

THE IMPACT OF IAS AND BASEL II REGULATIONS ON NET INTEREST MARGIN: EVIDENCE FROM ITALY

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ABSTRACT

The paper examines the impact of the costs of complying with IAS and Basel II regulations on the net interest margin and operating costs of Italian banks using bank level data for the period 2001-2007. More specifically, the paper intends to ascertain whether: a) IAS and Basel II compliance costs have increased operating costs and have been incorporated in a larger spread; b) there is the presence of scale diseconomies related to compliance costs for Italian mutual banks. An empirical analysis demonstrates that compliance costs have indeed affected operating costs and net interest margin although mutual banks do not face a higher average cost of complying with IAS and Basel II regulation, thanks to the presence of the mutual bank network which enables them to exploit economies of scale. Moreover, empirical findings show that mergers among banks can increase the impact of regulatory costs on net interest margin. These findings remain unchanged even if they are checked for individual bank characteristics represented by labor productivity, size, credit quality, loans, net fee income margin and equity. High net interest margin and operating costs tend to be associated with banks with low productivity that concentrate on traditional lending business, with high credit risk and relatively high equity.

JEL: D18; G21; G28; G33; G38

KEYWORDS: Net interest margin; compliance costs, Italian mutual banks, business processes

INTRODUCTION

There are a relatively large number of studies on the rationale behind financial regulation (Bhattacharya et al., 1998; Llewellyn, 1999). Such regulation can generate both benefits and compliance costs (Goodhart et al., 1998; Elliehausen, 1998). Beyond a certain threshold, financial regulation may introduce a perverse effect on market structure and behavior, such as lower levels of competition, greater entry barriers and increased moral hazard (Briault, 2002; Alfon and Andrews, 1999). Studies on the cost of regulation demonstrate that regulation increases operating costs, but the impact of these costs is not always constant for all firms (Hail and Leuz, 2006). Lastly, compliance costs can significantly affect the prices of financial products and services.

This paper contributes to this discussion on regulation costs by focusing on the International Accounting Standards, hereinafter IAS and the new Capital Accord, hereinafter Basel II. In fact, IAS and Basel II (Basel Committee on Banking Supervision, 2006) have been the most important innovations in financial regulation of the last decade. IAS has caused a dramatic change in bank balance sheets, and Basel II has introduced new ways to measure overall bank risk and capital absorption. Banks have been required to invest heavily in both human resources and technology systems to comply with IAS and Basel II regulations, but there are no studies, available to the public, on the impact of these regulations on bank operating costs and profitability.

This paper tackles two sets of questions: 1) Have IAS and Basel II compliance costs increased operating expenses, and have these compliance costs been translated into larger spreads? 2) Has this impact been different for banks of different size and, in particular, for mutual banks? To address these questions,

regressions are used on balanced panel data, which included 431 Italian banks of which 344 are mutual banks, over the period 2001-2007. It is worth noting that in Italy, the central bank has imposed IAS on all banks, including those that are not quoted (see: D. Lgs. N. 38 of 28/2/2005). For mutual banks, the obligation to draw up the balance sheet with IAS was introduced in 2006 instead of 2005 as with other banks. Basel II has been applied to all banks from the first of January, 2008.

This research follows in the footsteps of Franks et al. (1998), Elliehausen and Lowrey (2000), Demirgüç-Kunt and Huizinga (1999) and Demirgüç-Kunt et al. (2004). In particular, this paper applies objective of the first two papers and the methodological approach of the second papers. It extends existing literature in several ways.

First, the data include Italian mutual banks, which are characterized by lower integration and greater autonomy than other cooperative banks operating abroad (Gutiérrez, 2008). Moreover, mutual banks differ from other banks not only with respect to their very small size but also in terms of their business model, according to which proximity to customers and mutual control shared among member clients both play a crucial role.

Second, the determinants of commercial bank interest margins and operating costs have been studied by many authors (Tsy and Saunders, 1981; Hanson and Rocha, 1986; Molyneux and Thornton, 1992; Angbazo, 1997; Carbò Valverde and Rodriguez, 2007), but this paper considers the specific business processes (Masini, 1988; Frankel et al., 2002; Munari, 1995) on which regulation has significant impact. The determinants of net interest margin and operating costs have been chosen on the basis of these business processes. In particular, these determinants of net interest margin and operating costs are considered as proxies of various business processes, namely, labor productivity as a proxy of human resources management processes, size as a proxy of administration and accounting processes, credit quality and loans as a proxy of credit processes, net fee income as a proxy of activity mix processes and equity as a proxy of financial management processes.

The paper is organized as follows. Section 2 considers a literature review. Section 3 explains the data and empirical strategy. Section 4 presents the empirical findings and section 5 summarizes the main conclusions.

LITERATURE REVIEW

The impact of IAS and Basel II regulations on net interest margin and operating costs is related to the broader, relatively controversial topic of bank regulation. In this regard, studies have addressed this subject by focusing on both advantages and costs of regulation (Llewellyn, 1999; Di Giorgio and Di Noia, 2001; Demirgüç-Kunt and Detragiache, 2002; Hoggarth et al. 2005).

Financial regulation becomes particularly pertinent when market imperfections can prevent the market from reaching efficient conditions (Leland and Pyle, 1977; Diamond, 1984). Although there has been some disagreement in the literature over the usefulness of external regulation (Benston, Kaufman, 1996; Benston, 2000), a glance at actual financial systems shows that some sort of regulation exists virtually universally (Barth et al., 2006), although with varying intensity. Furthermore, bank regulation can itself generate some benefits in terms of earning stability and reductions in monitoring costs of the banking counterpart. However, beyond a certain threshold, bank regulation can result in inefficacy and inflexibility (Padoa-Schioppa, 2004), and it can negatively affect the competitive strategies of individual banks (Guiso et al., 2007).

