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Governance Structure, Risk an Performance in the European Banking Sector: an Empirical Analysis

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Abstract

Implementing safe and sound corporate governance practices in the banking sector has become a central topic for the international regulators during the recent past. In particular, the Basel Committee on Banking Supervision, after recognizing two main alternative governance structures (two-tier board vs. one-tier board), states that the particular legal framework adopted by banks should not impede the application of sound corporate governance practices.

By analyzing a sample of listed banks from the Euro-zone and UK over the period from January 2003 – November 2010, this paper investigates whether and to what extent there is a connection between the particular corporate governance structure, their risk and their financial and operating performance, especially during the recent financial crisis. Primary results suggest that, especially during the crisis of 2007-2009, the banks adopting the two-tier structure were less exposed to the bankruptcy risk with respect to the banks that adopted the one-tier structure; moreover, the strategy of buying the banks with a two-tier board structure and short selling the one-tier structure banks earned a positive abnormal return of about 6.36% per year.

Keywords:
One-tier board, Two-tier board, Governance structure, Four factor model, Distance to default.

JEL classification: C31, C58, G32, G34

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Estructura de la gobernanza, riesgo y rentabilidad en el sector bancario europeo: **Un análisis empírico**

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Resumen

La implementación de prácticas seguras y sólidas de gobernanza corporativa en el sector bancario se ha convertido, en los últimos años, en una cuestión crucial para los reguladores internacionales. En particular, el Comité de Supervisión Bancaria de Basilea, tras reconocer dos alternativas principales en cuanto a las estructuras de gobernanza (Consejo de dos niveles frente a Consejo de un nivel), establece que el marco legal particular adoptado por los bancos no debería impedir la aplicación de prácticas sólidas de gobernanza corporativa.

Mediante el análisis de una muestra de los bancos cotizados del área del Euro y del Reino Unido, en el periodo Enero 2003-Noviembre 2010, en este articulo se investiga si, y en qué medida, existe una conexión entre su estructura particular de gobernanza corporativa, su riesgo y su rentabilidad financiera y operativa, poniendo especial énfasis en la reciente crisis financiera. Los resultados obtenidos sugieren que los bancos con una estructura de dos niveles estuvieron menos expuestos al riesgo de quiebra que aquellos con una estructura de un solo nivel, especialmente durante la crisis 2007-2009. Además, la estrategia de compra de bancos con estructura de dos niveles y venta a descubierto de aquellos con estructura uninivel dio lugar a rentabilidades anormalmente positivas, del entorno del 6,36% anual.

Palabras clave:

Consejo de un nivel, Consejo de dos niveles, estructura de gobernanza, modelo de cuatro factores, distancia a la situación de mora.

1. Introduction

During the last few decades, the banking sector has undergone a deep change concerning several aspects of its activity. In particular, those regarding ownership and control structure seem to play a crucial role in explaining bank's performance. This process has assumed a pivotal role especially in those countries, Italy for example, where the presence of the government in the ownership structure was not negligible. It is remarkable that if the government controls the banking sector, the public interest of pursuing financial stability is predominant and not in conflict with the interest of maximising return on investment. On the contrary, in this new scenario, where the government is not a shareholder, the stakes of the public investors would become central and the particular corporate governance pattern should allow for the achievement of both a satisfying return to shareholders and financial stability.

Moreover, Italy's reform of its corporate law that was passed in 2003, introduced the possibility for firms to choose between two new legal frameworks of governance different from the still existing so called "Traditional Structure": the "Two-Tier Structure" (henceforth TTS) and the "One-Tier Structure" (henceforth OTS). One of the main differences among these patterns is that the TTS contemplates the presence of a specific board, called Surveillance Board, performing the monitoring function, while this board is absent in the OTS. We note also that in the Italian "Traditional Structure" there are two boards but, unlike the TTS, whose Board of Directors is appointed by the Surveillance Board, both the boards are appointed by the shareholders. For this reason the Traditional Structure is generally considered as a "horizontal" version of the TTS.

However, if only few Italian firms (especially banks) have adopted the TTS, which is very common in the German tradition, the OTS, widely used in UK, France and Spain, has still not been successful in Italy. Anyway, critics have addressed many issues with both the new governance patterns since their introduction. In fact it can noted that the TTS appears to be more costly to implement because of the presence of a second board and moreover, as some studies suggest (see Brogi, 2008), it may increase the risk of overlapping functions. On the other hand, the OTS is probably less expensive to implement and it can ensure a more efficient decision making process, although the monitoring function may be less effective than that of the TTS.

We notice that also the Basel Committee on Banking Supervision (BCBS) has paid some attention to the problems of bank corporate governance and, in a consultative document[1], it states that the particular legal framework adopted by banks should not impede the application of sound corporate governance practices.

[1] *For further details see Principles for enhancing corporate governance, issued by the working group on corporate governance in 2010.*

However, it can be questioned whether, and to what extent, banks can apply sound corporate governance principles irrespective of the particular legal framework. In fact, although the functioning of these two frameworks may change across different jurisdictions, some characteristics are common across all countries such as, for example, the fact that in the OTS the non executive members can participate in the decisions taken by the Board of management and, at the same time, ensure that those decisions do not harm investors' interests.

The aim of this article is to analyse how the specific corporate governance pattern – that is the adoption of the TTS vs. the OTS – affects the risk and the performance of a selected sample of banks, before and during the recent financial crisis. We are aware that sound corporate governance practices include a complex set of rules and provisions that cannot be limited only to the legal framework. Moreover, many of these practices can be applied independently of how the board of directors is arranged. Nevertheless, the attention here is focused on the legal framework because of its connection with some relevant features that may play a crucial role in enhancing corporate governance, such as, for example, the degree of separation between ownership and control, the degree of separation between the decision making process and monitoring activities and the presence or lack of the so called "labour co-determination", typical of the TTS especially in Germany.

The paper proceeds as follows. Section 2 offers the review of the literature, as well as of the theoretical framework. Section 3 explains data used in the research (3.1), and the methodology adopted for both risk (3.2) and performance (3.3) measurement. Section 4 reports some evidence of the relationships between the adoption of the particular board structure, the operating costs and the risk. In particular we show that the TTS is associated to higher operating costs and, especially from 2007, also a lower level of risk. Section 5 reports some evidence of the relationships between the legal framework and bank performance. First of all, it can be noticed that the financial crisis has been more severe in those countries where the OTS is widely used (i.e. Ireland, Spain, Greece). Secondly, we show that the investment strategy consisting of long position on banks adopting the TTS and short selling the banks implementing the OTS earned a statistically significant "abnormal" return of about 53 basis point per month, equivalent to 6.36% per year. Thirdly, it emerges that, before the financial crisis broke out, the adoption of the OTS was significantly associated to a better operating performance even if the significance of the relationship disappears as the financial crisis approaches. Finally, we conclude with section 6 by summarising the main results and some of the possible explanations as to why this significant difference in performance arises.

2. The Background

The theoretical background to this research can be traced back to the seminal paper by Jensen and Meckling (1976) where they showed that the value of a firm fully owned and managed by a single entrepreneur has a higher value than the same firm can have, if a fraction of its equity is sold on the financial market. This difference in the firm value is the total agency cost and it is entirely beard by the entrepreneur since he offers a fraction of equity on the financial market.

Jensen and Meckling also showed that monitoring and bonding activities can be put in place in order to mitigate these agency costs. However, since these activities are costly, the entrepreneur will devote resources to them until their marginal cost is equal to the corresponding marginal benefit, that is the marginal reduction in the recorded agency costs. Furthermore Jensen and Meckling showed that agency costs are associated also to the issue of debt. They argued that the higher the amount of debt issued by the firm, the higher the incentive for the owner-manager to assume an opportunistic behaviour. As a consequence, if the theory of rational expectations hold and the market is efficient, the cost of debt increases. Thus, the value of the firm could be lower than if the firm had no debt. This is one of the reasons that prevents the Modigliani and Miller (1958) theorem from holding.

If this is the case, it is not surprising that the agency problem for banks is more severe than for non-financial firms, as also shown by Ciancanelli and Gonzalez (2000). This occurs for at least two reasons: first of all because a financial intermediary is highly levered and there is a higher incentive for the management to adopt an opportunistic behaviour. At the same time, given the fundamental role banks, and in general financial institutions, play in the economy, in many countries they are usually not allowed to fail and the government is prone to intervene to avoid bankruptcy. This argument leads to the second reason: if the manager of a bank is aware of the government sustaining intervention, he will have a major incentive to choose riskier investment opportunities because he knows that the costs of bankruptcy may be burdened by the taxpayers. In addition, since the stockholders are aware of the "difficulty" or "impossibility" of bank failure, they will be willing to pay a higher price for the stocks. For these reasons the agency costs for a bank should be sensibly higher during a systemic crisis, while they will be quite negligible during an economic expansion. However, also in this case, it can be argued that an effective system of corporate control can sensibly reduce the agency costs. Within this context, it is straightforward that the corporate governance pattern should be able to guarantee an effective control process and thus enhancing the confidence of the financial markets.

