diversification, market structure (consolidation and concentration), privatisation.

A first, rather non controversial, point (see Papanikolau, 2009, for a thorough account of a large literature and some interesting results for a large EU-27 sample) is that the diversification of bank output favours both cost and profit efficiency. Accordingly, it is by now customary to include, among banking outputs, some measure of non-interest income business alongside with those traditional financial intermediation activities.

Focusing on branching and geography-based regulation, Hughes et al. (1996) find in the US that a higher number of branches is positively correlated with bank efficiency, whilst an increase in the number of states in which a bank operates has an insignificant effect. Yet it seems that interstate bank diversification has improved bank efficiency in the US after the enactment of the Riegle-Neal Interstate Banking and Banking Efficiency Act in 1994. Hughes et al. (1999) find that interstate banking leads to a higher level of profitability and a lower level of earning volatility, insolvency risk, and market risk. Also for the US, Deng et al. (2007), measuring territorial diversification through various indexes of deposit dispersion, find that diversification has a favourable impact upon the risk-return profile of bank holding companies.1 These findings are related to the impact of M&A's on bank efficiency, a point also made in Bos and Kolari (2005), who, considering the potential gains from geographic expansion for large European and US banks, concluded that profit efficiency gains were obtainable from cross-Atlantic bank mergers.

Attempts at singling out a causal chain going from deregulation to higher efficiency through higher competition have seldom met with resounding success. Brissimis et al. (2008), who carry out a thorough analysis of these relationships, conclude that the positive effect of deregulatory reforms on bank efficiency is only partly channelled through an increase in competition. At any rate, studies dealing with deregulation (abolition of credit rationing, interest rate regulation, free entry for banks from abroad, privatisation) usually find a positive relationship between this process and bank efficiency. This is the case of Sturm and Williams (2004) for Australian banks, of Tsionas et al. (2003) and Rezitis (2006) for Greek banks, of Isik and Hassan (2003a) for Turkish banks, of Brissimis et al. (2008) for a sample of banks from ten newly acceded EU countries. In a comparative study for Italy and Germany, Fiorentino et al. (2009) find that when Italian publicly-owned banks got privatised, they significantly increased their productivity, especially if they subsequently merged with other banks. Also German banks were able to increase their productivity through consolidation. Yet Hauner (2005) finds no response of efficiency to deregulation in a sample of relatively large German and Austrian banks. Similarly, Sathye (2002), focusing on Australian banks from 1995 to 1999 and the establishment in 1997 of the Australian Prudential Regulation Authority (taking over the role of the prudential supervisor from the Reserve Bank of Australia), finds relatively little impact for this reform. Since Sturm and Williams (2004) focus on a much longer period (1988-2001), this prompts Sathye to

[1] We will come back to the these points below, when dealing with risk-related behaviour in detail.

maintain that there may be an "optimal level of deregulation", beyond which very little efficiency gains can be obtained.

It is remarkable that most studies lump together the outcomes of broadly defined deregulatory reforms, instead of isolating some single aspects of them. Thangavelu and Findlay (2012), who attempt to do so for a sample of East Asian banks, find that stronger regulation of activities on non-interest income and official supervision tend to improve bank efficiency, while the contrary is true for more intense (private) monitoring of financial markets. Little has also been done in the literature about the hypothesis that the influence of deregulation may differ across different bank types (aside from Fiorentino et al., 2009, an exception to this rule is provided by Isik and Hassan, 2003a, according to which efficiency significantly improved after deregulation for all types of banks). This brings up the issue of interactions between deregulation and a further category, ownership, that is very important for our purposes.

Proprietary form, or, more generally, ownership structure is usually believed to be one of the main determinants of bank efficiency, along with other bank individual characteristics (mainly size, age and location). Surely, there are powerful factors presiding to the relationship between ownership structure and bank efficiency. There is however an evident lack of robustness in these results. In an important study, Altunbas et al. (2001) find evidence that German public and mutual (cooperative) banks have slight cost and profit advantages over their private sector competitors. This finding is vindicated by Isik and Hassan (2003b) for Turkey and by Hauner (2005) for Austria and Germany. Also for Turkey, however, Mercan et al. (2003) find the opposite result. Similarly, according to Garcia-Cestona and Surroca (2008), Spanish private banks (either profit- or nonprofit-oriented) are more efficient than public ones. For Italy, both Girardone et al. (2004) and Turati (2010) find that cooperative and popular banks are more efficient than (profit-oriented) commercial banks, while, as may be recalled, Fiorentino et al. (2009) find that Italian publicly-owned banks had a significant productivity lag vis-à-vis their private counterparts. Unlike in Altunbas et al. (2001), however, none of these Italian studies simultaneously control for bank type and size (yet Girardone et al., 2004, report that smaller banks are more efficient, and mutual banks are significantly smaller).

The analysis of the relationships between ownership structure and bank efficiency has also turned to factors typical of the corporate governance literature such as the managing board size and composition. Agoraki et al. (2010) find, in panel of large European banks, that smaller board structures are associated with higher bank efficiency and better management of credit risk. Moreover, dual board systems enhance efficiency, while ownership concentration seems to be insignificant. On the other hand, according to Tanna et al. (2011), who examine a sample of UK banks, the evidence of a positive association between board size and efficiency is not very robust.

There are various factors that can explain the lack of robustness in the results so far reviewed. Different environments cannot always be duly controlled for. Furthermore, when ownership structure is modelled with some care, going beyond the most obvious categories (public vs. private, for instance), the analytical focus improves, but bank-level characteristics can be assumed to be beyond the control of bank managers (and thus exogenous) only as a first approximation. Finally, very seldom the literature deals with clearly defined, exogenous, policy experiments. We shall take these points into account, when turning to our empirical analysis.