The literature usually classifies regulatory costs into three types, namely: direct external, direct internal and indirect regulatory costs. Direct external regulatory costs are all of the costs of running the regulatory

agencies. Direct internal costs are the costs that firms sustain by complying with regulations (Schroeder, 1985; Elliehausen and Kurts, 1985; Elliehausen and Lowrey, 1997). These internal costs affect bank operating expenses, even if the accounting systems used by the banks do not normally separate regulatory costs from other costs. Internal regulatory costs are in fact included in the following: a) the cost of personnel and system requirements necessary to provide information to regulators or to perform internal checks on compliance and b) the business income lost or costs incurred to redefine hedging risk strategies or products and services supply to comply with regulations (Franks et al., 1998). Indirect regulatory cost type includes costs that may have a negative impact on market efficiency by reducing competition or increasing moral hazard.

The compliance costs are analyzed in the literature from both macro and micro-economic points of view, which are distinct in terms of their objective and their method of analysis. From a macro-economic perspective, research has explored how banking industry regulation affects the market structure, the cost of credit, access to credit, the degree of competition and economic growth. Generally, this body of literature employs cross-section analysis among different countries with different institutional and regulation characteristics. Jayaratne and Strahan (1996) and Dehejia and Lleras-Muney (2005) focus, for example, on the impact of regulation changes across U.S. states on financial development and economic growth. Barth et al. (2004) evaluate the relationship between regulation and firm performance and show that disclosure together with incentives for market control have greater impact than other factors on bank stability and profitability. Guiso et al. (2004) emphasize the effects of credit access in Italy under the Banking Law of 1936. Barth et al. (2003) explore the influence of regulation on performance using accountant indicators such as the return on assets and the ratio between operating expenses and total assets. Demirgüç-Kunt et al. (2004) analyze the impact of banking regulation across different countries on the cost of intermediation. Guiso et al. (2007) explore both the effects of bank regulation before 1993 and the impact of deregulation after 1993. Demirgüç-Kunt et al. (2006) and Pasiouras et al. (2006) focus on the impact of regulation on bank solidity using credit ratings. Pasiouras et al. (2007) study the influence of regulation on bank efficiency using stochastic frontier analysis instead of accountant ratios.

Studies taking a micro-economic point of view do not analyze the systemic impact of the regulation as a whole but rather explores the influence of each regulation on the operating expenses of the bank. In this area of study, surveys and case studies are generally used, whereas econometric methods are relatively rare.

Most research that adopts surveys and case studies has been undertaken in the U.S. context. Grant Thornton (1993), for example, estimates the aggregate cost of complying with 13 regulatory requirements. In this survey, each bank was asked to assess the number of employee hours spent on compliance activities; the overall estimated regulatory costs were 12.6% of non-interest expenses. Similar results were found in the survey carried out by the American Bankers Association (Elliehausen, 1998), through the questionnaire did not specify a specific regulation for consideration. Consequently, in this survey, the set of regulations differed from bank to bank. In Europe, the surveys from the Financial Services Authority and conducted by Europe Economics (2003) are noteworthy in the Anglo-Saxon context (see: Deloitte, 2006; Oxera, 2006). In these surveys, each financial intermediary in the sample was asked to report compliance costs on the basis of a set of activities linked by regulation. Note that the surveys consider different sets of financial regulation.

Franks et al. (1998) use accounting data collected from different regulatory agencies to compare the direct regulatory costs of financial services, excluding banks, in the U.S., United Kingdom and France. They show that both direct and indirect costs vary according to the size of the firm. Some authors in this strand of literature show the presence of economies of scale with regard to regulation compliance costs. In the presence of economies of scale, smaller banks should face higher regulation compliance costs than larger banks (Schroeder, 1985; Elliehausen and Lowrey, 1997; Thakor and Beltz, 1993).

Besides surveys and case studies, econometric methods can also be used for such studies, even if they are only rarely used. A useful starting point is the estimate of Cobb-Douglas cost function in which the dependent variable is the compliance cost of each bank as related to the introduction (or start-up) of a specific regulatory rule. The independent variables are represented by the following: a) output defined by cost-causing activities that a bank can carry out to comply with regulations, b) input prices and c) other variables affecting compliance costs.

Benston (1975) first used econometric methods to study the operating cost of regulation but found no statistical significance for the estimated coefficients. Mitchell et al. (2008) analyze the effect of changes in regulation of Australian financial services on the expense ratio (i.e., operating expenses to total assets), showing a steady increase in compliance costs. Elliehausen and Lowrey (2000) use an econometric method to study the cost of implementing the Truth in Savings Act in the U.S.; they show that start-up compliance costs were insensitive to the extent of changes required to implement regulation.

There are some difficulties in using econometric methods to assess regulatory costs in a micro-economic perspective because of difficulties related to data collection. In particular, data relating to the activities carried out by banks to comply with regulations are not directly observable in balance sheets and profit and loss accounts. These data can only be collected through questionnaires and surveys.

It is worth noting that in a micro-economic point of view, the focus is generally on the cost of compliance with a single or set of specific regulations, but no study has analyzed the cost of compliance with IAS and Basel II. This paper addresses this gap in the literature by applying the goal of the micro-economic perspective and the methodological approach of the macro-economic perspective. In particular, this paper does not quantify the specific cost of compliance with IAS and Basel II but rather intends to estimate the impact of IAS and Basel II regulation on the net interest margin and operating costs as a whole. Consequently, the problem of collecting data not available in usual bank accounting is overcome. However, the results of this study cannot be compared with previous studies focusing on the compliance costs of specific regulations, the reason being that it is impossible to conclude whether the cost of complying with IAS and Basel II regulations has been more or less than other regulations.

EMPIRICAL METHOD AND DATA SAMPLE

Variable Definition

Following Demirgüç-Kunt et al. (2004), the paper examined two dependent variables to assess the impact of IAS and Basel II regulations, namely, net interest margin and operating costs.

Regarding net interest margin, the research considered the ex-post net interest margin over the bank output, which is equal to the sum of customers' loans and deposits. An ex-post measure of net interest margin is used because it does not reflect differences in perceived risks (Demirkug-Kunt and Huizinga, 1999). Regarding operating costs, the paper considered the ratio between operating costs associated with all bank activity and bank output. Bank output has been considered as the denominator rather than total assets because the evaluation criteria stated by IAS may affect the value of total assets.