Prior literature on corporate governance in the banking sector is very expansive, though not much attention has been devoted to the analysis of the relationship

between the particular board structure, the risk and the performance of banking institutions.

A significant contribution in comparing the role played by the two main types of boards of directors across different countries is accomplished by Demb and Neubauer (1992), although the attention is not specifically focused on the banking sector.

One of the most relevant contributions in comparing the two kinds of board structures can be attributed to Jungmann (2006) who, after a comparison, concludes that it is not possible to assign superiority to either of them. We however remark that Jungmann's research differs from our research for three main reasons. First of all, because the attention here is limited to the banking sector; secondly, because we take into account banks from the whole Euro-Area and the UK, while Jungmann only limits his attention to firms from UK and Germany; thirdly, because, differently from Jungmann, we perform the comparison both, during a period of (relative) financial stability and during the recent financial crisis.

Particularly relevant is also the comparison between two groups of firms, adopting respectively the two kinds of board structures, performed by Millet-Reyes and Zhao (2010) within the French non-financial industry. In their research the authors find little evidence of better operating performances in favor of the group of firms adopting the two-tier board structure.

Some contributions about the analysis of the corporate governance patterns can also be found in Brogi (2008), where a comprehensive recognition of the drawbacks related to the adoption of the TTS in the European financial system is provided. In particular, since the Surveillance Board does not only have the task of monitoring the company but also the designation of the board of directors, there may be the possibility of overlapping functions and difficulties in coordinating the efforts of the two boards. This may result in a decision process that is less efficient (and thus slower) in exploiting investment opportunities. On the other hand, this risk is less likely to occur in the OTS, where the Surveillance Board is non-existent and the control function is delegated to the independent members of the board. Moreover, Ghezzi and Malberti (2007), in depicting the main features of the governance patterns in the Italian corporate law, recognize that if the costs of switching from a model to another were null, the adoption of a different pattern of corporate governance could foster the value creation process. In this way, they implicitly assume it is possible to enhance the performance just by choosing the governance model that is more apt to solve specific categories of problems.

The idea developed in this article is that, although the TTS is more expensive, among other things due to the overlapping of functions, monitoring activities are more effective

than they are in the OTS. If this is true, it should be possible to find some evidence of over-performance of the banks adopting the TTS with respect to those adopting the OTS and, for the above-mentioned reasons, this difference in performance should be significant especially during periods of crisis. Finally, the methodology followed here is quite similar to that implemented by Gompers *et al*. (2003) both in using the Carhart (1997) four factor model to analyse financial performance and in investigating the relationships between operating performance and governance. At the same time, to test the relationship between governance and risk, following Sullivan and Spong (2007), we adopt a specific measure of a bank's distance to default based on publicly available balance sheet information.

3. Data and Methodology

In this section we describe the data used in this research (3.1) as well as the methodology adopted to test the relationship between governance structure, risk (3.2) and performance (3.3). We anticipate that as far as cross-sectional regressions are concerned, we correct for heteroskedasticity (White, 1980) by using a Weighted Least Squares (WLS) regression, whose details are reported in Appendix 1.

3.1 Data

We focus on a selected sample of listed banks located in the Euro-area and in the United Kingdom. The data are extracted from Bankscope© database. It should be remarked that the attention of this article is mainly focused upon the banks that provide traditional financial services. For this reason, we select only the commercial, savings and cooperative banks. However, if we look at many banking groups, very often only one firm is listed and sometimes this firm is the bank holding. Even if in this case there is the risk of not focusing upon the traditional banking activity, we take into account these banks not to exclude from our analysis some of the most important banks in Western Europe. By setting these criteria, we are left with a sample of 151 listed banks that are arranged into two portfolios: the OTS portfolio, grouping the banks adopting the OTS and the TTS portfolio, including the banks that adopt the TTS.

Data upon the corporate governance structure has been collected from the official annual report. As noticed above, some functions of the governance structures may change across different countries because of the specific legal discipline, so the presence of two different boards is not sufficient, on its own, to discriminate between the TTS and the OTS. However, we adopt a more detailed but still easy way to discriminate between the two structures. In particular, we include a bank in the TTS portfolio if the members of the Surveillance Board are all different from

the members of the Board of Directors. On the contrary, if the two boards also have just one member in common (though he or she has no executive functions), the bank is included in the OTS portfolio. Following this criterion, 73 banks are included in the TTS portfolio and 78 in the OTS portfolio. For each bank the monthly time-series of the closing price and market capitalization is available over the period January 2003 – November 2010 for a total amount of 14,043 observations, as well as annual balance sheet information (i.e. operating costs, total assets, total equity and so on).

However, it can be noticed that, for balance sheet information the period is slightly different, spanning from 2004 to 2010, for a total of 7 observations per item for each bank. Finally, the monthly average series of the 1-month Euribor is available and used in the performance measurement as a risk free rate. The Euribor time series is available at www.euribor.org.

Summary statistics for the two portfolios are reported in Table 1. Panel A reports the information from the financial markets while Panel B reports some balance sheet information, available at the end of 2009, taken as an average. From Panel A it is clear that the TTS portfolio earned a global return higher than the OTS portfolio, but also had a higher standard deviation. Furthermore, Panel B shows that the OTS portfolio admits banks that are, on average, larger than those included in the TTS portfolio with regard to both the market capitalization and the total assets. Moreover, the OTS portfolio is characterized by a higher value of the book to market ratio (BE/ME ratio, defined as the book value of equity divided by the market capitalization) and a sensibly lower cost to income ratio (defined as the ratio between the operating costs and the operating income).

Table 1. **Summary statistics**

Panel A reports the information from the financial markets over January 2003 – November 2010; Panel B reports the portfolio average of some operating measures referred to year 2009.

Panel A		
	TTS	OTS
Market value at January 2003	100.00	100.00
Market value at November 2010	114.89	94.96
% variation	14.89	-5.04
Min	66.71	53.29
Max	285.16	209.93
Average	168.46	138.94
St. deviation	56.65	41.18

Panel B		
	TTS	OTS
Total assets (mil. Eur)	111,731.57	223,507.07
BE/ME ratio (%)	5.83	4.44
Operating costs/net income (%)	68.24	59.24
Total capital ratio (%)	13.57	12.94
Return on average assets (%)	0.35	1.05
Return on average equity (%)	4.37	4.09
2009 capitalization (average, mil. Eur)	3,637.12	9,474.09

3.2 Measuring the risk

To test the relationship between corporate governance structure and risk we follow Spong and Sullivan (2007) and DeYoung *et al*. (2001) by adopting, as measure of risk, the distance to default (in some other works also defined as "survivor likelihood ratio"; see Sullivan and Spong, 1995), defined as:

$$Distance\ to\ Default = \frac{\frac{K}{A} + E[ROAA]}{\sigma[ROAA]}$$

where K and A are the book value of equity and of assets, respectively, while $E[ROAA]$ and $\sigma[ROAA]$ are the expected value and the standard deviation of the Return on Average Assets (ROAA), respectively. The distance to default can be defined as the number of standard deviations that ROAA would need to fall in order to exhaust equity and force a bank failure.

The distance to default (DD) is closely linked to the probability of default (PD) by means of the following relationship:

$$PD = Prob\{\pi < -K\} = Prob\left\{\frac{\pi}{A} < -\frac{K}{A}\right\} \quad (1)$$

where π represents the net income and where, by assumption, the ratio $\frac{\pi}{A}$ has a normal distribution with mean μ and variance σ, so that the quantity

$$Z = \frac{\left(\frac{\pi}{A} - \mu\right)}{\sigma}$$

has a standard normal distribution. By rearranging equation (1) we have:

$$PD = Prob\left\{Z < -\frac{\left(\frac{K}{A} - \mu\right)}{\sigma}\right\} = Prob\{Z < -DD\} \quad (2)$$

We remark that the higher the DD, the lower the PD and thus the risk of a bank failure. For the reasons proposed in section 2, we expect that the DD is lower for the banks adopting the OTS with respect to those adopting the TTS. To evaluate the expected value and the variance of the ROAA, a sufficiently long time series of return and total assets should be available. Since in our case, 7 observations per item are available, the time-series average cannot be considered an efficient proxy for the expected value. Moreover, by using a time series estimate of the expected ROAA and its variance, it may happen that the DD does not change significantly over time even if a consistent change in the PD may have occurred because of changes in the macroeconomic scenery. For this reason we follow Gorman *et al*. (2010), by adopting cross-sectional estimates of the two unknown parameters. More precisely, each year in the period 2004-2010, we

estimate $E[ROAA]$ and $\sigma[ROAA]$ respectively as the cross-sectional average and the standard deviation of the ROAA of our whole sample banks, so that during the years in which the systemic risk is higher also the variability of ROAA will be higher and thus, the average distance to default will be lower.