Above we have already referred to the potential role of location. It has also long been known that efficiency measurement involving banks from different areas ought to make allowance for territorial differences in the socio-economic and institutional environment. Indicators of these differences traditionally include GDP per capita, population density, the degree of concentration (measured by the Herfindahl-Hirschman index), measures of bank deposit or branch density (per capita or per square kilometre) and of bank profitability (income or deposits per branch). Dietsch and Lozano-Vivas (2000) and Lozano-Vivas et al. (2002) provide a thorough survey of the role of these factors, as well as an assessment of some of them in a European cross-country set-up (a more recent example for East Asian countries is Thoraneenitiyan and Avkiran, 2009).[2]

It can be easily argued that similar indicators are needed in order to take into account territorial differences within a given country, if the latter is characterised by marked heterogeneity. Yet, examples of sub-national analyses for these factors are much less frequent. A telling example is the analysis of Hasan et al., 2009, which, although very thorough on many accounts, fails to allow for within-country differences in socio-economic environment. Exceptions to this pattern are typically provided by Italian studies. A good example is Battaglia et al. (2010), who analyse the impact of various regional factors in a sample of Italian CB's. With its high territorial heterogeneity and good data availability, Italy is indeed a promising field of analysis for this kind of issues.

Another point, long recognised but not yet been fully exploited in the literature, is that socio-economic differences may relate to rates of growth as well as to levels. This also means there has been little attempt to investigate the impact upon bank efficiency (particularly in Europe) of the financial crisis that set on in late 2007. More generally, differences in the socio-economic and institutional environment, and especially their changes, are also crucially related to the treatment of risk. Changes in economic environment may bring about risk of losses owing to customers' problems to pay back their debts and a deterioration in banks' performance (the “bad luck”

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2 Perhaps because of multicollinearity, it is often difficult to make sense of the impact of any of these factors, taken in isolation, upon the efficiency of banks.

hypothesis). Yet, also poor management may bring about a higher insolvency risk (the "bad management" hypothesis). A popular indicator of credit risk, linked to both the "bad luck" and "bad management" mechanisms, is the amount of bad (overdue) loans or their share upon total loans (see, e.g., Berger and De Young, 1997; Girardone et al., 2004; Fiorentino et al., 2009; Fiordelisi et al., 2011; Asmild and Zhu, 2012).

If bank managers are not risk-neutral, their degree of risk-aversion is likely to be reflected in their choices: in principle, highly capitalised banks are more likely to cope with possible risks without incurring danger of default. Reflecting this, analyses of banking efficiency often allow for measures of solvency such as the equity-asset ratio (see, e.g., Hughes and Mester, 1993; Mester, 1996; Fiordelisi et al., 2011).

An important point concerning these issues, already made by Berger and De Young (2007), is that it could be interesting to analyse the "bad luck" hypothesis relying on risk indicators that are exogenous for a given bank. To the best of our knowledge, this attempt has never been carried out in the literature.

A further fundamental point concerning risk management, which we have already partially touched upon, is risk diversification. Diversification can occur across income sources, industries (Papanikolau, 2009; Rossi et al., 2009) or geographical areas. We have already dealt with the US results for territorial diversification from Hughes et al. (1996; 1999), Deng et al. (2007). More recently, the attention of this literature has switched from branching to loan portfolio diversification. Yet only in Berger et al. (2010), loan diversification is assessed across sub-national areas (the Chinese regions). According to this study, both product and geographic (loan) diversification is associated to lower efficiency, most likely because of greater monitoring problems.

In this paper we aim to expand the literature analysing the impact of the current crisis on the efficiency of Italian banks, and taking up several points that have been prompted by this survey. We shall focus on the interaction between the crisis and a single, relatively neglected, regulation feature: geographic (branching) restrictions. We will compare the performance of CB's and other small banks, exploiting the fact (to be elucidated below) that peculiar location rules apply to CB’s. Problems of variable omission and endogeneity shall be taken into account through an appropriate estimation strategy. Also, territorial differences in the socio-economic environment will be measured through a GDP per capita indicator computed at a finer level of territorial disaggregation than hitherto utilised in the literature (this level approximately entails a population close to a local bank customers’ pool). This indicator, although allowing for a great deal of heterogeneity, is exogenous for a given bank, providing a novel test of the 'bad luck' hypothesis.

3. Italian cooperative banks: main features and environment

In Italy there are nowadays approximately 430 CB's with more than 3600's branches (about 11% of the total of all branches) and shares of 6.6 and 8.3% over, respectively, total loans and deposits. Italian CB’s are characterised by small size, self-governance, a very local attitude, and the principle of mutuality (internal: the activity is mainly biased in favour of members; external: there important activities aimed at supporting the moral, cultural and economic development of the local community), and have an important role in the financing of households, artisans and small businesses (Angelini, 1998; Fonteyne, 2007, Battaglia et al., 2010). External mutuality means (among other things) that CB's will often end up in relatively lower income areas than other banks (prima-facie confirmation of this can be found in Table 6, in the Appendix).

Italian CB's must apply the so-called *principle of prevalence*, requiring that more than 50% of assets are either loans to co-operative members or risk-free assets, according to the criteria established by the Financial Regulator. Furthermore, as far as profit distribution is concerned, the *Testo Unico Bancario*, 1993, requires that CB's must:

1. devote at least 70% of annual net profits to legal reserve;

2. pay a share of annual net profits to mutual funds for the promotion and development of cooperation in an amount equal to 3%;

3. devote the remaining share of profits to purposes of charity or mutual aid.

