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RESEARCH PAPER

# The Impact of Bank's Internal Governance Mechanism on Operational Loss: Evidence from Turkey

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## Abstract
We study the impact of internal governance mechanisms on the operational risk management provided with deposit banks of Turkey as a Basel compliant representative banking system. Drawing from internal audit, internal control and risk management literature, we consider the impact of characteristics of these mechanisms on the degree of operational loss at the subcommittee level. Two factors stand out as improving the internal governance of banks. Internal governance quality improves resulting in less material operational loss with adequate staffing. Organization of the internal governance mechanisms, carefully structured control points, and sufficient reporting to senior-level management in banks ensure that banks' shareholders experience fewer surprises. Excess funding has limited or no effect on mitigating operational loss. Characteristics are more significant for internal audit and internal control subcommittees than they are for risk management subcommittees. Results are robust when tests are repeated with aggregated data to capture potential cooperation between and contribution of the individual units.
**Keywords**: Internal Audit, Internal Control, Risk Management, Operational Risk, Operational Loss, Corporate and Internal Governance.
**JEL Classification:** C33, G21, G34, M42.

## Introduction

Operational risk is inherent in all banking products, activities, processes, and systems. Effective management of operational risk has always been a fundamental element of a bank's risk management.

The operational risk was not as common as credit or market risk twenty years ago. However, financial scandals have helped this concept to gain attention. Halperin (2001) argues (as cited in Moosa, 2007) that "operational risk has traditionally occupied a netherworld below market and credit risk" but "headline-grabbing financial fiascos, decentralized control, the surge in e-commerce and the emergence of new products and business lines have raised its profile." While the banks have traditionally followed credit or market risk, operational risk is being taken more seriously into consideration, and possibly is even regarded as more detrimental compared to market risk (Moosa, 2007). Cummins et al. (2006) indicate that a bank can experience a market value decrease in the days surrounding the announcement of a substantial operational loss that is considerably much more than the loss itself.

Operational losses have been part of serious financial crises or scandals. In the context of the 2008 financial crisis, operational risk was not the primary risk type, which caused the crisis.

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However, Andersen et al. (2012) reveal that poor management of the operational risk in financial corporations has resulted in the issuance of loans with inappropriate documents which causes them to misjudge the credibility of borrowers. Esterhuysen et al. (2010) show that 2008 was the most difficult year, regarding the size and impact of operational losses experienced by financial institutions. The amount of the operational risk-driven losses observed in 2008 was almost four times greater than those observed in 2007.

Regulators have put a lack of appropriate corporate governance mechanisms at the heart of operational loss. According to the Basel Committee's 2011 "Principles for the sound management of operational risk" report, the 2008 financial crisis not only unveiled inadequacies in risk management, but it also presented the control and governance processes at banks as a fundamental cause of the banking crisis. Basel Committee (2011) indicated that the human factor is the core element of operational risks and suggested that a robust corporate governance structure helps to control operational risk. A great deal of interest has come from the regulators who consider the audit committee as an essential corporate governance mechanism. Basel Committee indicated that the audit committee reveals the potential to enhance corporate financial reporting quality and reduce operational risks to expand transparency for financial markets and shareholders. Considering that the complexity of banking operations increases the asymmetry of information, stakeholders require more capacity to monitor bank managers (Andres and Vallelado, 2008). Consequently, following the introduction of mandatory audit committees, regulators have promoted the introduction of additional mechanisms such as internal control, risk management, and internal audit departments under the supervision of the audit committee. We call these departments subcommittees and units interchangeably hereafter.

Academia exhibited a similar approach along with developments in the regulatory environment. Literature mainly focused on the applicability and benefits of these mechanisms, their position, and their role in corporate governance (Haron et al., 2005). As literature evolved, the primary interest has shifted from investigating the question of "whether or not having these mechanisms" to "how to structure them for the highest effectiveness." The attention was particularly on the "determinants that mitigate the effectiveness of the audit committee and the subcommittees." This body of the literature revealed that the committee and subcommittee level characteristics could play a vital role in bank governance effectiveness. However, literature has remained silent due to the lack of bank-level data on these determinants.

Hence, the Basel Committee indicates that operational loss prevention could be achieved with an effective corporate governance mechanism. The mechanism should be supported by the internal control, risk management, and internal audit departments. Academia confirms the decisive role of corporate governance mechanisms on operational risk considering operational loss amount (Li and Moosa, 2015). It further documents that besides the existence of these subcommittees, their characteristics also impact the overall effectiveness of the corporate governance mechanism.

This study's primary objective is to contribute to the last body of literature. It attempts to investigate whether and how subcommittee level characteristics (H&R, competency, financial resource, and service intensity) of internal audit, internal control, and risk management subcommittees impact their effectiveness on operational risk management of commercial banks at reducing operational loss. Three sub-committees (internal audit, internal control, and risk management) serve the common purpose of mitigating the risk level of banks. The analysis of the organizational drivers that influence their effectiveness would enable us to understand how to increase their quality and decrease the risk of loss. Since these units function independently from each other, and their functions, roles, and responsibilities are different, each subcommittee should be analyzed separately. An additional aggregated model analysis would also capture the joint effect on operational risk. The study uses a bank-level unique data set that is compiled by the Banking Regulation and Supervision Agency (BRSA hereafter), the sole regulatory body

of the banking system in Turkey. In doing so, it does not only overcome data limitation but also attempts to investigate the characteristics which the literature has been silent so far.