3.3 Performance attribution

If the corporate governance pattern used by the banks affects the performance and the financial markets are efficient, differences in the governance structure will be reflected in the stock prices. However, if the TTS portfolio would earn higher returns than the OTS portfolio, this may be due to differences in the "style" of the two portfolios, that is to say the different exposure to some common risk factors. From Panel A of Table 1 we see that the TTS portfolio earned a higher stock return than the OTS portfolio; we also see, from Panel 2, that the OTS includes larger banks with a lower BE/ME ratio than the TTS portfolio. Furthermore, we notice that the variability of the TTS portfolio is higher than the variability of the OTS portfolio. Then, opposite to the evidence referred to the stock performance measure, looking at the operating measures, we notice that the TTS portfolio earned on average a lower ROAA than the OTS portfolio. This is consistent with the theory (Fama and French, 1993) that firms with a low stock price relative to the book value (a higher BE/ME ratio) and a lower size tend to have lower earnings on assets.

To assess if these differences are explained by a different exposure of the two portfolios to common risk factors or, on the contrary, an abnormal return can be recognised, we estimate the Carhart (1997) four-factor model by means of the following equation:

$$R_t = a + \beta_1 RMRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_t, \qquad t = 1 \ldots n \tag{3}$$

where R_t is the excess return of a portfolio to some asset (in this case the risk free rate); β_t is the regression coefficient (factor loading) associated to the i-th risk factor; $RMRF_t$ is the t-time value of the market factor in the Sharp-Lintner Capital Asset Pricing Model (1964, 1965), that is the excess return of the market portfolio on the risk free rate; SMB_t, HML_t and MOM_t are respectively factor-mimicking portfolios that proxy respectively for size, book to market and momentum effects. More specifically, $RMRF_t$ represents the excess return of the value weighted average of the log returns of the portfolio formed by all the banks in the sample. However, to estimate the other risk factors, we adopt a higher number of firms, given that 151 firms are not sufficient to this aim. In particular we refer to all the listed commercial, savings, cooperative banks and bank holdings available on Bankscope, for a total of 2,041 banks. For this reason we consider as proxy for the return on the market portfolio, the equally weighted log return of all banks total sample.

Based upon this "enlarged" sample, SMB_t (small minus big) can be interpreted as the month t return on a zero-investment value weighted portfolio which takes a long position on the banks with a small capitalization and a short position on the firms with a large capitalization; HML_t can be interpreted as the month t return on a zero-investment value weighted portfolio which goes long on the banks with a high B/M ratio and short on firms with a low B/M ratio; finally MOM_t is the simple average month t return on bank stocks with the highest 30 percent eleven-month return minus that referred to the stocks with the lowest 30 percent eleven-month return, where the eleven-month return for month t is the return over the period ranging from t-12 to t-1. To construct these risk factors, we follow Fama and French (1993b), for the SMB and the HML, and Jegadeesh *et al*. (1993) for the MOM.

It is remarkable that the effectiveness of the four factors in explaining the stock returns depends on the correlation among them. The lower the correlation, the higher the "explanatory power" of the variables. Moreover, the absence of correlation among the right-hand side variables is a key assumption for the classical regression models. Table 2 reports a generally low Pearson correlation index amongst the dependent variables, except for the correlation between the market portfolio and the SMB portfolio, which is statistically significant at the 1 percent confidence level.

Table 2. Pairwise correlation coefficients

Pearson correlation index between returns on factor-mimicking portfolios for the banking sector over the period January 2003 – February 2010.

	RMRF	SMB	HML	MOM
RMRF		-0.42***	0.25	0.23
SMB			-0.17	0.13
HML				-0.19
MOM				

** statistically significant at 10% confidence level. ** statistically significant at 5% confidence level. *** statistically significant at 1% confidence level.*

4. Governance and Risk

As anticipated in the previous section, we are interested in analysing the relationship between the adoption of a particular governance structure and the bankruptcy risk. Economic theory suggests that monitoring and bonding activities may reduce the default risk even if they are costly. To our purposes, we find evidence that TTS is associated, on the one hand, with higher operating costs, and, on the other hand, with a lower riskiness, if compared to OTS. To begin with, Table 3 reports, for each year from 2004 to 2010, the simple average and the median, for the two groups of banks (adopting respectively the TTS and the OTS), of some operating measures that are used in order to measure the relationship between the governance pattern, the risk and the operating performance.

First we notice a sensible difference between the groups of banks in both the average and the median of the cost to income ratio, each year from 2004 to 2010. In particular, we notice that the OTS banks beard average operational costs, per each euro of operational profit, that are considerably lower than those beard by the TTS banks. Furthermore the difference of these two averages is monotonically increasing over time from 2004 to 2008, where it peaked

Table 3. **Average and median of the main variables**

This table reports, for each year from 2004 to 2010, the average (AVG) and the median (MED) for both groups, the banks adopting the Two-Tier System (TTS) and the One-Tier System (OTS), of the following ratios expresses as percentage: the cost to income ratio (C/I), defined as the operational costs divided by the operational income, the ratio between interest income and average earning asset (II/AEA), the ratio between the operating profit and the risk weighted asset (OP/RWA), the ratio between the net income and the risk weighted asset (NI/RWA), the ratio between impaired loans and gross loans (IL/GL) and the the Distance to Default (DD), calculated as the ratio between the sum of the equity/asset ratio and the expected value of the return on average asset (ROAA) and the volatility of the ROAA. The expected value and the volatility of the ROAA are calculated respectively as the simple average and the standard deviation of the ROAA of the entire sample of banks during the reference year.

Year	Statistic	C/I		II/AEA		OP/RWA		NI/RWA		IL/GL		DD	
		OTS	TTS	OTS	TTS	OTS	TTS	OTS	TTS	OTS	TTS	OTS	TTS
2010	AVG	59.45	67.24	4.57	3.63	0.19	0.80	-0.15	0.67	7.06	6.89	0.08	0.09
	MED	55.59	66.32	3.94	3.27	0.85	0.74	0.49	0.62	5.92	6.09	0.07	0.07
2009	AVG	59.24	68.24	2.91	2.35	0.47	1.08	0.42	0.79	6.21	5.95	0.54	0.57
	MED	55.74	64.22	1.80	1.95	0.90	0.80	0.70	0.55	5.50	5.80	0.44	0.48
2008	AVG	64.03	76.24	1.88	3.14	0.57	0.60	0.48	0.37	4.37	3.98	-0.25	-0.23
	MED	58.84	70.28	1.85	2.30	0.75	0.70	0.79	0.60	3.50	3.90	-0.34	-0.29
2007	AVG	54.80	66.67	2.06	3.76	2.42	2.20	2.12	1.87	4.05	3.21	0.44	0.49
	MED	55.34	63.08	1.90	2.12	1.85	1.50	1.55	1.20	2.80	2.60	0.39	0.37
2006	AVG	54.29	64.98	2.18	3.72	2.61	2.05	2.25	1.60	4.91	3.50	0.46	0.41
	MED	55.65	62.28	2.15	2.10	2.05	1.50	1.75	1.20	2.10	2.70	0.34	0.35
2005	AVG	57.31	66.44	2.38	3.70	1.96	1.81	1.65	1.47	5.31	4.15	0.53	0.55
	MED	57.50	64.00	2.30	2.15	1.90	1.20	1.5	1.00	1.80	3.50	0.41	0.42
2004	AVG	62.66	72.19	2.28	4.22	1.63	1.38	1.19	1.10	7.31	4.00	0.54	0.50
	MED	60.29	68.55	2.82	2.30	1.80	1.05	1.20	0.85	2.90	4.05	0.42	0.41

at 12.21%. However, such great difference in the operational costs is not associated to an analogous difference in the operating performances of the two groups. The difference of the average operating profits to risk weighted assets ratio between the two groups appear to be relevant only during the 2004 and the 2005, and, on the contrary, becomes negative during the 2009 (though the median of the OTS banks is still higher than those of the TTS banks).

Something similar can be said about the difference of the average net income to risk weighted asset ratio between the two groups. Moreover, the average (but not the median) impaired to gross loans for the TTS banks is, every year, higher than that associated to the OTS banks, while the opposite occurs for the average distance to default (except for

the year 2004). We also notice that the distance to default was negative for both the groups during the 2008 but very positive for both groups in 2009 and, finally, very meagre but still positive in the 2010. This effect is probably due to the fact that in 2009, the most negative year for the OECD economies (the GDP of the OECD group decreased of about 2.7%) of the recent financial crisis, many banks in both groups earned huge profits that (at least partly) compensated for the losses of the previous year.