Because of these regulations, CB's cannot maximise profits by choosing an optimal combination of outputs. Hence, they cannot be properly compared with other banks profit-efficiency wise. Moreover, CB's employees are often cooperative members as well, a fact that is likely to impinge heavily on CB's allocative efficiency (Pestieau and Tulkens, 1993; Fonteyne, 2007). On the other hand, comparing CB's technical efficiency with that of other banks seems much more appropriate, because CB's too need to meet a survival requirement (Pestieau and Tulkens, 1993).

There is a further important point. CB's can provide loans only within a given area, the so-called area of territorial competence (*area di competenza territoriale)*. The territorial competence (jurisdiction) of the CB's is determined by the Supervisory Instructions of the Bank of Italy and must be specified in their statute. It includes the municipalities in which the bank has its head office, branches and the surrounding areas, so that there must be territorial contiguity between these areas. Only in very special cases can CB's open branches in non-contiguous municipalities.

In Table 1 we highlight some consequences of this state of affairs. CB’s have less branches than other small banks (as defined by the Bank of Italy), and the mean distance between their head office and a given branch is much smaller.

Table 1 - Number of branches and head office-branches mean distance, percentiles for bank types, years 2006-2010.

Percentiles	Number of branches		Head office-branches Mean distance	
	CB's	Other Small Banks	CB's	Other Small Banks
5%	1	1	0	0
25%	4	7	2,60	10,67
50%	7	31	4,82	23,01
75%	13	86	7,99	79,93
95%	27	200	16,80	212,99

Source: own calculations on BilBank 2000 and Bank of Italy data

Sticking to the area of territorial competence greatly hampers any move to territorial diversification on the part of CB's and is likely to make them very sensitive to local shocks. In this paper we provide some measures of the efficiency loss ensuing from this institutional difference. To do so, however, we must have some quantitative indicators of local shocks at an appropriate territorial level.

A very important analytical category for territorial economic analyses in Italy is the *Sistema locale del lavoro*, SLL). This is a group of municipalities (akin to the UK's Travel-to-Work-Areas) adjacent to each other geographically and statistically comparable, characterised by common commuting flows of the working population. They are an analytical tool appropriate to the investigation of socio-economic structure at a fairly disaggregated territorial level. The identification of 686 SLL's made by ISTAT (the Italian Statistical Office) in some recent research (ISTAT, 2005) has highlighted remarkable differences in economic performance across the Italian territory.[3]

[3] For purposes of comparison note that there are nowadays in Italy 110 *province* (the NUTS3-type classification) and 20 *regioni* (the NUTS2-type classification).

SLL-level indicators are likely to provide a much more accurate representation of the socio-economic environment than the usually adopted provincial (NUTS3) or regional (NUTS2) indicators. However, it could be rightfully asked what is the precise relevance of SLL-level statistical information for local banks. We immediately stress that there is no precise correspondence between a SLL and the area of territorial competence of a CB. However, especially for the smaller CB's, there is a close correspondence between the SLL's population and the bank customers' pool (calculated as the sum of populations from municipalities where the bank has a branch). This correspondence is shown in Table 2, that also highlights how the population of the closest territorial divide (the *provincia*) is usually much larger than the CB customers' pool. Also note that the customers' pool of other small banks, unhampered by territorial regulations about loan provision, is significantly larger.

Table 2 - Population and customers' pools, percentiles for various territorial divides and bank types, years 2006-2010

Percentiles	SLL population	*Provincia* (NUTS3) population	CB's customers'pool	Other Small Banks customers'pool
5%	6,978	141,195	4,485	54,147
25%	13,718	231,330	19,129	694,700
50%	34,276	369,427	74,373	2547,677
75%	79,595	580,676	250,342	7109,032
95%	268,503	1,239,808	1225,440	28417,586

Source: own calculations on ISTAT and BilBank 2000 data

We conclude that SLL-level data are likely to provide useful information on the local shocks relevant for CB's, potentially yielding novel evidence about the "bad luck" hypothesis and the importance of territorial diversification.

4. The empirical set-up

We model the banks' production set through the "asset" (or "intermediation") approach, that has acquired some ascendancy in the literature (Sealey and Lindley, 1997). Accordingly, our output set will include: *customer loans*, *securities* (loans to banks, Treasury bills and similar securities, bonds and other debt less bonds and debt securities held by banks and other financial institutions), *other services*[4] (commission income and other operating income). The vector of inputs consists of the following items: *physical capital (number of branches)*, *number of workers*, and *fundraising*: total liabilities to customers, amounts owed to banks and debt securities (bonds, certificates of deposit and other securities).

Let us now turn to the more specific part of our analysis. Our basic hypothesis is that the impact of the crisis is stronger for CB's, because of their initial location choices and their smaller scope for territorial diversification. Hence, including some local shock indicators in the production set should improve on average the efficiency of CB's vis-à-vis other small banks.

Our chief indicator of local shocks is the variation of SLL-level GDP per capita before and after the financial crisis. As previously argued, this indicator is likely to provide a good measure of territorial heterogeneity. Yet it can be reasonably supposed to be exogenous for small banks, allowing an appropriate test of the "bad luck" hypothesis. We expect that, without local environment indicators in the production set, the technical efficiency of CB's should be more affected by the crisis. On the other hand, allowing for the change in the GDP per capita of the SLL where the bank's head office is located, should significantly diminish the differential impact of the crisis across CB's and other banks. As we shall see below, this amounts to a "difference-in-difference" estimation strategy, which has also the advantage of taking into account a large class of omitted variable problems. Unobserved time-invariant differences among bank types and in their environment are not going to bias the evidence, being wiped put by the time-difference

[4] The inclusion of this item follows from the literature on output diversification (Papanikolau, 2009).

operator.

We provide various robustness checks for our expected nexus.