The Turkish banking system complies with Basel III standards. Basel III revised supervising audit committee and sub-committee structures. Turkish banking system adopted this structure at the same time as other Basel compliant countries. It is following international rules and regulations and is compatible with other Basel-based banking systems, including the G20 countries. General rules regarding audit committee and operational loss recording are in accord with Basel Committee requirements since the beginning of the 2000s. Therefore, the Turkish banking system provides a representative environment to investigate the impact of internal governance on operational loss. As the local regulatory body, BRSA overlooks compliance with Basel III and actively participates in the ongoing regulation proposal processes on the international ground. Therefore, the unique internal governance data set provided by BRSA could shed light on the bank's internal governance system. Generally speaking, according to this internal governance structure, the tasks and responsibilities are divided between three sub-committees which assist the audit committee to execute its duties. The sub-committees are responsible to and supervised by the Audit Committee. Audit Committee functions under the Board of Directors.

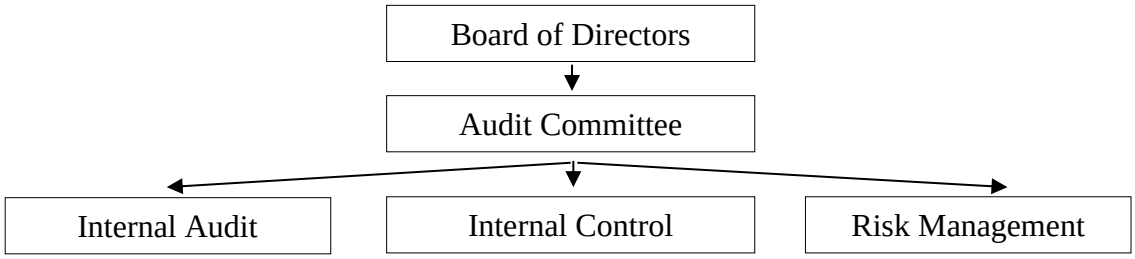


**Figure 1.** Structure of Internal Corporate Governance Mechanisms
**Source:** Research finding.

Bank governance plays a pivotal role in the economy where commercial banks hold 86.71% of financial assets. All Turkish banks are licensed by the BRSA and must have internal control, internal audit, and a risk management department, and at least two audit committee members.

The rest of the study is organized as follows: Chapter 2 reviews the literature and states the hypotheses. Chapter 3 sets out the data and methodology. Chapter 4 reports empirical results and discusses possible implications. Finally, Chapter 5 concludes.

## Literature Review and Hypotheses

Separation of control and ownership, as well as potential conflict between stakeholders and managers (principal-agent problem), has been two prominent issues since the late 1960s. Corporate governance mechanisms serve to align the interests of both managers and stakeholders and mitigate the conflict of interest and any opportunistic behavior resulting from this conflict. Numerous corporate governance mechanisms have been developed to moderate the principal-agent problem. Table 1 summarizes the developed underlying theories. Our study aligns more with the Agency Theory, which views agents as bodies protecting the shareholders' rights established with the initiation of management.

Below we discuss the role and present the relevant literature on the examined characteristics of each sub-committee separately. The section concludes with the proposition of the hypotheses. The characteristics capture four dimensions of a subcommittee, human resource (staff), competency of staff (certification), financial support (budget), and service intensity (i.e., the number of reports, control points). According to the general view adopted in this study, the

primary characteristic would be adequate staffing to comply with the regulations. Secondary characteristics would be to determine the competency of the staff and provide a sufficient budget. Finally, the mechanism would optimize the service intensity to maximize the efficiency of the subcommittee. Figure 2 summarizes this general view.

**Table1.** Major Theories

| Theory | Major Contributors | Relation with Corporate with Governance |
|---|---|---|
| **Agency Theory** | Jensen and Meckling, 1976; Pratt and Zeckhauser, 1985 | The principal wants to ensure that agents use their decision rights in a way that contributes to the firm's objectives efficiently and does not impair the integrity of the firm. A principal may use several agents. These agents are called corporate governance mechanisms. As a result of information asymmetry, hidden information, and conflict of interests, the management may need corporate governance mechanisms to operate the firm most efficiently. |
| **Transaction Cost Economies** | Williamson, 1981;1996 | Transactional Cost Economics propounds the study of corporate governance which provides a robust framework to investigate contracting problems between the management of the firm and its stakeholders. The governance structure has three primary properties. First, as with agency theory, stakeholders claim a status in the firm. Second, the lifetime of the firms is equal to the duration of the partnership contract. And third, stakeholders need safeguard mechanisms. |
| **Property Rights Theory** | Hart and Moore, 1990 | Contracts between shareholders and managers are incomplete because they include gaps and missing provisions. The basic concept of the property-rights theory is related to the control of the firm regarding the allocation of the company's tangible assets and intangible assets. The property-rights theory provides an implicit basis for management control and the right of management to issue instructions to employees. The issue of the control of alienation rights implies that corporate governance is required to assess operational-loss incidents so that the alienation rights would not be violated. |
| **Resource and knowledge-based view** | Penrose, 1995 | Company-specific information investments are required for a sustainable competitive advantage; therefore the company board relies heavily on insiders with a proper self-control system. All corporate governance mechanisms for value creation through learning and innovation are useful tools for the firm. |