Table 4 shows the results of the cross-sectional WLS regression of the cost to income ratio on a dummy accounting for the board structure and control variables, for each year during the period 2004-2010. The dummy (GOV) takes the value of 1 for banks in the OTS portfolio and 0 for banks in the TTS portfolio. Following Gompers *et al*. (2003), we include, among the control variables, the book to market ratio (BE/ME), while, following Sullivan and Spong (2007), we add the log of total assets (LOG[TA]) and the ratio between fixed assets and total assets (FA/TA). Finally, to account for location effects, we add a dummy to control for banks situated outside the Euro Area (EUR) and the growth rate[2] of the Gross Domestic Product, measured at constant prices (GDP), of the country where the bank is mainly located. The dummy EUR takes the value of 1 if the bank is located outside the Euro Area and 0 otherwise.

Table 4. **Governance pattern and operating costs**

WLS regression coefficient of the cost to income ratio (C/I) on a dummy (GOV) to account for the board structure, and control variables. The dummy takes the value of 1 to the banks included in the OTS portfolio and 0 otherwise.The control variables are the log of total assets (LOG[TA]), the ratio between fixed assets and total assets (FA/TA), the book to market ratio (BE/ME), a dummy to control for banks whose main location is outside the Euro area (EUR) and the growth rate of the Gross Domestic Product, measured at constant prices (GDP), of the country where the bank is mainly located.The dummy EUR takes the value of 1 if the bank is located outside the Euro area, 0 otherwise. GDP data are provided the International Monetary Fund internet website.

C/I	2010	2009	2008	2007	2006	2005	2004
Const.	0.866***	0.751***	0.725***	0.577***	0.573***	0.312**	0.735***
	(0.112)	(0.156)	(0.143)	(0.084)	(0.096)	(0.129)	(0.135)
GOV	-0.098***	-0.087**	-0.058*	-0.044***	-0.092***	-0.070***	-0.129***
	(0.029)	(0.042)	(0.031)	(0.016)	(0.021)	(0.022)	(0.024)
LOG[TA]	-0.011*	-0.001	-0.001	-0.002	0.001	0.022***	-0.001
	(0.006)	(0.007)	(0.008)	(0.004)	(0.005)	(0.007)	(0.001)
FA/TA	0.012**	0.002**	0.002	0.003	0.006***	0.022***	0.001***
	(0.006)	(0.001)	(0.003)	(0.002)	(0.002)	(0.005)	(0.000)
BE/ME	-0.001	-0.001	-0.002***	-0.001***	0.001	0.002	0.003***
	(0.000)	(0.003)	(0.000)	(0.000)	(0.001)	(0.002)	(0.001)
EUR	0.102*	0.078	-0.030	-0.034	-0.003	-0.055	0.069
	(0.058)	(0.101)	(0.032)	(0.032)	(0.043)	(0.083)	(0.057)
GDP	-0.021**	0.020	-0.001	-0.001	0.011	-0.049***	-0.047**
	(0.009)	(0.014)	(0.006)	(0.006)	(0.011)	(0.015)	(0.017)
R^2	0.202	0.079	0.694	0.318	0.306	0.792	0.786

** statistically significant at 10% confidence level. ** statistically significant at 5% confidence level*
**** statistically significant at 1% confidence level. Standard deviation coefficients are in parentheses.*

[2] *Data about the GDP are provided by the International Monetary Fund web site.*

First of all, we notice from Table 4 that the dummy coefficients are always negative and both economically and statistically significant at the 1 percent level, except for the year 2008 where the dummy coefficient is statistically significant at the 10% level, and for year 2009 where the significance is of 5%. These results are consistent with the intuition that the TTS bears higher operational costs. In fact, it is noticeable from Table 4 that lower levels of the cost to income ratio are associated to the adoption of the OTS. It can now be questioned whether the higher costs may imply a reduction in the risk.

To answer this question, for each year in the period 2004-2010, we perform a WLS regression of the distance to default on a dummy to account for the governance structure and control variables. As before, the dummy takes the value of 1 for banks in the OTS portfolio and 0 for banks in the TTS portfolio. For the selection of the control variables we follow Spong and Sullivan (2007) by adopting the log of total assets (LOG[TA]) and the ratio between fixed assets and total assets (FA/TA). Moreover, we notice from Table 1 that the banks in the OTS portfolio report, for the 2009, a higher Total Capital Ratio (TCR) than the banks in the TTS portfolio. Since a higher TCR may imply a larger distance to default, we add this new control variable and notice an appreciable improvement of the adjusted R-squared.

It is worth noting that the default risk of a bank is also linked to the particular legal and political context of the country in which it is (mainly) located. Furthermore, some banks (as for example banks mainly located in UK or, before the first January 2008, in Cyprus or Malta) are situated outside the Euro Area. For these reasons, it can be appropriate to control for such a possible "location effect" on the default risk of a bank. To this aim, we perform two regressions where other control variables are added to the basic model depicted above. In the first regression, we add two more control variables: a dummy to control for banks situated outside the Euro Area (EUR) and the growth rate of the Gross Domestic Product, measured at constant prices (GDP), of the country where the bank is mainly located. The dummy EUR takes the value of 1 if the bank is located outside the Euro Area and 0 otherwise.

In the second regression, following Fonseca and Gonzáles (2008), we add, to the basic model, a dummy for each country (except one) in which the banks are mainly located. Each of these dummies takes the value of 1 if the bank is located in the corresponding country and 0 otherwise. However, in this second case, we notice that the matrix of the independent variables is near to be singular. To mitigate such an effect, we decide to exclude the country whose dummy variable presents the highest value for the Variance Inflation Factor (VIF, see Marquardt 1970). We notice that the maximum VIF is associated to the dummy variable correcting for banks located in France. Moreover, we decide (only in this regression) to not include in the sample the

banks mainly located in those countries that, during the years 2004-2008, have still not been admitted to the Euro Area (except for UK).

The estimated coefficients of such regressions are reported on Table 5 and 6 respectively. From Table 5, it can be noticed that the constant is always positive except for the year 2008. This probably occurs because of the dramatic drop in the DD of many banks during the most negative year of the 2007-09 financial crisis. Secondly, it is possible to notice that the coefficient for the dummy is negative and statistically significant in 2010, 2009, and 2008, practically null for the years 2007 and 2005, and positive for the years 2006 and 2004. Moreover, it is noticeable that such coefficient is approximately decreasing over time, meaning that banks in the OTS portfolio are associated to a lower distance to default and thus to a higher probability of default. Moreover, we observe that the significance of such estimates is increasing over time. This implies that the advent of the financial crisis has significantly increased the default risk of the banks adopting the OTS with respect to the banks included in the TTS portfolio.

Table 5. **Governance pattern and distance to default: DD regression 1**

This table shows the WLS regression coefficients of the distance to default (DD) on a dummy that accounts for the board structure (GOV) and control variables, over the period 2004-2010. The dummy GOV takes the value of 1 if the bank is included in the OTS portfolio and 0 otherwise. As control variables we use the log of total assets (LOG[TA]), the ratio between fixed assets and total assets (FA/TA), the total capital ratio (TCR), a dummy to control for banks whose main location is outside the Euro area (EUR) and the growth rate of the Gross Domestic Product, measured at constant prices (GDP), of the country where the bank is mainly located. The dummy EUR takes the value of 1 if the bank is located outside the Euro area, 0 otherwise. GDP data are provided the International Monetary Fund internet website.

DD	2010	2009	2008	2007	2006	2005	2004
Const.	0.071***	0.265*	-0.263	0.511***	0.496***	0.561***	0.079
	(0.006)	(0.148)	(0.260)	(0.174)	(0.133)	(0.141)	(0.232)
GOV	-0.004***	-0.062***	-0.069**	0.003	0.029	-0.001	0.050
	(0.001)	(0.021)	(0.031)	(0.026)	(0.024)	(0.026)	(0.041)
LOG[TA]	-0.001*	-0.016	-0.074***	-0.047***	-0.053***	-0.059***	-0.016
	(0.001)	(0.015)	(0.028)	(0.017)	(0.013)	(0.015)	(0.023)
FA/TA	2.681***	9.58***	12.092***	6.107***	7.107***	3.814***	8.819***
	(0.094)	(1.46)	(3.069)	(1.530)	(1.502)	(1.061)	(2.122)
TCR	0.052**	0.019***	0.030***	0.013**	0.014***	0.018***	0.016***
	(0.022)	(0.004)	(0.008)	(0.005)	(0.004)	(0.003)	(0.004)
EUR	0.000	-0.068*	-0.106	-0.018	-0.043	-0.004	0.038
	(0.002)	(0.038)	(0.093)	(0.038)	(0.030)	(0.037)	(0.027)
GDP	-0.019	0.444	-1.325	-0.814	-1.948**	-1.117	0.387
	(0.020)	(0.434)	(1.163)	(0.820)	(0.915)	(1.150)	(2.389)
R^2	0.368	0.465	0.449	0.381	0.509	0.585	0.706
Adj R^2	0.322	0.431	0.413	0.341	0.476	0.556	0.671

** statistically significant at 10% confidence level.*
*** statistically significant at 5% confidence level.*
**** statistically significant at 1% confidence level.*
Standard deviation coefficients are in parentheses.