1) We estimate both input- and output oriented DEA models. In principle, the impact of the crisis and its interaction with regulation should not depend on the orientation of the analysis.

2) We provide estimates for both (pure) technical efficiency and scale efficiency. According to the bad luck literature, local shocks should affect the relationship between outputs and inputs for any given production scale. Hence we expect a much stronger impact of the crisis (and its interaction with regulation) for (pure) technical efficiency.

3) We experiment with several variables controlling for various features of risk and its diversification. We measure credit risk - or (poor) loan quality - through the amount of bad loans.[5] We do not allow for non-performing loans because they represent a milder form of risk, possibly biasing the measurement of credit risk. Differences in risk-related behaviour are accounted by an index of capitalisation (equity, equal to capital plus reserves – without adding profits or losses -, over total assets). Finally we measure diversification also through the mean distance between a bank's head office and its branches (a measure akin to the diversification indicators constructed by Deng et al., 2007).

Including these variables in the production set may also in principle reduce the differential impact of the crisis across bank types, providing a benchmark for the role of changes in the SLL-level GDP per capita.

4) In the difference-in-difference procedure, we take two thresholds for the year when the crisis has supposedly set in (2007 and 2008).

Given our interest in measuring technical efficiency in a multi-output production set, we adopt

[5] We also experimented with the ratio between bad and total loans, obtaining virtually the same results.

the DEA (variable-returns to scale) non-parametric method (Banker et al., 1984), side-stepping the so-called Greene problem, inherent to the calculation of technical efficiency in a parametric cost-function set-up (Greene, 1980). As DEA, like other non-parametric approaches, is very sensitive to the presence of outliers, which may bias estimates, we searched and eliminated all the outliers in the dataset using the super-efficiency and rho - Tørgensen's concepts (Tørgensen et al, 1996).

GDP per capita, capitalisation, and mean distance from the head office are included in the production set as a fixed (non-discretionary) inputs. The latter two, although being in principle choice variables, can be considered as fixed in the short run.[6] On the other hand, following Fethi and Pasiouras (2010), Asmild and Zhu (2012), the amount of bad loans is included in the production set as a discretionary input, penalising banks who may not select their loans with the due care, or who anyway may achieve a larger loan portfolio at the cost of quality.

In estimating our DEA models, summed up in Table 3, we relied on two packages based on the freeware R (FEAR 1.13, Benchmarking 0.18).

Table 3 - The Empirical Models; The Production Set

Models	**# 1**	**# 2**	**# 3**	**# 4**	**# 5**
INPUTS	Physical Capital Labour Fundraising	= “# 1” + SLL- level GDP per capita (non-discretionary)	= “# 1” + bad loans (discretionary)	= “# 1” + capitalisation (non-discretionary)	= “# 1” + Mean distance (non-discretionary)
OUTPUTS	Customer Loans Securities Other Services	= “# 1”	= “# 1”	= “# 1”	= “# 1”

Given our interest in CB's and local shocks, and the eminently comparative nature of frontier analysis, our sample relates to essentially local banks. It is made up by Italian banks classified by

6 Including capitalisation as an input reflects the outcome of a large literature (Fethi and Pasiouras, 2010; Fiordelisi et al., 2011).

the Bank of Italy as a small (funds below 9 billion euro). We use data compiled from the database "BilBank 2000 - Analysis of bank balance sheets" distributed by ABI (the Italian Banking Association) for the 2006-2010 period.[7] The sample includes all CB's and most of the former savings and *popular* (*popolari*) banks. In the rest of the paper, these other small banks shall often be dubbed as Others. Table 4 (in the Appendix) provides some background information about the sample by geographical location and bank type. The balance-sheet information in this database allows calculation of measures for our inputs and outputs, as well as for asset quality and capitalisation. The GDP per capita of the head-office's SLL is constructed by updating the SLL value added data from ISTAT through the 2006-2010 data from the Bureau Van Dijck's AIDA dataset. Population is from the ISTAT SLL data-set. The mean distance between a bank head office and a given branch is taken from the Bank of Italy's database of branches. It is the availability for this variable that fundamentally drives our sample choice. Descriptive statistics about the baseline production set and all additional variables are provided in Tables 5 and 6 (also in the Appendix), highlighting differences in structural characteristics across areas and bank types, as well as the evolution of these characteristics before and after the crisis.

5. The empirical evidence

We applied DEA to Models #1 - #5, pooling all years together. Summing up our arguments again, our main a priori expectation is that CB's are much more affected by the current financial crisis than the other banks, due to their localisation rules. This impact should also be stronger when considering technical (as compared to scale) efficiency, since local shocks ought to affect

[7] No data are available before 2006 for some of our variables of interest.

the relationship between bank inputs and outputs for any given production scale. On the other hand, no a priori difference is to be expected across input- or output-oriented efficiency scores. This differential impact should also attenuate or vanish when local GDP per capita is included in the production set.

In Table 7 (in the Appendix) we detail the efficiency estimates for our five models, across bank types and time. In order to provide some additional information and room for interpretation, we also report mean efficiency scores from Italy's four territorial partitions (North-West, North-East, Centre, South).

Starting from Model #1, it clearly appears that CB's are less efficient than other banks (the models' efficiency scores are detailed in Table 7a; for the reader's ease, we also highlight differences in the cross-model mean scores in table 7b). This is not in accordance with previous literature, but, as we have already recalled, the available studies for Italian banks do not simultaneously control for bank size and type. It is common knowledge that smaller Italian banks are more efficient that their larger counterparts, and here we compare CB's with other banks of comparable (small) size.[8] More interestingly, the current financial crisis has clearly a stronger impact upon CB's. This is true for both input- and output-oriented technical efficiency scores, whilst the evolution of scale efficiency does not show any clear pattern.