Net interest margin and operating costs are affected by IAS and Basel II regulations and by several internal and external factors, as shown in the following equation:

$$y_{i,t} = f(\text{Reg}_{i,t} + \text{Bank}_{i,t} + \eta_t)$$

where $y_{i,t}$ represents either net interest margin or operating costs for bank i at time t ; $Reg_{i,t}$ is a proxy of IAS and Basel II regulations; $Bank_{i,t}$ is a vector of firm-specific characteristics for bank i at time t ; and η_t is a temporal dummy variable that represents external factors.

Reg is the ratio between Information and Communication Technology cash-outflow (ICT cash-out, i.e., I.C.T. expenses plus I.C.T. net investment) and bank output. Reg refers to three functional areas, namely, 1) administration and accounting, 2) credit and 3) risk and control management. These three areas have been selected because it is likely that IAS and Basel II regulations have directly affected the ICT endowment involved in those areas.

The inclusion of bank characteristics is intended to control for factors that may influence net interest margin and operating costs. These bank characteristics have been selected by taking into account banking business processes (Frankel R. et al., 2002) such as 1) human resources management processes, 2) administration and accounting processes, 3) credit processes, 4) bank activity mix processes and 5) financial management processes.

For each business process, certain factors have been chosen as proxies affecting net interest margin and operating costs. In particular, the following factors have been associated with various business processes (variable names in parentheses): 1) labor productivity is proxied by the ratio between bank output and the number of employees (Productivity); 2) size is proxied by the logarithm of total assets (Lnsize) (Demirküç-Kunt et al. 2004); 3) credit quality (Angbazo, 1997) and loans (Naceur and Goiaed, 2005) are represented by loans to bank output (Loans) and the ratio between non performing exposures to loan (Credit risk), respectively; 4) net fee income margin is represented by net fee and commission income (fee and commission income – fee and commission expenses) to bank output (Net fee income); 5) equity (Berger, 1995) is represented by the ratio of equity to bank output (Equity). Two additional factors that may affect the net interest margin and the costs, have also been included. These factors are mergers (M&A) and quotation (Quot), which are represented by dummy variables. Table 1 sums up the above control variables together with the expected sign.

Table 1: Explanatory Variables and Expected Signs

Explanatory Variables	Expected Sign with Respect to Net Interest Margin to Bank Output	Expected Sign with Respect to Operating Costs to Bank Output
IAS and Basel II regulations (Reg) = ratio of ICT cash-outflow (i.e., administration, credit, risk & management control) to bank output	> 0	> 0
Size (Lnsize) = logarithm of total assets	< 0	< 0
Labor productivity (Productivity) = ratio of bank output to number of employees	< 0	< 0
Loans (Loan) = ratio of loans to bank output	> 0	> 0
Credit quality (Credit risk) = non-performing exposure to bank output	> 0	> 0
Bank activity mix process (Net fee income) = ratio of net fee and commission income to bank output	< 0	> 0
Equity (Equity) = ratio of equity to bank output	> 0	> 0
Merger and Acquisitions (M&A) = dummy variable with the value of 1 if bank underwent a merger from the year of merger	> 0	> 0
Quotation (Quot) = dummy variable with the value of 1 for banks quoted	> 0	> 0

This table shows the definition of independent variables together with their expected sign for both the dependent variables, i.e. net interest margin and operating costs divided by bank output. Bank output is the sum of customers' loans and deposits.

To isolate the effect of banks characteristics on net interest margin and operating costs, it is important to also control for external factors, such as indicators related to the macro-economic and financial sector environment, taxation and regulatory variables (Levine, 1996; Demirküç-Kunt, et al. 2004). These external factors change over time and do not depend on the bank. As the research focuses on the impact of compliance costs of IAS and Basel II regulations on net interest margin and operating costs only for Italian banks, these factors are common across all banks under analysis. Thus, in order to capture their

impact, only temporal dummies (η_t) have been introduced for 2001 to 2007, with 2001 used as the base year.

Econometric Modeling

After defining all the variables, regressions of the following form are estimated:

$$y_{i,t} = \alpha_i + \beta_1 \text{Reg}_{i,t} + \beta_2 \eta_t + \varepsilon_{i,t} \quad (1)$$

where $y_{i,t}$ represents either the net interest margin or operating cost ratio of the bank i at time t for 2001 to 2007; $\text{Reg}_{i,t}$ is a proxy of IAS and Basel 2 regulations; η_t represents dummy variables (six dummy variables); and $\varepsilon_{i,t}$ is the residual. These dummy variables account for an important source of unobserved heterogeneity due to time-specific effects, including the impact of external variables that affect the net interest margin and operating cost ratio, as discussed above.

To control for bank characteristics, model 1 has been modified by adding a vector of internal factors related to business processes (i.e., productivity, size, credit risk, loan, fee income and equity). The following model is then estimated:

$$y_{i,t} = \alpha_i + \beta_1 \text{Reg}_{i,t} + \beta_2 \eta_t + \beta_3 \text{Bank}_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $\text{Bank}_{i,t}$ is a vector of firm-specific characteristics for bank i at time t .

To take into account additional factors such as M&A and quotation, model 2 can be modified as follows:

$$y_{i,t} = \alpha_i + \beta_1 \text{Reg}_{i,t} + \beta_2 \eta_t + \beta_3 \text{Bank}_{i,t} + \beta_4 M \& A + \beta_5 M \& A * \text{Reg}_{i,t} + \beta_6 \text{quot} + \beta_7 \text{quot} * \text{Reg}_{i,t} + \varepsilon_{i,t} \quad (3)$$

where M&A is a dummy variable that assumes the value of 1 in presence of a merger; $M\&A * \text{Reg}_{i,t}$ is the interaction term with respect to mergers and IAS and Basel II regulations; quot is a dummy variable that assumes the value of 1 for a quoted bank; $\text{quot} * \text{Reg}_{i,t}$ is the interaction term between quot and IAS and Basel II regulations. It is possible to evaluate whether there are differences in the influence of regulatory costs for IAS and Basel II with respect to banks that are not involved in mergers and not quoted.