Table 6. Governance pattern and distance to default: DD regression 2

This table shows the WLS regression coefficients of the distance to default (DD) on a dummy that accounts for the board structure (GOV) and control variables, over the period 2004-2010. The dummy GOV takes the value of 1 if the bank is included in the OTS portfolio and 0 otherwise. As control variables we use the log of total assets (LOG[TA]), the ratio between fixed assets and total assets (FA/TA) and the total capital ratio (TCR) and a dummy for each country bank location (main). We add the value of 1 if the bank is located in the corresponding country, 0 otherwise.

DD	2010	2009	2008	2007	2006	2005	2004
Const.	0.071*** (0.006)	0.265* (0.148)	-0.263 (0.260)	0.511*** (0.174)	0.496*** (0.133)	0.561*** (0.141)	0.079 (0.232)
Const.	0.040*** (0.009)	0.199 (0.138)	-0.660*** (0.214)	0.108 (0.190)	0.186 (0.147)	0.354*** (0.127)	0.427* (0.225)
GOV	-0.003*** (0.000)	-0.054*** (0.012)	-0.069*** (0.015)	-0.095*** (0.014)	-0.064 (0.039)	-0.003 (0.077)	-0.059 (0.092)
LOG[TA]	-0.001 (0.015)	-0.020 (0.013)	-0.030 (0.019)	-0.008 (0.019)	-0.032** (0.013)	-0.038*** (0.012)	-0.039 (0.032)
FA/TA	5.990 *** (1.380)	5.466*** (1.789)	9.609*** (2.369)	4.479*** (1.435)	4.508*** (1.596)	1.816** (0.951)	3.894*** (1.090)
TCR	0.198*** (0.053)	0.021*** (0.003)	0.027*** (0.005)	0.019*** (0.001)	0.018*** (0.003)	0.018*** (0.003)	0.016*** (0.002)
Austria	-0.001 (0.003)	0.046 (0.063)	0.089 (0.075)	0.073 (0.076)	0.079 (0.083)	0.049 (0.065)	-0.068 (0.058)
Belgium	-0.008** (0.003)	-0.136 (0.171)	-0.212 (0.577)	-0.055** (0.021)	-0.018 (0.078)	-0.009 (0.079)	N.A.
Cyprus	0.005 (0.005)	0.138* (0.072)	0.189* (0.111)	N.A.	N.A.	N.A.	N.A.
Finland	0.003 (0.003)	0.050 (0.073)	0.121 (0.077)	0.142 (0.101)	0.057 (0.125)	0.287*** (0.073)	0.071 (0.091)
Germany	-0.001 (0.004)	-0.178*** (0.064)	-0.281** (0.121)	-0.113* (0.060)	-0.067 (0.079)	-0.076 (0.059)	-0.108 (0.082)
Greece	-0.001 (0.003)	0.091 (0.063)	0.112 (0.074)	0.178*** (0.041)	0.039 (0.061)	0.053 (0.046)	-0.012 (0.078)
Ireland	0.005** (0.002)	0.067 (0.163)	0.125 (0.193)	0.137* (0.075)	-0.007 (0.151)	0.037 (0.118)	N.A.
Italy	0.005* (0.003)	0.143** (0.056)	0.226*** (0.070)	0.147** (0.068)	0.165** (0.077)	0.142** (0.054)	0.037 (0.027)
Luxembourg	0.005* (0.003)	0.206*** (0.056)	0.247*** (0.045)	0.250*** (0.027)	0.078 (0.051)	N.A.	N.A.
Malta	0.007*** (0.002)	0.067 (0.064)	0.144 (0.167)	N.A.	N.A.	N.A.	N.A.
Netherlands	0.006 (0.004)	0.151*** (0.056)	0.198*** (0.061)	0.271*** (0.072)	0.108 (0.088)	0.106* (0.056)	0.072* (0.037)
Portugal	0.004 (0.003)	0.139* (0.075)	0.123 (0.097)	0.142*** (0.052)	0.122 (0.093)	0.042 (0.056)	-0.107** (0.050)
Slovakia	0.008* (0.003)	0.081 (0.165)	N.A.	N.A.	N.A.	N.A.	N.A.
Slovenia	0.002 (0.004)	0.081 (0.062)	0.132 (0.096)	0.179** (0.077)	N.A.	N.A.	N.A.
Spain	0.006*** (0.002)	0.089 (0.057)	0.154*** (0.046)	0.166*** (0.033)	0.017 (0.051)	0.079 (0.047)	0.054 (0.045)
UK	-0.003 (0.002)	0.004 (0.058)	-0.027 (0.071)	0.132*** (0.048)	-0.015 (0.070)	0.015 (0.061)	-0.068 (0.156)
R^2	0.702	0.699	0.887	0.876	0.738	0.712	0.668
Adj R^2	0.651	0.707	0.701	0.695	0.682	0.700	0.688

** statistically significant at 10% confidence level. ** statistically significant at 5% confidence level.*
**** statistically significant at 1% confidence level. Standard deviation coefficients are in parentheses.*

From Table 6 we notice that the inclusion of the country dummies instead of the variables EUR and GDP, produces an increase of the adjusted R-squared, especially during the years 2010, 2009 and 2008. On the contrary, the main conclusions about the relationship between governance and distance to default are not sensibly different from those that can be inferred from the regression results of Table 5. Even in this case, we notice that the dummy coefficient accounting for the governance structure is always negative and statistically significant over the years 2008-2010. Moreover, such coefficient is negative also from 2004 to 2007, though statistically significant only in this last year.

Finally, although the results from DD regressions 1 and 2 seems to provide some evidence supporting the theory that the TTS system is associated to a lower default risk, it is worth noting that such evidence is not sufficient enough to assess a superiority of a board model with respect to the other. This conclusion can be drawn observing that, if on the one hand the average coefficient GOV is always negative, being equal to –0.013 and –0.049 in regression 1 and 2 respectively, on the other hand none of them are statistically significant.

5. Governance and performance

Section 5.1 reports the main results regarding the relationship between governance and stock prices, while section 5.2 reports the analysis of the relationship between some operational measures and the governance structure.

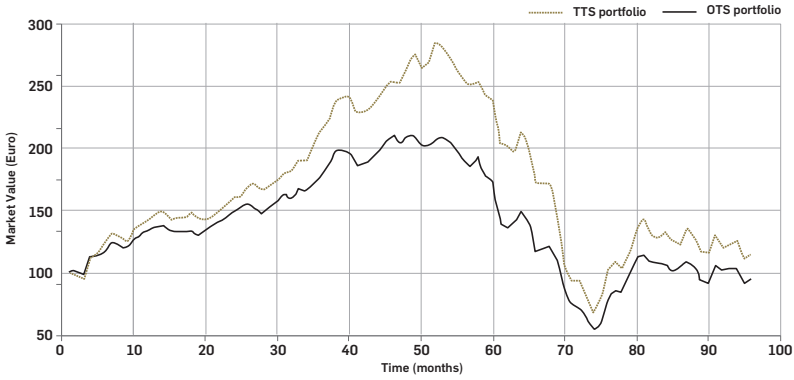
5.1 Governance and stock prices

Figure 1 compares the market price of the OTS and TTS portfolios during the overall sample period. The TTS portfolio achieved a better performance with respect to the OTS when the market rose and a worse performance when it declined because of the financial crisis. In fact, the distance between the two portfolios became larger in a bull market and narrower in a bear market.

In particular, assuming the value of the two portfolios to be equal to 100 at the beginning of 2003, the value of the TTS portfolio peaked at 262.77 at the end of March 2007 while, at the same date, the OTS portfolio was worth 207.59. Moreover, from Panel A of Table 1 we can see that, at the end of the sample period, the TTS portfolio value was 114.89, with an overall gain of about 14.89%, while the OTS portfolio worth 94.69 with an overall loss of about 5.31%. The four-factor model seems to be a powerful tool in explaining such differences, also in an international context. In fact, Fama and French (1998) find evidence that a model that includes the book to market equity effect seems to capture the value premium in international returns.