Generally speaking, the impact of the crisis is stronger for input-oriented efficiency all across the board, but this is not of particular import for the present analysis. It is on the other hand highly significant for our purpose that Model #2 reveals that inclusion of local shocks, such as proxied by SLL-level GDP per capita in the production set, relatively improves the technical efficiency of CB’s. Interestingly, Model #2 seems also to reduce the efficiency divide across Northern and

8 Note also that scale efficiency differential seem to counterbalance those in technical efficiency. This may also explain why results from the parametric frontier literature (where these efficiencies are harder to disentangle) typically favour the CB's cost efficiency. It is not however our aim to further pursue this line of analysis here.

Southern banks. Also, and crucially, the inclusion of SLL-level GDP per capita attenuates the diverging evolution of technical efficiency differentials.

Examination of Model #3 reveals that including bad loans in the production set increases the efficiency of the Others. Also, if less strongly than with Model #2, it attenuates the differential pattern over time for CB's and Others' efficiency scores. Given the results from Model #2, this evidence rather favours explaining the role of bad loans in terms of bad luck. On the other hand, allowing for the equity-asset ratio (Model #4) has a strong impact on the efficiency scores, but does not appear to reduce their diverging evolution across bank types. It seems that capitalisation has a powerful influence over banks' efficiency (as also vouched by the large literature on this topic), but cannot effectively explain why CB's were more heavily affected by the current crisis. Finally, if we control for the mean distance between a bank head office and a given branch (Model #5), technical efficiency increases, but not much, and without any discernible impact on the evolution of technical efficiency differentials.

We could give to the above analysis a more formal twist, testing for the equality of efficiency scores across models. Yet, much as the previous evidence provides interesting prima-facie evidence about the impact of the crisis and its interactions with regulatory regimes, the measurement of efficiency levels may suffer from problems of variable omission and endogeneity. Applying a difference-in-difference estimation strategy is likely to take care of these problems, as unobservable time-invariant characteristics are going to be wiped put by the time-difference operator.

We show the results from the difference-in-difference analysis in Table 8 of the Appendix. Its basic format is an Analysis of Variance allowing for banks' fixed effects, year dummies[9] and an

[9] For illustration purposes, time dummies are specified so as to allow estimation of a post-crisis binary variable, highlighting the impact of the crisis for the Others.

interaction term between the crisis and the CB bank type. Standard errors are clustered by bank. As already said, we explore the evidence from two different thresholds for the year when the crisis has supposedly set in (2007 and 2008). To gain a further check on the robustness of our results, we also provide an Analysis of Variance based on Truncated Regression, which may suit better the statistical distribution of efficiency scores (Simar and Wilson, 2007). In this case, we cannot compute fixed-effect effect estimates, and the ANOVA format includes a binary variable for CB's, time-related dummies and an interaction term between the crisis and the CB bank type.

The difference-in-difference evidence is overwhelmingly aligned with the previous one. It shows by and large that the crisis has a larger negative impact on the technical efficiency of CB's in Model # 1 (as highlighted by the interaction term DiD). This differential impact largely attenuates or vanishes in Model #2. The interaction term between the crisis and the CB bank type is both smaller in size and less significant in Model # 2 than in Model # 1. To a slighter extent this also happens in Model # 3, which controls for credit risk. No such attenuation is at work within Models # 4 and # 5. Once again no strongly consistent pattern shows up for scale efficiency. All in all, there is rather convincing evidence that the heavier impact of the crisis on Italian CB's is linked to the influence of local GDP per capita on these banks.

As we will discuss below, this evidence can be refined in various ways. However, we believe that our evidence shows that modelling shocks at the SLL-level reduces to a great deal differences in the impact of the crisis across Italian CB's and other small banks. Analytically, this points to a strong role for the bad luck hypothesis in the present juncture, and, correspondingly, to a potentially strong endogeneity of bank performance indicators. From a more practical standpoint, there appears to be some reasons to ease the localisation constraints for CB's.

6. Concluding remarks

In this paper we have analysed the impact of the current financial crisis on the efficiency of Italian small banks belonging to two great institutional categories: CB’s and other banks. We have applied DEA throughout the 2006-2010 period, highlighting the effect of some environmental and institutional factors on banks' performance. The evidence shows that that local shocks, proxied by SLL-level GDP per capita, affect technical efficiency differentials, especially for CB’s. This can be easily rationalised. Their mission in favour of the local community, as well as current regulations, may endow CB’s with less performing locations vis-à-vis other banks, harming their relative efficiency. Also in accordance with our expectations, the evidence shows that the differential impact of the crisis on CB's attenuates or vanishes when we include in the banks' production set proxies of local environment (GDP per capita) or an indicators traditionally associated with credit risk (bad loans).

Analytically, this (unsurprisingly) suggests a strong role for the bad luck hypothesis in the present juncture. More interestingly, this could mean that most available bank performance indicators are strongly endogenous. From a policy viewpoint, there appears to be some reasons to ease the localisation constraints for CB's.

We are fully aware that there are various ways in which our evidence could be made much more robust. Perhaps most prominently, in future work we plan to include our measure of local shocks in a panel analysis of bank efficiency, risk, and capitalisation, also allowing for lagged relationships, as in Fiordelisi et al. (2011) or in Rossi et al. (2009). In order to do so, our sample should be extended through time.