To consider the specific impact of IAS and Basel II regulations on mutual banks (MB), the following model has also been considered:

$$y_{i,t} = \alpha_i + \beta_1 \text{Reg}_{i,t} + \beta_2 \eta_t + \beta_3 \text{Bank}_{i,t} + \beta_4 MB + \beta_5 MB * \text{Reg}_{i,t} + \varepsilon_{i,t} \quad (4)$$

where MB is a dummy variable that assumes the value of 1 for mutual banks and 0, otherwise; $MB * \text{Reg}_{i,t}$ is an interaction term between IAS and Basel II regulations and mutual banks. In this way, it is possible to assess whether there are differences between mutual banks and other types of banks with respect to the influence of compliance costs for IAS and Basel II regulations.

The estimation technique involves balanced panel data regressions. For each regression, two different estimation techniques have been used, namely, a fixed effect model and a random effect model. The null hypothesis that there is no individual heterogeneity within banks has been rejected on the basis of Breusch and Pagan's Lagrange multiplier test (1979), whereas Hausman's test supports the fixed effect model (within estimator) with respect to random effects (Wooldridge J.M., 2006, pp. 448-500). Consequently,

random effect estimates are not reported, and the discussion will focus on the most robust empirical findings.

Data Sources and Descriptive Statistics

The data needed for this study were extracted from two different data sources. To measure the control variable, the data have been extracted from the Abibank dataset provided by the Italian Banking Association (ABI), which contains accounting information relating to all banks in the Italian credit system. Table 2 shows the number of observations split by year and by asset size.

Table 2: Composition of the Sample Data

Asset Size Classes (Classification Bank of Italy)	2001	2002	2003	2004	2005	2006	2007	Total
Greater size banks	4	4	4	4	4	4	4	28
Large size banks	7	7	7	7	7	7	7	49
Medium size banks	21	21	21	21	21	21	21	147
Small size banks	55	55	55	55	55	55	55	385
Sub total	87	87	87	87	87	87	87	609
Mutual banks	344	344	344	344	344	344	344	2408
Total	431	431	431	431	431	431	431	3017
% total assets with respect to the whole Italian banking system	72.31%	79.00%	75.73%	74.15%	73.64%	75.00%	72.94%	

This table shows: the number of observations, divided by year and asset size, and the dimension of the sample compared with the whole of the Italian banking system.

The sample includes 431 banks representing about 72.94% of the total assets of the Italian banking system at the end of 2007. The sample also includes banks of different size categories as defined by the Bank of Italy, wherein 344 are mutual banks. Data have been taken from the period 2001-2007. Only banks with available balance sheets for the whole period were included. To measure IAS and Basel II regulations (Reg), data have been collected from the “Annual survey on Automation in Italian credit system” carried out by the Interbank Convention Automation (CIPA) which was set up in 1968 at the initiative of the Bank of Italy and the Italian Banking Association (ABI). In this survey, the annual ICT cash-out is available for the entire Italian banking system. It also includes the breakdown of ICT cash-out by functional area. Tables 3 and 4 provide summary statistics for all dependent and independent variables for each year and for different sizes of banks.

Cross-bank differences in the net interest margin and operating cost ratio may reflect differences in efficiency and competition degree but also may be justified due to different bank activities, asset allocations or risk preferences. In particular, in the 2001-2007 period, for mutual banks and unlike other banks, one can observe less development of fee income activity and greater values for net interest margin, credit risk and equity. This is in line with the specific business model of mutual banks, which is much more oriented to retail segments and greatly stresses the relationship between customers and the bank. In addition, mutual banks located in the south of Italy are smaller in average size show greater values in terms of net interest margin, operating costs, risk credit and equity in comparison with the mutual banks located in the north of Italy. Tables 5 and 6 display the correlation among the explanatory variables with respect to net interest margin and operating costs.

Table 3: Summary Statistics of all Variables for Each Year

Years	Variables	Net Interest Margin/Bank Output	Operating Costs/Bank output	IAS and Basel 2 Regulation	Size (Mln)	Productivity (mln)	Credit risk	Loan	Net fee income	Equity
2001	Mean	0.0242	0.0232	0.0005	3,021	5.12	0.0488	0.4105	0.0055	0.1011
	Std. Dev.	0.0062	0.0063	0.0001	20,000	2.19	0.033	0.0733	0.0036	0.0595
2002	Mean	0.0218	0.0218	0.0005	3,490	5.52	0.0441	0.4169	0.005	0.094
	Std. Dev.	0.0045	0.0055	0.0001	24,800	2.25	0.0275	0.0743	0.0032	0.043
2003	Mean	0.0205	0.0207	0.0006	3,479	5.96	0.0449	0.4276	0.0051	0.0901
	Std. Dev.	0.0046	0.0058	0.0001	24,300	2.39	0.0265	0.0734	0.0037	0.0403
2004	Mean	0.0194	0.0196	0.0006	3,592	6.39	0.0461	0.4361	0.0051	0.0865
	Std. Dev.	0.0042	0.0053	0.0001	24,800	2.35	0.0286	0.0683	0.0039	0.0381
2005	Mean	0.0187	0.0193	0.0006	3,911	6.79	0.0513	0.4424	0.0049	0.0835
	Std. Dev.	0.0042	0.0048	0.0001	27,200	2.27	0.0303	0.0691	0.0032	0.0319
2006	Mean	0.0204	0.0187	0.0006	4,283	7.16	0.0523	0.4734	0.0048	0.087
	Std. Dev.	0.0047	0.0047	0.0001	29,800	4.17	0.0522	0.0779	0.003	0.038
2007	Mean	0.0213	0.0182	0.0005	4,617	7.51	0.0506	0.4764	0.0046	0.0863
	Std. Dev.	0.0052	0.0052	0.0001	32,600	2.98	0.0315	0.0752	0.0027	0.0394
Total Average	Mean	0.0215	0.0208	0.0005	2,759	5.14	0.0488	0.4378	0.0052	0.0919
	Std. Dev.	0.0057	0.0061	0.0001	17,200	11.24	0.0345	0.0766	0.0039	0.048

The table shows mean and standard deviation, year by year, of all variables. Dependent variables are represented by: 1) the ratio between net interest margin and bank output and 2) the ratio between operating costs and bank output. The independent variables are IAS and Basel II regulation (ICT cash-out, referring to administration, credit, risk & management control), size (total assets), productivity (bank output divided by number of employees), credit risk (non-performing exposure), loans, net fee income (net fee and commission income), equity. All the above variables, except for productivity, are understood to be divided by bank output which is the sum of customers' loans and deposits

The correlation matrices show: a) a positive, statistically significant relationship between net interest margin and operating costs and compliance costs for IAS and Basel II regulations; and b) expected signs and significant relationships between dependent variables and the control variables, except for the loan variable, which has an unexpected sign.