To begin with, equation (3) is estimated three times by means of the Ordinary Least Squares procedure, adopting as left hand side variables respectively the excess return on the TTS portfolio to the risk free rate (TTS-rf), the excess return on the OTS portfolio to the risk free rate (OTS-rf) and, finally, the excess return on the TTS portfolio to the return on the OTS portfolio (TTS-OTS). The return on each portfolio is calculated as the average of each bank's log return weighted by the ratio of the i-th bank market capitalization to the portfolio market capitalization. The results of such regressions over the period January 2003 – November 2010 are reported in Table 7.

■ Figure 1. **The Market Value of the TTS and of the OTS Portfolios from January 2003 to November 2010**



First of all, we notice that the difference in the market beta of the two portfolios is not economically significant, while the most relevant difference refers to the HML factor loading.

● Table 7. **Performance attribution regressions over the period 01/2003 - 11/2010**

OLS regressions of monthly excess returns and risk factors over the period 01/2003 - 11/2010, by using equation (3). The TTS and the OTS portfolios are value weighted. RMRF is the excess return of the market portfolio to the risk free rate (rf), while SMB, HML and MOM represents the factor-mimicking portfolios designed to capture respectively the size, the book to market and the momentum effects.

	ALPHA	RMRF	SMB	HML	MOM	R^2
TTS-rf	0.36**	0.96***	-0.24**	0.29***	0.01	0.93
	(0.17)	(0.04)	(0.12)	(0.16)	(0.04)	
OTS-rf	-0.17**	1.04***	0.09	-0.15***	0.01	0.98
	(0.08)	(0.02)	(0.06)	(0.05)	(0.02)	
TTS-OTS	0.53***	-0.07	-0.32*	0.43**	0.01	0.10
	(0.15)	(0.06)	(0.17)	(0.16)	(0.06)	

** statistically significant at 10% confidence level. ** statistically significant at 5% confidence level*
**** statistically significant at 1% confidence level.*
Standard deviation coefficients are in parentheses.

However, what is very interesting to us, while the OTS portfolio achieved a negative α (statistically significant at 5% level) of about –17 basis points per month, such value for the TTS is of about 36 basis points per month (and significant at 5% level). That

is, the abnormal return for the OTS portfolio was about –2.04% per year, while the TTS portfolio achieved an abnormal return of +4.32% per year.

Finally, to show that the relative performance of a portfolio with respect to the other is significant, it can be noticed from the 3rd row of the Table 7 that the strategy of buying the TTS portfolio and short selling the OTS portfolio, achieved an abnormal return of about 53 basis points per month (6.36% per year) that is statistically significant at the 1% level.

A similar conclusion can be achieved even if we consider a different composition of the two portfolios or if we produce results for different periods. Table 8 reports the same data as Table 7 but in this case we use as left-hand side variables the excess return of the equally weighted TTS and OTS portfolios. We can see that the values of the alpha are not very different from the corresponding values in Table 7, even if their significance levels in the first and the third row are lower.

Table 8. **Performance attribution regressions under alternative portfolio construction**

OLS regression coefficients of monthly excess returns and risk factors over the period 01/2003 - 11/2010, by using equation (3). The TTS and the OTS portfolios are equally weighted. RMRF is the excess return of the market portfolio to the risk free rate (rf), while SMB, HML and MOM represents the factor-mimicking portfolios designed to capture respectively the size, the book to market and the momentum effects.

	ALPHA	RMRF	SMB	HML	MOM	R^2
TTS-rf	0.23*	0.93***	-0.07	0.08	0.11***	0.92
	(0.17)	(0.04)	(0.06)	(0.08)	(0.03)	
OTS-rf	–0.34**	1.14***	0.11	–0.04	–0.01	0.98
	(0.16)	(0.04)	(0.07)	(0.06)	(0.02)	
TTS-OTS	0.49**	–0.20***	–0.20*	0.05	0.12	0.30
	(0.22)	(0.06)	(0.11)	(0.14)	(0.05)	

** statistically significant at 10% confidence level. ** statistically significant at 5% confidence level.*
**** statistically significant at 1% confidence level.*
Standard deviation coefficients are in parentheses.

Table 9. **Performance attribution regressions over different sub-periods**

OLS regression coefficients of monthly excess returns and risk factors over the period 01/2003 - 11/2010, by using equation (3). The TTS and the OTS portfolios are equally weighted. RMRF is the excess return of the market portfolio to the risk free rate (rf), while SMB, HML and MOM represents the factor-mimicking portfolios designed to capture respectively the size, the book to market and the momentum effects. Panel A reports results of the regression using data from 01/2003 to 11/2007, while panel B reports the results from 12/2007 to 11/2010.

Panel A - First Half

	ALPHA	RMRF	SMB	HML	MOM	R^2
TTS-rf	0.48*	1.00***	-0.25	0.02	0.03	0.92
	(0.39)	(0.05)	(0.16)	(0.16)	(0.06)	
OTS-rf	–0.11	0.99***	0.08	–0.01	–0.01	0.98
	(0.07)	(0.02)	(0.05)	(0.05)	(0.02)	
TTS-OTS	0.67	0.00	–0.35	0.06	0.05	0.08
	(0.77)	(0.07)	(0.22)	(0.22)	(0.08)	

Panel B - Second Half

	ALPHA	RMRF	SMB	HML	MOM	R^2
TTS-rf	0.11 (0.30)	1.03*** (0.03)	-0.23 (0.23)	–0.15 (0.20)	–0.02 (0.09)	0.96
OTS-rf	–0.09 (0.14)	1.01*** (0.02)	0.21* (0.12)	0.05 (0.12)	0.01 (0.03)	0.98
TTS-OTS	0.22 (0.47)	–0.01 (0.06)	0.55 (0.35)	–0.21 (0.31)	0.01 (0.13)	0.06

** statistically significant at 10% confidence level. ** statistically significant at 5% confidence level.*
**** statistically significant at 1% confidence level.*
Standard deviation coefficients are in parentheses.

Finally, Table 9 reports the same results as in Table 7 referred to two "sub-periods" of about equal length, in which the research period have been divided. The first half goes from January 2003 to November 2006 (for a total of 46 observations) while the second half goes from December 2006 to November 2010 (for a total of 47 observations). The results from these two sub periods are reported respectively in Panel A and B of Table 9. From this table it is possible to assess the insight from Figure 1, that the over performance of the TTS with respect to the OTS occurred especially during the first part of the sample period. The strategy of buying the TTS portfolio and short selling the OTS portfolio achieved an average (monthly) abnormal return of 67 basis points during the first half and of only 22 basis points during the second half even if such over performance is, in both cases, not statistically significant.

5.2 Governance and operating performance

In this section we analyze the relationships between the governance structure and some important operating measures. In particular we refer to the net interest income over the average earning assets (II/AEA), the operating profit over the risk weighted assets (OP/RWA) and the net income over the risk weighted assets (NI/RWA). Furthermore, since we are concerned with evaluating whether the governance structure influences the bank risk attitude in exploiting investment opportunities, we also consider a fourth operating measure: the impaired loans over the gross loans (IL/GL). We then regress (by using the WLS), for each year in the period 2004-2010, these four dependent variables on the above-mentioned dummy accounting for the governance structure (GOV) and control variables. As control variables we follow Gompers *et al*. by adopting the book to market ratio; moreover, we also follow DeYoung *et al*. (2001) by adding the log of total assets. Moreover, to account for possible location effects, we add the variables EUR and GDP as in section 4. Table 10 summarizes the main results of such regressions by showing the regression coefficient associated to the dummy variable GOV. A positive coefficient implies that a higher value of the ratio is associated to the OTS board structure and vice versa.

First of all, we notice from columns 1 of Table 10 that, in general, a positive operating performance with respect to the interest income is associated to the adoption of the OTS, and that both the extent and the statistical significance tend in general to increase, even if not monotonically. Furthermore, if we look at the operating income (column 2) or at the net income (column 3) we can notice a decreasing pattern of the coefficients. More specifically, in 2005 the difference in the operating profit and net income (both divided by risk weighted assets) between the TTS and the OTS banks were respectively of about 0.57% (statistically significant at 10%) and 0.54% (statistically significant at 1%). The same differences dropped to -0.47% (statistically significant at 1%) and to -0.61% (statistically significant at 10%) in 2009, and again became positive (though not statistically significant) in 2010.

Secondly, by looking at column 4 of Table 10, it is noticeable that the adoption of the OTS model is related to a lower amount of impaired loans with respect to the TTS during the whole sample period. However, even in this case we notice a decreasing pattern for both the extent and the statistical significance of the estimates as the financial crisis approaches. This implies that, during the financial turmoil, the differences in the credit portfolio quality of the two groups tend to disappear."