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Appendix

Table 4 - Sample by bank types and areas

Year	**2006**	**2007**	**2008**	**2009**	**2010**
CB's	429	437	422	417	403
Others	185	211	222	230	212
Geogr, location					
North – West CB's	180	179	178	171	171
North – East CB's	60	64	60	56	54
Centre CB's	82	82	78	82	79
South CB's	107	112	106	105	98
North – West Others	49	52	55	57	51
North – East Others	58	64	67	77	78
Centre Others	41	52	55	54	55
South Others	37	43	45	41	36

Source: own calculations on BilBank 2000 data

Table 5 - *The Baseline Production Set: Mean Values, Years 2006 and 2010*

	Loans	**Securities**	**Other Services**	**Branches**	**Workers**	**Fundraising**
CB's (2006)						
North-West	244.272,7	69.397,86	3.985,545	9,388889	67,91667	259.176,5
North-East	358.886,1	141.288,2	6.321,645	14	109,1833	419.807,1
Centre	214.888,0	99.707,40	3.999,863	8,597561	66,47561	287.955,8
South	73.721,89	65.561,73	1.564,948	5,271028	33,62617	129.130,6
Total	212.147,6	84.289,09	3.711,270	8,855478	64,86014	254.707,6
Others (2006)						
North-West	1.912.829	592.188,3	54.234,78	62,5102	550,8367	2.382.418
North-East	1251598	906.094,4	73.570,68	44,5	454,7241	2.021.878
Centre	1674213	687.159,5	54.434,66	65,95122	512,1707	2.263.012
South	1495976	784.095,9	41.712,12	77,40541	653,2432	2.201.482
Total	1.569.271	750.031,3	57.836,61	60,60541	532,6162	2.206.734
CB's (2010)						
North-West	285.588,4	79.716,99	4.411,213	10,88372	79,08721	353.029,6
North-East	508.059,2	169.470,5	7.503,753	19,29091	137,7636	680.110,4
Centre	281.068,6	111.713,7	4.698,751	11,0250	82,075	406.495,1
South	92.235,49	72.942,38	2.064,634	6,151515	40,25253	165.025,4
Total	266.819,0	96.574,82	4.296,091	10,85856	77,88089	361.231,6
Others (2010)						
North-West	1.900.808	520.877,4	49.603,28	62,58491	539,2264	2.571.359
North-East	1.438.958	885.685,0	81.720,78	42,75714	448,6286	2.336.577
Centre	1.341.212	464.080,1	70.793,75	44,12281	430,5965	1.825.651
South	1.912.484	586.092,2	47.061,12	90,31579	729,8421	2.664.996
Total	1.628.422	635.010,4	66.425,97	56,82547	520,9151	2.340.878

Source: own calculations on BilBank 2000 data.
Note: All monetary aggregates in thousands of 2008 Euros.

Table 6 - Additional variables, mean values by area and bank type, year 2006-2010

	GDP per capita		**Bad Loans**		**E/TA Ratio**		**Mean distance**	
AREA (2006/2010)	**CB's**	**Others**	**CB's**	**Others**	**CB's**	**Others**	**CB's**	**Others**
N-West	26,3	29,5	3.418,029	30.509,21	0,1341	0,1269	6,06	43,61
N-East	26	31	5.702,062	15.914,62	0,1216	0,1255	8,32	67,99
Centre	23,1	22,8	3.895,547	19.949,76	0,1136	0,1307	6,02	50,51
South	15,8	18,6	2.469,969	31.817,52	0,1359	0,1459	10,42	44,19
TOTAL								
2006	23,6	26,5	2.454,349	18.301,49	0,1415	0,1386	6,95	48,96
2007	23,7	26,4	2.534,589	17.545,33	0,1367	0,1399	7,22	52,23
2008	23,3	25,6	3.066,954	20.046,11	0,1282	0,1246	7,37	55,51
2009	22,2	26,4	4.218,502	26.491,16	0,1214	0,1243	7,71	55,96
2010	22,4	26,6	5.534,311	34.944,42	0,1156	0,1221	7,99	53,65

Source: own calculations on BilBank 2000 and Bank of Italy data

Note: All monetary aggregates in thousands of 2008 Euros.

Table 7a - Mean Technical Efficiency Scores and their Differences across Models
Technical Efficiency

CB's, 2006-2010 Mean Values

	Model #1		**Model #2**		**Model #3**		**Model #4**		**Model #5**	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
N-West	0,6939	0,6816	0,7076	0,6950	0,7106	0,7038	0,7544	0,7402	0,7139	0,7086
N-East	0,6574	0,6884	0,6722	0,6806	0,6695	0,6822	0,7236	0,7292	0,6726	0,6898
Centre	0,6221	0,6111	0,6458	0,6342	0,6250	0,6156	0,7034	0,6881	0,6298	0,6247
South	0,5870	0,5393	0,6530	0,6084	0,5873	0,5419	0,6604	0,6241	0,5923	0,5502

Others, 2006-2010 Mean Values

	Model #1		**Model #2**		**Model #3**		**Model #4**		**Model #5**	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
N-West	0,7836	0,7835	0,7882	0,7884	0,7950	0,7985	0,8364	0,8295	0,8026	0,8050
N-East	0,7867	0,7715	0,7937	0,7810	0,8176	0,8095	0,8340	0,8174	0,7953	0,7839
Centre	0,6972	0,7112	0,7164	0,7275	0,7222	0,7359	0,7616	0,7676	0,7087	0,7247
South	0,6980	0,7009	0,7304	0,7398	0,7093	0,7137	0,7606	0,7524	0,7012	0,7073

CB's, The Evolution of Efficiency Scores

	Model #1		**Model #2**		**Model #3**		**Model #4**		**Model #5**	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
2006	0,6817	0,6644	0,7098	0,6946	0,6953	0,6813	0,7411	0,7247	0,6971	0,6862
2007	0,6702	0,6482	0,6970	0,6765	0,6828	0,6649	0,7315	0,7138	0,6834	0,6679
2008	0,6437	0,6244	0,6716	0,6545	0,6536	0,6392	0,7100	0,6930	0,6566	0,6442
2009	0,6235	0,6062	0,6545	0,6349	0,6287	0,6140	0,6968	0,6784	0,6354	0,6242
2010	0,6190	0,6072	0,6497	0,6350	0,6236	0,6138	0,7020	0,6859	0,6317	0,6258