EMPIRICAL FINDINGS

Tables 7 and 8 report the results of the regressions of net interest margin and operating costs, respectively. The tables show two specifications for model 2 and three specifications for model 4, including a basic specification with a regulation variable and year effects. In the first specification of model 2, size and productivity variables have been added and in the second specification other bank characteristics have also been considered. In the first specification of model 4, the regulation variable is interacted with a dummy variable representing Italian mutual banks; in the second specification of model 4, it has been added another interaction term between the regulation variable and the dummy variable representing small banks that are not mutual banks. Finally, in the third specification of model 4, the regulation variable is interacted with mutual banks located in the northwest, northeast, middle and south of Italy.

Table 4: Summary Statistics of all Variables for Size Class. Mean over the Period 2001-2007

Variable	Other Bank (OB)		Mutual Bank (MB)		Mutual Bank of Which		Mutual Bank of Which		Mutual Bank of Which		Mutual Bank of Which	
	Mean	Std. Dev.	Mean	Std. Dev.	North - West Italy		North - East Italy		Middle Italy		South Italy	
					Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Net interest margin/bank output	0.0185	0.0066	0.0216	0.0049	0.0214	0.0038	0.0204	0.0043	0.0214	0.0041	0.0262	0.0052
operating costs/bank output	0.0218	0.0092	0.02	0.0048	0.0202	0.0047	0.0188	0.0041	0.0206	0.0046	0.0234	0.0051
IAS and Basel II regulation	0.0006	0.0001	0.0005	0.0001	0.0005	0.0001	0.0005	0.0001	0.0005	0.0001	0.0006	0.0001
Size (mln)	17,000	54,800	267	340	464	366	234	217	301	566	137	110
Productivity (mln)	6.36	4.04	6.3	2.46	6	1.58	6.67	6.92	5.99	1.55	5.6	3.43
Credit risk	0.0399	0.0289	0.0507	0.0356	0.0374	0.0201	0.0453	0.0364	0.0509	0.0218	0.0686	0.0401
Loan	0.4799	0.0882	0.4299	0.0694	0.4458	0.0503	0.4642	0.0492	0.4243	0.0534	0.3538	0.0587
Net fee income	0.0091	0.0068	0.0041	0.0014	0.0047	0.0014	0.0044	0.0017	0.0043	0.0012	0.0037	0.0014
Equity	0.0792	0.0722	0.0931	0.0386	0.0933	0.0302	0.098	0.037	0.0777	0.0247	0.1015	0.0505

The table reports mean and standard deviation of the variables with respect to size classification over the period 2001-2007. Dependent variables are represented by: 1) the ratio between net interest margin and bank output and 2) the ratio between operating costs and bank output. The Independent variables are: IAS and Basel II regulation (ICT cash-out, referring to administration, credit, risk & management control), size (total assets), productivity (bank output divided by number of employees), credit risk (non-performing exposure), loans, net fee income (net fee and commission income), equity. All the above variables, except for productivity, are understood to be divided by bank output which is the sum of customers' loans and deposits.

Table 5: Correlation Matrix between Net Interest Margin Ratio and the Explanatory Variables

	Net Interest Margin/Bank Output	IAS and Basel II Regulation	Size	Productivity	Credit Risk	Loan	Net Fee Income	Equity
Net interest margin	1							
IAS and Basel 2 regulation	0.1345*	1						
Size	-0.1652*	0.2027*	1					
Productivity	-0.4191*	-0.0982*	0.0448	1				
Credit risk	0.1943*	0.0127	-0.0494*	-0.0059	1			
Loan	-0.4238*	-0.2379*	0.0665*	0.3105*	-0.0705*	1		
Net fee income	-0.0379	0.2879*	0.1357*	-0.2168*	-0.1975*	0.1564*	1	
Equity	0.4633*	0.5051*	0.0032	-0.1100*	0.0386	-0.1476*	0.1595*	1

Correlations are presented for the sample of all observations. The matrix shows the correlation between the dependent variable, that is the net interest margin divided by bank output, and the independent variables represented by: IAS and Basel II regulation (the ratio between ICT cash-out, referring to administration, credit, risk & management control and bank output), size (logarithm of total assets), productivity (the ratio between bank output and the number of employees), credit risk (ratio between non-performing exposure and bank output), loan (ration between loans and bank output), net fee income (the ratio between net fee and commission income and bank output), equity (the ratio between equity and bank output). *Indicates significance at 1% level.

In the first column of tables 7 and 8 (model 1), the coefficients of the regulation variable are positive and significant, regardless of the dependent variable (i.e., net interest margin or operating costs). This suggests that compliance costs resulting from IAS and Basel II regulations not only contributed to cost increases, which seems intuitive, but these costs were also passed on to depositors and lenders by increasing net interest margin. The robustness of the above results has been checked in a number of ways, as described below.