Table 10. **Governance pattern and operating performance**

This table presents the results from the WLS regression of four operating measures on the dummy to account for the governance structure (GOV) and control variables. The dummy GOV takes the value of 1 if the bank adopts the OTS and 0 otherwise. Only the dummy coefficients are presented. The dependent variables are the interest income over the average earning assets (II/AEA), the operating profit over the risk weighted assets (OP/RWA), the net income over the risk weighted assets (NI/RWA) and the impaired loans over the gross loans (IL/GL). As control variables we adopt the book to market ratio, the log of total assets, a dummy (EUR) to control for banks whose main location is outside the Euro area and the growth rate of the Gross Domestic Product, measured at constant prices, of the country where the bank is mainly located. The dummy EUR takes the value of 1 if the bank is located outside the Euro area, 0 otherwise. GDP data are provided the International Monetary Fund internet website.

Year	II/AEA	OP/RWA	NI/RWA	IL/GL
2010	1.063*	0.206	0.026	-3.115***
	(0.611)	(0.232)	(0.256)	(0.577)
2009	0.477**	-0.467***	-0.614*	-1.947*
	(0.230)	(0.101)	(0.313)	(0.998)
2008	0.277	0.141	0.139	-0.401
	(0.309)	(0.278)	(0.289)	(0.474)
2007	0.373	0.288	0.156	-1.062*
	(0.309)	(0.177)	(0.175)	(0.569)
2006	0.253	0.229	0.189	-2.187***
	(0.202)	(0.268)	(0.160)	(0.584)
2005	0.077	0.575*	0.545***	-1.148*
	(0.525)	(0.281)	(0.127)	(0.628)
2004	0.170	0.014	0.075	-1.209***
	(0.258)	(0.253)	(0.206)	(0.482)

Standard deviation coefficients are in parentheses.

6. Conclusions

The results explained in the preceding sections suggest that, if the financial markets are efficient, the agents well behaving, and thus if the stock prices reflect the overall information available, the banks adopting the TTS were able to achieve a better financial performance. However, the same does not hold if we look at operating performance. In fact, it is remarkable that if we look at the period before the financial crisis broke out, the banks adopting the OTS performed better in terms of operating income, net income and interest income. Moreover, these intermediaries showed a lower level of impaired loans. Except for the interest income, the significance of such traces of over-performance tends however to disappear as the financial crisis approaches, and sometimes the banks with a two-tier board performed better than those with a one-tier board.

By comparing this data with the evidence referring to the operating costs, we can state that the better accounting performance achieved by the OTS banks is probably due to the fact that this governance structure allows a sensible reduction in the operating costs. Moreover, these lower costs are balanced by a sensible increase in the bankruptcy risk, measured by the distance to default, only when the financial crisis approached. In particular, we find evidence that the banks adopting the two-tier board were less exposed to bankruptcy risk, showing a higher distance to default, only during the years from 2007/08 to 2010, while no appreciable differences can be observed during the period from 2004-2006. Moreover, the banks with a one tier board are not only exposed to a higher bankruptcy risk during the recent financial crisis, but present also a higher amount of impaired loans, even if such a lower credit quality is probably caused by the poor economic growth of the country in which the banks are mainly located. This conclusion can be drown by noticing that, after correcting for the location effects, the banks with a one-tier board are associated to a lower level of impaired loans to gross loans, even if the significance of such differences tended to vanish as the recent financial crisis was approaching. It is also worth noting that, even if the bankruptcy risk has increased for OTS banks more than for TTS banks, the evidence supporting the superiority of this second legal framework is not very strong because, on average, it is not statistically significant. These are the main reasons that should induce one to retain that the evidence reported in this research is not sufficient to assess the superiority, within the banking sector, of a board structure with respect to the other.

The results reported here can however suggest, on the one hand, that the monitoring function should be enhanced especially for banks adopting the one tier board while, on the other hand, the necessity to curb operating costs and impaired loans arises especially for banks with a two tier board. In our opinion, to enhance

the monitoring function within the one-tier board structure, it should not be necessary to enforce the powers of the independent directors, or to provide more severe provisions for their appointment. This is the case mainly because of the difficulties in granting a stronger independence to non executive directors. A better separation of their tasks from those of the executives, for example by preventing the executive directors from voting on some relevant questions, should be sufficient.

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Appendix 1. 1 – The WLS regression

In order to avoid the risk that the presence of conditional heteroskedasticity may imply not robust *t*-statistic, a technique that "corrects" the model is employed. This method may allow to get reliable *t*-tests even if the error term is conditionally heteroskedastic. In this case, a Weighted Least Squares (WLS) procedure can allow obtaining coefficient estimates that are more efficient, under particular conditions. Notice that, if the error term is conditionally heteroskedastic we have:

$$\mathrm{E}[\boldsymbol{\varepsilon}\boldsymbol{\varepsilon}'|\mathbf{X}] = \sigma^2 V(\mathbf{X}) \qquad [A1]$$

where $V(\mathbf{X})$ is a diagonal matrix (function of $\mathbf{X}$) whose elements are denoted by $v_t(\mathbf{X})$, so that it can be written:

$$\mathrm{var}(\varepsilon_t|\mathbf{X}) = \sigma^2 v_t(\mathbf{X})$$

When the assumption of conditional heteroskedasticity is relaxed, the functional form of the estimator of $\boldsymbol{\beta}$ is different and the t-ratio cannot be used for hypothesis testing. To avoid this problem, suppose the existence of a non singular $n \times n$ matrix $\mathbf{S}$ such that $\mathbf{V}^{-1} = \mathbf{S}'\mathbf{S}$. The diagonal matrix $\mathbf{S}$ is therefore equal to:

$$\mathbf{S} = \begin{pmatrix} \frac{1}{\sqrt{v_1(\mathbf{X})}} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \frac{1}{\sqrt{v_n(\mathbf{X})}} \end{pmatrix}$$

However, in order to use the [A1] to correct for heteroskedasticity, it should be necessary to "weight" each observation by using the correspondent diagonal element of $\mathbf{S}$, so that:

$$\tilde{\mathbf{y}}_t = \mathbf{y}_t \frac{1}{\sqrt{v_i(\mathbf{X})}} \quad \text{and} \quad \tilde{\mathbf{x}}_t = \mathbf{x}_t \frac{1}{\sqrt{v_i(\mathbf{X})}}$$

The main problem to face in doing this is that the conditional second moment is not known. However, it can be estimated by using a consistent estimator. Without loss of generality, it is assumed that $\sigma^2 = 1$ and that $v(\mathbf{x}_t) = \mathbf{z}_t'\mathbf{a}$, where $\mathbf{z}_t$ is a particular function of $\mathbf{x}_t$ and $\mathbf{a}$ is a vector of constants, so that the conditional second moment can be written as:

$$E(\varepsilon_t^2|\mathbf{x}_t) = \mathbf{z}_t'\mathbf{a} \qquad [A2]$$

In order to estimate it, an auxiliary regression is employed:

$$\varepsilon_t^2 = E(\varepsilon_t^2|\mathbf{x}_t) + \eta_t \qquad [A3]$$

where $E(\eta_t|\mathbf{x}_t) = 0$ by construction. Substituting out $E(\varepsilon_t^2|\mathbf{x}_t)$ in the equation [A3], and noticing that the error term ε_t is not observable, the regression model is:

$$e_t^2 = \mathbf{z}_t'\mathbf{a} + \eta_t \qquad [A4]$$

where e_t is the OLS residual in estimating equation (3).

In order to perform the estimation procedure, the vector $\mathbf{z}_t$, function of $\mathbf{x}_t$, has to be specified. In this work the vector $\mathbf{z}_t$ is assumed to be a quadratic function of $\mathbf{x}_t$ and, more precisely, it is the vector of t-time regressors and their squared, so that the regression [A4] can be expressed as it follows:

$$e_t^2 = a_0 + a_1 x_{1t} + a_2 x_{2t} + a_3 x_{3t} + a_4 x_{4t} + a_5 x_{1t}^2 + a_6 x_{2t}^2 + a_7 x_{3t} + a_8 x_{4t}^2 + \eta_t \qquad [A5]$$

Moreover, in order to avoid the risk that some element of $E(\varepsilon_t^2|\mathbf{x}_t)$ can be negative, the log of e_t^2 is used as left hand variables in the [A4] instead of e_t^2. Consequently, the matrix of weights to be used in order to correct for heteroskedasticity is:

$$\mathbf{S} = \begin{pmatrix} \frac{1}{\sqrt{exp(\mathbf{z}_1'\mathbf{a})}} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \frac{1}{\sqrt{exp(\mathbf{z}_n'\mathbf{a})}} \end{pmatrix}$$

Finally, the WLS regression coefficients can be estimated by applying the usual least squares procedure to the dependent variable weighted with the elements of the matrix $\mathbf{S}$.