Others, The Evolution of Efficiency Scores

	Model #1		**Model #2**		**Model #3**		**Model #4**		**Model #5**	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
2006	0,76338	0,7707	0,7790	0,7879	0,78645	0,7946	0,81138	0,8130	0,7738	0,7832
2007	0,76773	0,7698	0,78253	0,7840	0,79825	0,8032	0,82021	0,8160	0,7805	0,7847
2008	0,75116	0,7450	0,76844	0,7682	0,77174	0,7716	0,80661	0,7955	0,7612	0,7583
2009	0,72676	0,7199	0,73912	0,7319	0,74257	0,7401	0,7866	0,7722	0,7369	0,7338
2010	0,73146	0,7329	0,74279	0,7444	0,74579	0,7498	0,7932	0,7881	0,7426	0,7470

Scale Efficiency

CB's, 2006-2010 Mean Values

	Model #1		Model #2		Model #3		Model #4		Model #5	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
N-West	0,9265	0,9354	0,9488	0,9722	0,9300	0,9334	0,9043	0,9339	0,9359	0,9425
N-East	0,9333	0,9162	0,9781	0,9849	0,9290	0,9097	0,9345	0,9492	0,9225	0,9161
Centre	0,9321	0,9364	0,9374	0,9659	0,9312	0,9338	0,8767	0,9101	0,9395	0,9429
South	0,9144	0,9589	0,8343	0,8962	0,9175	0,9607	0,8220	0,8813	0,9183	0,9622

Others, 2006-2010 Mean Values

	Model #1		Model #2		Model #3		Model #4		Model #5	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
N-West	0,8382	0,8344	0,9511	0,9669	0,8408	0,8342	0,9398	0,9593	0,8529	0,8569
N-East	0,8579	0,8663	0,9461	0,9706	0,8544	0,8588	0,9281	0,9573	0,8771	0,8915
Centre	0,8789	0,8588	0,9747	0,9856	0,8780	0,8587	0,9452	0,9654	0,8992	0,8843
South	0,8054	0,8014	0,9359	0,9527	0,8081	0,8027	0,9207	0,9484	0,8322	0,8312

CB's, The Evolution of Efficiency Scores

	Model #1		Model #2		Model #3		Model #4		Model #5	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
2006	0,9268	0,9412	0,9243	0,9520	0,9277	0,9389	0,8944	0,9272	0,9350	0,9467
2007	0,9215	0,9386	0,9201	0,9529	0,9229	0,9362	0,8865	0,9208	0,9299	0,9456
2008	0,9241	0,9386	0,9215	0,9529	0,9268	0,9366	0,8825	0,9181	0,9289	0,9420
2009	0,9252	0,9387	0,9184	0,9534	0,9258	0,9355	0,8757	0,9135	0,9288	0,9412
2010	0,9302	0,9374	0,9257	0,9575	0,9319	0,9730	0,8730	0,9101	0,9360	0,9430

Others, The Evolution of Efficiency Scores

	Model #1		Model #2		Model #3		Model #4		Model #5	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
2006	0,8454	0,8330	0,9606	0,9688	0,8430	0,9025	0,9498	0,9643	0,8694	0,8631
2007	0,8494	0,8430	0,9549	0,9712	0,8465	0,9075	0,9394	0,9594	0,8688	0,8688
2008	0,8474	0,8490	0,9467	0,9655	0,8456	0,9053	0,9288	0,9558	0,8644	0,8705
2009	0,8438	0,8450	0,9439	0,9696	0,8464	0,8977	0,9218	0,9549	0,8632	0,8699
2010	0,8552	0,8496	0,9578	0,9744	0,8586	0,8972	0,9326	0,9575	0,8749	0,8754

Table 7b - Comparing Efficiency Differences across Models
Technical Efficiency
CB's, The 2006-2010 Evolution

	Model #2 vs Model #1		Model #3 vs Model #1		Model #4 vs Model #1		Model #5 vs Model #1	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
2006	0,0281	0,0302	0,0136	0,0169	0,0594	0,0603	0,0154	0,0218
2007	0,0267	0,0283	0,0125	0,0167	0,0613	0,0656	0,0132	0,0197
2008	0,0279	0,0301	0,0099	0,0148	0,0663	0,0686	0,0129	0,0198
2009	0,0310	0,0287	0,0052	0,0078	0,0734	0,0722	0,0120	0,0180
2010	0,0307	0,0278	0,0047	0,0066	0,0830	0,0787	0,0128	0,0186

Others, The 2006-2010 Evolution

	Model #2 vs Model #1		Model #3 vs Model #1		Model #4 vs Model #1		Model #5 vs Model #1	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
2006	0,0157	0,0172	0,0232	0,0239	0,0481	0,0423	0,0105	0,0125
2007	0,0148	0,0142	0,0305	0,0334	0,0525	0,0462	0,0128	0,0149
2008	0,0173	0,0232	0,0206	0,0266	0,0554	0,0505	0,0100	0,0133
2009	0,0124	0,0120	0,0158	0,0202	0,0598	0,0523	0,0102	0,0139
2010	0,0113	0,0115	0,0145	0,0169	0,0617	0,0552	0,0111	0,0141