Table 6: Correlation Matrix between Operating Cost Ratio and the Explanatory Variables

	Operating Costs	IAS and Basel II Regulation	Size	Productivity	Credit Risk	Loan	Net Fee Income	Equity
Operating costs	1							
IAS and Basel 2 regulation	0.3477*	1						
Size	-0.0261	0.2027*	1					
Productivity	-0.5582*	-0.0982*	0.0448	1				
Credit risk	0.0597*	0.0127	-	-0.0059	1			
Loan	-0.4137*	-0.2379*	0.0665	0.3105*	-0.0705*	1		
Net fee income	0.5360*	0.2879*	0.1357	-0.2168*	-0.1975*	0.1564	1	
Equity	0.3266*	0.5051*	0.0032	-0.1100*	0.0386	-	0.1595*	1
						0.1476		

Correlations are presented for the sample of all observations. The matrix shows the correlation between the dependent variable, that is the operating costs divided by bank output, and the independent variables represented by: IAS and Basel II regulation (the ratio between ICT cash-out, referring to administration, credit, risk & management control and bank output), size (logarithm of total assets), productivity (the ratio between bank output and the number of employees), credit risk (ratio between non-performing exposure and bank output), loan (ration between loans and bank output), net fee income (the ratio between net fee and commission income and bank output), equity (the ratio between equity and bank output). *Indicates significance at 1% level.

Additional controls for productivity and size (model 2a): The coefficient of productivity is negative and significant. This result indicates that banks with higher labor productivity tend to show lower net interest margin. This is also true for size, as the negative coefficient suggests that larger banks tend to show lower net interest margin and operating costs due to scale economies. This is consistent with previous empirical studies (Shaffer, 1985) as well as models that emphasize the positive role of size due to scale efficiencies.

Credit process, activity mix and leverage (model 2b); In the third column of tables 7 and 8 (model 2b), the paper checked whether the results remain valid when considering certain banks characteristics, such as credit process variables (i.e., loans and credit risk), the product mix variable (i.e., net fee income) and equity. The results do not indicate important differences with respect to either net interest margin or operating costs. There is a positive, though not significant, relationship between credit risk and the dependent variables (i.e., net interest margin and operating costs), which is consistent with previous studies (Wong, 1997). The coefficient is positive and significant with respect to the loan variable, indicating that at a higher ratio of loans to output, banks tend to have higher net interest margins, which confirms previous findings (Demirgüç-Kunt and Huizinga, 1999; Naceur and Goaid, 2005).

Next, there is a positive but insignificant coefficient on the non-interest income with respect to net interest margin; however, this coefficient is significant with respect to operating costs. The sign of the coefficient for net interest margin is not as expected, which signals that higher fee-income activities increase net interest margin. This indirectly suggests traditional bank activities subsidize non-traditional bank activities. The inverse mechanism, that is traditional bank activities subsidized by non-traditional bank activities, is true abroad (Demirküç-kunt et al., 2004). Finally, there is a positive and significant coefficient for the equity variable with respect to net interest margin, but this same relationship is not significant with regard to operating costs. Well-capitalized banks tend to have higher net interest margins, which is consistent with the theory that highly capitalized banks face lower risks of bankruptcy. As such, funding costs are reduced, which increases net interest margin. However, equity is much more expensive than debt, and banks with relatively high capital ratio may attempt to cover this cost by introducing an extra spread (Saunders and Schumacher, 2000).

Table 7: Regression Results: Dependent Variable Ratio of Net Interest Margin to Bank Output.

Independent	Model 1		Model 2		Model 3		Model 4		
		a)	b)		a)	b)	c)		
Reg	0.250*** (0.07490)	0.232*** (0.07990)	0.0943* (0.05450)	0.102* (0.05570)	0.0723* (0.04160)	0.0972* (0.05330)	0.0696* (0.03920)		
Year 2002	-0.00227*** (0.00009)	-0.00162*** (0.00015)	-0.00163*** (0.00016)	-0.00163*** (0.00016)	-0.00162*** (0.00016)	-	-0.00162*** (0.00017)		
Year2003	-0.00533*** (0.00055)	-0.00395*** (0.00067)	-0.00311*** (0.00050)	-0.00315*** (0.00048)	-0.00312*** (0.00048)	-	-0.00308*** (0.00042)		
Year 2004	-0.00745*** (0.00086)	-0.00542*** (0.00101)	-0.00411*** (0.00073)	-0.00419*** (0.00070)	-0.00412*** (0.00070)	-	-0.00407*** (0.00061)		
Year 2005	-0.00805*** (0.00083)	-0.00552*** (0.00102)	-0.00433*** (0.00077)	-0.00442*** (0.00074)	-0.00434*** (0.00074)	-	-0.00429*** (0.00065)		
Year 2006	-0.00552*** (0.00059)	-0.00260*** (0.00086)	-0.00250*** (0.00077)	-0.00254*** (0.00075)	-0.00251*** (0.00075)	-	-0.00246*** (0.00068)		
Year 2007	-0.00203*** (0.00026)	0.00120* (0.00065)	-0.000206 (0.00071)	-0.000154 (0.00072)	-0.000187 (0.00072)	-0.000217 (0.00072)	-0.00019 (0.00073)		
Productivity		-0.00272** (0.00111)	-0.00202** (0.00094)	-0.00202** (0.00093)	-0.00200** (0.00094)	-0.00198** (0.00094)	-0.00203** (0.00092)		
Lnsiz		-0.00443*** (0.00096)	-0.00374*** (0.00080)	-0.00363*** (0.00077)	-0.00375*** (0.00080)	-	-0.00373*** (0.00080)		
Credit risk			0.000312 (0.00190)	0.0000864 (0.00186)	0.000247 (0.00189)	0.000199 (0.00188)	0.000216 (0.00188)		
Loan			0.0150*** (0.00357)	0.0144*** (0.00342)	0.0148*** (0.00343)	0.0150*** (0.00342)	0.0148*** (0.00338)		
Net fee income			0.158 (0.16300)	0.184 (0.14400)	0.171 (0.15900)	0.177 (0.15400)	0.172 (0.15900)		
Equity			0.0375*** (0.00753)	0.0373*** (0.00737)	0.0376*** (0.00748)	0.0384*** (0.00755)	0.0374*** (0.00731)		
M&A				-0.00750** (0.00310)					
Reg*M&A				0.129** (0.06080)					
Reg*quot				-0.0957 (0.06800)					
Reg*MB					0.0305 (0.03630)	0.00204 (0.04880)			
Reg*small size						-0.0503 (0.04480)			
Reg*MB north-west							0.0221 (0.02810)		
Reg*MB north-east							0.014 (0.03290)		
Reg*MB middle							0.0510 (0.03000)		
Reg*MB south							0.0371 (0.05040)		
_cons	0.0117*** (0.00370)	0.0910*** (0.01510)	0.0726*** (0.01300)	0.0713*** (0.01270)	0.0724*** (0.01290)	0.0720*** (0.01290)	0.0727*** (0.01270)		
Oobservations	3017	3017	3017	3017	3017	3017	3017		
adj. R-sq	0.518	0.575	0.635	0.639	0.636	0.636	0.636		
Within R ²	0.5195	0.5762	0.6364	0.6405	0.6373	0.6381	0.638		