Appendix 2. The sample of banks as extracted from Bankscope

Bank Name	Location	Board Type	Bank Name	Location	Board Type	Bank Name	Location	Board Type
Erste Group Bank AG	Austria	TTS	IW Bank SpA	Italy	TTS	Caisse régionale de crédit agricole mutuel Nord de France	France	OTS
Raiffeisen Bank International AG	Austria	TTS	Banca Ifis SpA	Italy	TTS	Caisse Régionale de Crédit Agricole Mutuel Brie Picardie	France	OTS
Oesterreichische Volksbanken AG	Austria	TTS	Banca Profilo SpA	Italy	TTS	Caisse Régionale de crédit agricole mutuel Atlantique Vendée	France	OTS
Raiffeisenlandesbank Oberösterreich AG	Austria	TTS	Azimut Holding SpA	Italy	TTS	Caisse régionale de credit agricole mutuel d'Alpes-Provence	France	OTS
Oberbank AG	Austria	TTS	Mittel SpA	Italy	TTS	Caisse régionale de credit agricole mutuel Sud Rhône -Alpes	France	OTS
Bank für Tirol und Vorarlberg AG-BTV (3 Banken Gruppe)	Austria	TTS	Banca Finnat Euramerica SpA	Italy	TTS	Caisse régionale de crédit agricole mutuel de Normandie-Seine	France	OTS
BKS Bank AG	Austria	TTS	ING Groep NV	Netherland	TTS	Caisse régionale de credit agricole mutuel de la Touraine et du Poitou	France	OTS
Volksbank Vorarlberg e.Gen.	Austria	TTS	SNS Reaal NV	Netherland	TTS	Caisse régionale de crédit agricole mutuel de l'Ille-et-Vilaine	France	OTS
Autobank AG	Austria	TTS	Van Lanschot NV	Netherland	TTS	Caisse régionale de crédit agricole mutuel Loire Haute-Loire	France	OTS
Deutsche Bank AG	Germany	TTS	BinckBank NV	Netherland	TTS	Caisse régionale de Crédit Agricole mutuel du Morbihan	France	OTS
Commerzbank AG	Germany	TTS	Robeco NV	Netherland	TTS	Caisse Régionale de Crédit Agricole Mutuel Toulouse 31	France	OTS
Deutsche Postbank AG	Germany	TTS	Banco Comercial Português, SA-Millennium bcp	Portugal	TTS	Banque Tarneaud	France	OTS
Landesbank Berlin Holding AG-LBB Holding AG	Germany	TTS	Banco Espirito Santo SA	Portugal	TTS	Cofitem - Cofimur	France	OTS
Wüstenrot & Württembergische	Germany	TTS	BANIF SGPS SA	Portugal	TTS	Société financière pour le financement de bureaux et d'usines SOFIBUS	France	OTS
Aareal Bank AG	Germany	TTS	Nova Kreditna Banka Maribor d.d.	Slovenia	TTS	FALA	France	OTS
HSBC Trinkaus & Burkhardt AG	Germany	TTS	Abanka Vipa dd	Slovenia	TTS	Banque de la Réunion	France	OTS
DVB Bank SE	Germany	TTS	Probanka d.d. Maribor	Slovenia	TTS	Institut Régional de Développement de la Région Nord Pas-de-Calais	France	OTS
Comdirect Bank AG	Germany	TTS	Vseobecna Uverova Banka a.s.	Slovakia	TTS	Union Financière de France Banque	France	OTS
DAB Bank AG	Germany	TTS	Tatra Banka a.s.	Slovakia	TTS	Royal Bank of Scotland Group Plc (The)	United Kingdom	OTS
UmweltBank AG	Germany	TTS	Dexia banka Slovensko a.s.	Slovakia	TTS	HSBC Holdings Plc	United Kingdom	OTS
MLP Ag	Germany	TTS	OTP Banka Slovensko, as	Slovakia	TTS	Barclays Plc	United Kingdom	OTS

Merkur-Bank KGaA	Germany	TTS	Devin Banka as	Slovakia	TTS	Lloyds Banking Group Plc	United Kingdom	OTS
Baader Bank AG	Germany	TTS	Dexia	Belgium	OTS	Standard Chartered Plc	United Kingdom	OTS
DF Deutsche Forfait Aktiengesellschaft	Germany	TTS	KBC Groep NV/ KBC Groupe SA-KBC Group	Belgium	OTS	Paragon Group of Companies Plc	United Kingdom	OTS
Bankverein Werther AG	Germany	TTS	Ageas	Belgium	OTS	Schroders Plc	United Kingdom	OTS
NORDAKTIENBANK AG	Germany	TTS	Groupe Bruxelles Lambert	Belgium	OTS	Brewin Dolphin Holdings Plc	United Kingdom	OTS
Varengold Wertpapierhandelsbank AG	Germany	TTS	Ageas SA/NV	Belgium	OTS	Arbuthnot Banking Group Plc	United Kingdom	OTS
Gontard & Metallbank AG	Germany	TTS	Marfin Popular Bank Public Co Ltd	Cyprus	OTS	London Capital Group Holdings Plc	United Kingdom	OTS
mwb fairtrade Wertpapierhandelsbank AG	Germany	TTS	Bank of Cyprus Public Company Limited-Bank of Cyprus Group	Cyprus	OTS	National Bank of Greece SA	Greece	OTS
quirin bank AG	Germany	TTS	Hellenic Bank Public Company Limited	Cyprus	OTS	EFG Eurobank Ergasias SA	Greece	OTS
Crédit Industriel et Commercial - CIC	France	TTS	USB Bank Plc	Cyprus	OTS	Alpha Bank AE	Greece	OTS
UniCredit SpA	Italy	TTS	Banco Santander SA	Spain	OTS	Piraeus Bank SA	Greece	OTS
Intesa Sanpaolo	Italy	TTS	Banco Bilbao Vizcaya Argentaria SA	Spain	OTS	Agricultural Bank of Greece	Greece	OTS
Banca Monte dei Paschi di Siena SpA-Gruppo Monte dei Paschi di Siena	Italy	TTS	Banco Popular Espanol SA	Spain	OTS	Emporiki Bank of Greece SA	Greece	OTS
Banco Popolare	Italy	TTS	Banco Espanol de Crédito SA, BANESTO	Spain	OTS	Marfin Egnatia Bank SA	Greece	OTS
Unione di Banche Italiane Scpa-UBI Banca	Italy	TTS	Banco de Sabadell SA	Spain	OTS	TT Hellenic Postbank S.A	Greece	OTS
Banca popolare dell'Emilia Romagna	Italy	TTS	Caja de Ahorros del Mediterraneo CAM	Spain	OTS	Marfin Investment Group	Greece	OTS
Banca Popolare di Milano SCaRL	Italy	TTS	Bankinter SA	Spain	OTS	Attica Bank SA-Bank of Attica SA	Greece	OTS
Banca Carige SpA	Italy	TTS	Banco Pastor SA	Spain	OTS	General Bank of Greece SA	Greece	OTS
Credito Emiliano SpA-CREDEM	Italy	TTS	Banco de Valencia SA	Spain	OTS	Proton Bank S.A.	Greece	OTS
Credito Valtellinese Soc Coop	Italy	TTS	Banco Central Hispanoamericano - BCH	Spain	OTS	T Bank S.A	Greece	OTS
Banca Popolare di Sondrio Societa Cooperativa per Azioni	Italy	TTS	Pohjola Bank plc-Pohjola Pankki Oyj	Finland	OTS	Bank of Ireland	Ireland	OTS
Credito Bergamasco	Italy	TTS	Sampo Plc	Finland	OTS	Allied Irish Banks plc	Ireland	OTS
Banco di Sardegna SpA	Italy	TTS	Aktia Plc	Finland	OTS	Espirito Santo Financial Group S.A.	Luxemburg	OTS
Banca popolare dell'Etruria e del Lazio Soc. coop.	Italy	TTS	Alandsbanken Abp-Bank of Aland Plc	Finland	OTS	IdB Holdings SA	Luxemburg	OTS
Credito Artigiano	Italy	TTS	BNP Paribas	France	OTS	Bank of Valletta Plc	Malta	OTS
Banco Desio - Banco di Desio e della Brianza SpA	Italy	TTS	Crédit Agricole S.A.	France	OTS	HSBC Bank Malta Plc	Malta	OTS
Exor Spa	Italy	TTS	Société Générale	France	OTS	Lombard Bank (Malta) Plc	Malta	OTS
Banca Generali SpA-Generbanca	Italy	TTS	Natixis	France	OTS	FIMBank Plc	Malta	OTS
Banca Popolare di Spoleto SpA	Italy	TTS	Caisse régionale de crédit agricole mutuel de Paris et d'Ile-de-France	France	OTS	Delta Lloyd NV-Delta Lloyd Group	Netherland	OTS
						Banco BPI SA	Portugal	OTS

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