Scale Efficiency

CB's, The 2006-2010 Evolution

	Model #2 vs Model #1		**Model #3 vs Model #1**		**Model #4 vs Model #1**		**Model #5 vs Model #1**	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
2006	-0,0025	0,0108	0,0009	-0,0023	-0,0324	-0,0140	0,0082	0,0055
2007	-0,0013	0,0143	0,0015	-0,0024	-0,0349	-0,0178	0,0085	0,0071
2008	-0,0026	0,0143	0,0027	-0,0020	0,0416	-0,0205	0,0048	0,0034
2009	-0,0068	0,0147	0,0005	-0,0032	-0,0495	-0,0252	0,0036	0,0025
2010	-0,0045	0,0201	0,0017	-0,0001	-0,0571	-0,0273	0,0058	0,0056

Others, The 2006-2010 Evolution

	Model #2 vs Model #1		**Model #3 vs Model #1**		**Model #4 vs Model #1**		**Model #5 vs Model #1**	
	inp.-or.	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*	*inp.-or.*	*outp.-or.*
2006	0,1151	0,1358	-0,0027	0,0695	0,1043	0,1313	0,0240	0,0301
2007	0,1055	0,1282	-0,0029	0,0645	0,0900	0,1164	0,0194	0,0258
2008	0,0994	0,1165	-0,0017	0,0563	0,0814	0,1068	0,0170	0,0215
2009	0,1001	0,1246	0,0026	0,0527	0,0780	0,1099	0,0194	0,0250
2010	0,1026	0,1248	0,0034	0,0476	0,0774	0,1079	0,0198	0,0258

**Table 8 - The Impact of the Crisis across Bank Types,
Difference-in-Difference estimates for 2007 and 2008 Threshold Values**

Legend.

IO-FE: Fixed effect regression specifying as dependent variable the (technical or scale) efficiency calculated with input-oriented DEA;
OO-FE: Fixed effect regression using as dependent variable the (technical or scale) efficiency calculated with output-oriented DEA;
IO-TR: Truncated regression using as dependent variable the (technical or scale) efficiency calculated with input-oriented DEA;
OO-TR: Truncated regression specifying as dependent variable the (technical or scale) efficiency calculated with output-oriented DEA.

CB: CB bank type binary variable
Crisis: post-crisis binary variable
DiD: post-crisis binary variable interacted with CB bank type

*, **, *** Significant at 10%, 5% and 1%, respectively.

		Model #1	Model #2	Model #3	Model #4	Model #5
Technical Efficiency Crisis set on 2007						
IO-FE	**Crisis**	-.037***	-.041***	-.052***	-.014*	-.034***
	Did	-.024***	-.019**	-.02**	-.025***	-.030***
OO-FE	**Crisis**	-.035***	-.037***	-.048***	-.016**	-.031***
	Did	-.022***	-.02**	-.021**	-.023***	-.028***
IO-TR	**CB**	-.093***	-.084***	-.1***	-.08***	-.089***
	Crisis	-.036***	-.038***	-.044***	-.017*	-.036***
	Did	-.024**	-.021*	-.027**	-.022**	-.028**
OO-TR	**CB**	-.11***	-.099***	-.12***	-.091***	-.1***
	Crisis	-.041***	-.043***	-.047***	-.025***	-.039***
	Did	-.015*	-.014	-.021**	-.013	-.02*

		Model #1	Model #2	Model #3	Model #4	Model #5
Technical Efficiency Crisis set on 2008						
IO-FE	**Crisis**	-.015***	-.017***	-.028***	-.011*	-.015***
	Did	-.015**	-.0099	-.0051	-.013*	-.017**
OO-FE	**Crisis**	-.017***	-.014**	-.027***	-.013**	-.016***
	Did	-.012*	-.01	-.0043	-.011*	-.014**
IO-TR	**CB**	-.1***	-.093***	-.12***	-.09***	-.1***
	Crisis	-.036***	-.037***	-.05***	-.021**	-.037***
	Did	-.018*	-.013	-.014	-.012	-.018*
OO-TR	**CB**	-.12***	-.11***	-.13***	-.1***	-.11***
	Crisis	-.038***	-.039***	-.051***	-.027***	-.038***
	Did	-.005	-.005	-.005	-.003	-.007

		Model #1	Model #2	Model #3	Model #4	Model #5
Scale Efficiency Crisis set on 2007						
IO-FE	**Crisis**	-.002	.004	.003	-.015***	-.007
	Did	.004	-.003	.003	-.006	.007
OO-FE	**Crisis**	-.003	.005*	-.001	-.008**	-.004*
	Did	.001	-.001	.002	-.009**	.004
IO-TR	**CB**	.086***	-.021*	.086***	-.043***	.068***
	Crisis	.007	-.005	.012*	-.023***	-.003
	Did	-.004	.006	-.006	.004	-.002
OO-TR	**CB**	.1***	-.01	.098***	-.03***	.077***
	Crisis	.013**	.002	.014**	-.011*	.009
	Did	-.015**	.001	-.013**	-.005	-.011**

		Model #1	Model #2	Model #3	Model #4	Model #5
Scale Efficiency Crisis set on 2008						
IO-FE	**Crisis**	-.002	.002	.002	-.000	-.006
	Did	.003	-.005	-.001	-.009*	.004
OO-FE	**Crisis**	.001	.000	.001	.004	-.008*
	Did	-.000	-.003	-.001	-.012***	.002
IO-TR	**CB**	.081***	-.021**	.082***	-.042***	.066***
	Crisis	.006	-.002	.011	-.015**	.005
	Did	.002	.008	-.002	.004	.001
OO-TR	**CB**	.096***	-.01	.094***	-.031***	.074***
	Crisis	.008*	.002	.012*	-.006	.007
	Did	-.011**	.003	-.011*	-.004	-.010**