This table reports regression estimates. The dependent variable is net interest margin divided by bank output. Bank output is the sum of customers' loans and deposits. Reg. stands for IAS and Basel II Regulation.; Year 2002 to 2007 are temporal dummy variables. The control variables are: Productivity (ratio of bank output to the number of employees); Lnsiz (logarithm of total assets); Credit risk (ratio of non performing exposure to bank output); Loans (ratio between loans and bank output); Net fee income (Bank activity mix process proxy by net fee and commission income divided by bank output); Equity (ratio of equity and to output). M&A is a dummy variable with value 1 for banks which merged; quotation is a dummy variable with the value of 1 for banks quoted; The fixed effect model has been used as estimation techniques. Standard errors are between brackets. *, **, ***, indicate significance levels of 10%, 5% and 1%, respectively.

Table 8: Regression Results: Dependent Variable is the Ratio of Operating Costs to Bank Output

Independent	Model 1		Model 2		Model 3		Model 4	
		a)	b)		a)	b)	c)	
Reg	0.250*** (0.03640)	0.176*** (0.03670)	0.141*** (0.03560)	0.130*** (0.03980)	0.138*** (0.02900)	0.143*** (0.03430)	0.140*** (0.02910)	
Year 2002	-0.00113*** (0.00011)	-0.000232 (0.00021)	-0.000154 (0.00018)	-0.000153 (0.00018)	-0.000153 (0.00018)	-0.000154 (0.00018)	-0.000152 (0.00018)	
Year2003	-0.00408*** (0.00027)	-0.00174*** (0.00049)	-0.00170*** (0.00044)	-0.00162*** (0.00046)	-0.00170*** (0.00044)	-0.00170*** (0.00044)	-0.00172*** (0.00043)	
Year 2004	-0.00618*** (0.00041)	-0.00267*** (0.00071)	-0.00264*** (0.00065)	-0.00251*** (0.00067)	-0.00264*** (0.00065)	-0.00264*** (0.00065)	-0.00267*** (0.00062)	
Year 2005	-0.00635*** (0.00043)	-0.00212** (0.00082)	-0.00224*** (0.00074)	-0.00210*** (0.00077)	-0.00224*** (0.00075)	-0.00223*** (0.00074)	-0.00226*** (0.00072)	
Year 2006	-0.00615*** (0.00036)	-0.00163* (0.00087)	-0.00194** (0.00083)	-0.00185** (0.00085)	-0.00194** (0.00083)	-0.00194** (0.00083)	-0.00196** (0.00082)	
Year 2007	-0.00403*** (0.00020)	0.000443 (0.00094)	-0.000267 (0.00092)	-0.000275 (0.00093)	-0.000265 (0.00093)	-0.00027 (0.00092)	-0.000253 (0.00092)	
Productivity		-0.00826*** (0.00225)	-0.00646*** (0.00190)	-0.00643*** (0.00189)	-0.00646*** (0.00190)	-0.00645*** (0.00191)	-0.00644*** (0.00190)	
Lnsiz		-0.00313** (0.00126)	-0.00221* (0.00114)	-0.00238** (0.00114)	-0.00221* (0.00115)	-0.00220* (0.00114)	-0.00222* (0.00114)	
Credit risk			0.00669** (0.00307)	0.00690** (0.00314)	0.00668** (0.00306)	0.00667** (0.00305)	0.00663** (0.00308)	
Loan			0.00102 (0.00319)	0.00163 (0.00322)	0.00101 (0.00315)	0.00103 (0.00318)	0.000986 (0.00312)	
Net fee income			0.692*** (0.13500)	0.651*** (0.16300)	0.693*** (0.13900)	0.694*** (0.14000)	0.693*** (0.13900)	
Equity			0.00402 (0.01150)	0.00453 (0.01110)	0.00404 (0.01130)	0.00417 (0.01080)	0.00407 (0.01150)	
M&A				0.00698** (0.00274)				
Reg*M&A				0.142*** (0.05410)				
Reg*quot				0.126* (0.06660)				
Reg*MB					0.00366 (0.03300)	0.00121 (0.02870)		
Reg*small size						-0.0086 (0.04650)		
Reg*MB north-							0.018 (0.03330)	
Reg*MB north-							0.0165 (0.02900)	
Reg*MB middle							0.0000324 (0.02770)	
Reg*MB south							0.00209 (0.04270)	
_cons	0.0106*** (0.00180)	0.124*** (0.02190)	0.0936*** (0.02120)	0.0955*** (0.02120)	0.0936*** (0.02110)	0.0935*** (0.02100)	0.0935*** (0.02110)	
Number of	3017	3017	3017	3017	3017	3017	3017	
adj. R-sq	0.456	0.59	0.647	0.652	0.647	0.647	0.647	
Within R ²	0.457	0.5915	0.6486	0.654	0.6487	0.6487	0.6491	

The table reports the regression estimates. The dependent variable is operating costs divided by bank output. Bank output is the sum of customers' loans and deposits. Reg. stands for IAS and Basel II Regulation.; Year 2002 to 2007 are temporal dummy variables. The control variables are: Productivity (ratio of bank output to the number of employees); Lnsiz (logarithm of total assets); Credit risk (ratio of non performing exposure to bank output); Loans (ratio between loans and bank output); Net fee income (Bank activity mix process proxy by net fee and commission income divided by bank output); Equity (ratio of equity and to output). M&A is a dummy variable with value 1 for banks which merged; quotation is a dummy variable with the value of 1 for banks quoted; The fixed effect model has been used as estimation techniques. Standard errors are between brackets. *, **, ***, indicate significance levels of 10%, 5% and 1%, respectively.

Mergers and public quotation (model 3): The coefficient of the interaction variable with mergers is positive and significant for both net interest margin and operating costs. This suggests that compliance costs for IAS and Basel II regulations are higher for firms involved in mergers. Merged banks tend to translate higher costs into net interest margin. In contrast, the coefficient of the interaction variable with quotation is negative and not significant for net interest margin, but it is positive and significant for operating costs. This suggests that for quoted banks, IAS and Basel II regulations have higher costs as compared to unquoted banks due to the fact that quoted banks must meet more severe regulations with respect to transparency. It is worth noting that this greater cost may not be translated into net interest margin.

Regulation and mutual banks (model 4): The last three columns of tables 7 and 8 are designed to test whether there is a difference in the impact of IAS and Basel II compliance costs for mutual banks as compared to other banks. The coefficient sign of the regulation variable interacted with mutual banks (MB) is positive though not significant (model 4a) both for net interest margin and operating costs. This suggests that for mutual banks, there is a certain degree of sensitivity to regulatory costs, but there is no strong evidence that there exists a cost disadvantage in complying with IAS and Basel II regulations.

This is also true for non-cooperative small banks. In fact, as can be observed from model 4b, the sign of the coefficient of the interaction variable Reg*small size banks is negative, even if not significant. The same results also appear if we consider mutual banks with regard to location. The coefficient sign of the interaction term between IAS and Basel II regulations and mutual banks is always positive, though not significant, regardless of geographic location (model 4c).

In general, the empirical evidence does not lead to the conclusion that mutual banks face a higher average cost of compliance with IAS and Basel II regulations as compared with other banks. This is not surprising if it is considered that mutual banks have generally opted for a rather standard approach to the Basel II, which is much simpler and requires less investment than other approaches. Moreover, mutual banks have been supported by local and national associations, which have centralized certain key products in order to facilitate the common management of important support services, such as regulatory compliance. Thus, mutual banks have overcome the problem of indivisibilities in regulatory compliance. Software, human skills and organizational processes generate large fixed costs and are not divisible; thus, to comply with IAS and Basel II regulations, banks must acquire all of these capabilities. With respect to mutual banks, local associations have acquired all of these capabilities, thereby exploiting the cost advantages derived from production on a larger scale. This has allowed all mutual banks to benefit from an economy of scale much like larger banks, which have taken advantage of scale economies in regulation costs, as shown in previous studies (Elliehausen, 1998; Thakor and Beltz, 1993).

CONCLUSIONS

This paper focuses on the impact of IAS and Basel II regulations on the net interest margin and operating costs of Italian banks using bank-level data for the period 2001-2007. In particular, the paper intends to verify if: a) IAS and Basel II compliance costs have increased operating costs and have been translated into a larger spread, b) there is the presence of scale diseconomies with respect to IAS and Basel II compliance costs for mutual banks as compared with other banks. To address these aims, a series of regressions on balanced panel data have been estimated in the paper. Estimations have been conducted by using: a) the accounting data of 431 Italian banks of which 344 are mutual banks and b) the annual ICT cash outflow collected from the “Annual Survey on Automation in the Italian credit system” carried out by Interbank Convention Automation.

In the paper, the dependent variables are represented by net interest margin and operating costs which are both divided by bank output defined as the sum of customers’ loans and deposits. The independent

variable relating to IAS and Basel II regulations is represented by the ratio between the ICT cash-outflow and bank output. This variable specifically refers to three functional areas: 1) administration and accounting, 2) credit and 3) risk and control management.

The robustness of the findings has been checked for various bank characteristics, including labor productivity, size, credit quality, loan, net fee income and equity linked to typical business processes, such as human resource management, administration, credit processes, bank activity mix processes and financial management. Mergers and quotations have been included as additional extraordinary factors that may affect net interest margin and operating costs.

The main results of the paper are as follows: first, the compliance costs of IAS and Basel II regulations affect operating costs; they also partly affect net interest margins. Second, mutual banks as compared with other banks present a certain sensitivity with respect to IAS and Basel II compliance costs, but there is no strong evidence of the existence of cost disadvantages even if regulations are simpler to fulfill for mutual banks. Third, bank mergers can increase the impact of regulatory costs on net interest margin due to diseconomies, whereas in quoted banks, the contrary is true. Fourth, the above findings remain unchanged even when checking for individual bank characteristics. High net interest margin and operating costs tend to be associated with banks with low levels of productivity that concentrate on traditional credit business and have high levels of equity and credit risk.

The empirical findings suggest that the regulatory authority should carefully evaluate the impact of all new financial rule on the operating costs of the banks as part of these costs could be passed on to depositors and lenders. In addition, the empirical findings demonstrate the positive role played by mutual bank networks, as these networks help Italian mutual banks exploit economies of scale, but this advantage can only persist if institutions dedicated to linking mutual banks continue to improve their own efficiency and offer high-value services.

It is worth underlining that this paper does not quantify the specific cost of compliance with IAS and Basel II but rather intends to estimate the impact of IAS and Basel II regulation on the net interest margin and operating costs as a whole. Consequently, the results of this study cannot be compared with previous research quantifying the compliance costs of specific regulations. Future developments of the research should focus on the cost-causing activities that a bank may carry out in order to comply with IAS and Basel II regulations. To address this task, a questionnaire needs to be drawn up and submitted to a sample bank. After collecting the data, it will be possible to estimate a Cobb-Douglas cost function as in most studies using an econometric method. Moreover, the paper focuses exclusively on the compliance cost of regulation. Further work should be undertaken on the possible benefits of IAS and Basel II regulation. In fact, it is important to highlight that IAS have generated costs but also a greater transparency and homogeneity of valuation criteria by favoring the opportunity for comparison. On the other hand, Basel II establishes a minimum level of capital needed to cover unexpected losses and this can reduce the monitoring costs that other banks have to sustain in order to evaluate each other's creditworthiness. The Interaction between cost and benefits could improve the understanding of the impact of IAS and Basel II regulation.

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