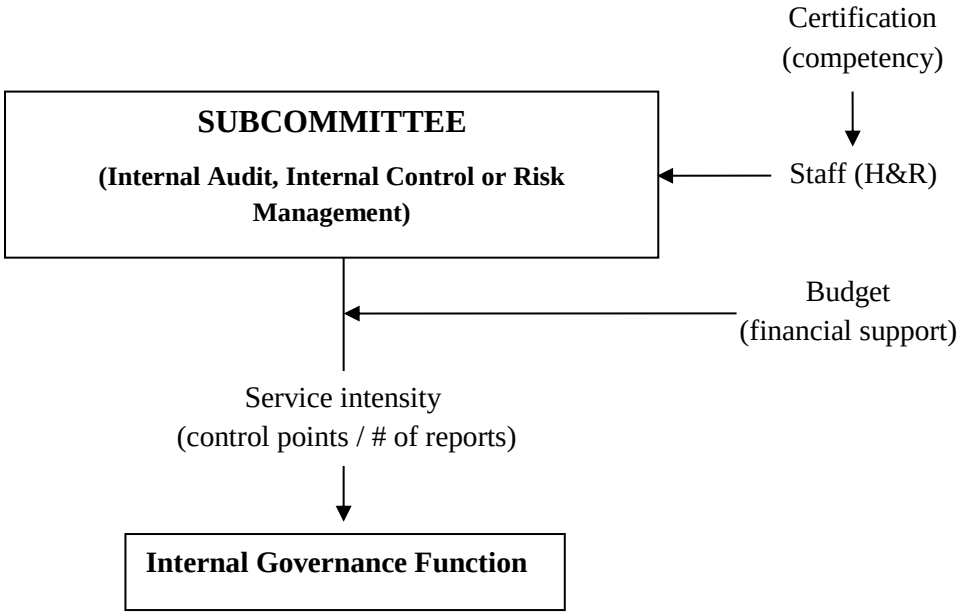


**Figure 2.** General Framework
**Source:** Research finding.

*Internal Audit Subcommittee*

"Internal audit subcommittee" should not be confused with the supervising "audit committee." The supervising audit committee is more of a management body of an entity (i.e., the bank), reports directly to the board, and oversees the managerial issues. The internal audit subcommittee oversees the operational activities and focuses more on daily operations. An internal audit evaluates and improves the effectiveness of control, risk management, and governance processes (The Institute of Internal Auditors [IIA] 2008). It provides independent and objective opinions concerning an organization's operations, functions, processes, systems, or any other subject matter relevant to client management (Norman et al., 2011). The goal of internal auditing is to enhance organizational efficiency and effectiveness through constructive criticism (Cohen and Sayag, 2010).

A primary condition for a well-functioning internal audit subcommittee is the sufficiently large number of competent staff (Arena and Azzone, 2009). An internal audit requires the capacity to acquire human resources with suitable competencies, skills, and qualifications to maintain the effective auditing function mandated by monitoring boards (Basel Committee, 2012). There is a direct relationship between the characteristics of internal-audit function, such as size, and internal auditors' evaluation of their contribution to the financial-statement audit (Zain et al., 2006). Consequently, larger internal audit departments should lead to a lower operational loss.

The internal auditing subcommittee is expected to report all vital information to the upper management, which enables the administration to take relevant corrective measures (Basel Committee, 2012). These reports are recognized as vital results of internal auditing activities. They minimize the asymmetry of information concerning matters such as risk management and internal control, and thereby relieve inconsistencies (Sarens et al., 2009). Gendron et al. (2004) highlight that internal audit reports help to locate deficiencies in firms and to take appropriate measures. Therefore, a higher number of reports could lead to a lower operational loss.

Professional certification affects the level of competence (Arena and Azzone, 2009) and performance (Ziegenfuss et al., 2006) of an internal audit subcommittee. According to the

(Basel Committee, 2012), professional competence which covers individual and collective knowledge and experience of each internal auditing board member constitutes the foundation of an effective internal audit function of a financial institution. However, Hanim Fadzil et al. (2005) suggest that professional proficiency such as sufficient knowledge, professional membership, and certification could be harmful in terms of the objectivity of internal auditors. Hence, the relationship between the certified internal audit department member and operational loss remains inconclusive.

The Basel Committee (2012) advises banks to provide an appropriate budget to support the internal audit function's operations. In fact, 2001 (Enron), and subsequent 2002 (WorldCom, Qwest Communications, Adelphia, Global Crossing, Nortel, Parmalat) cases have resulted in budget increases for internal-audit sub-committees (Carcello et al., 2005). They also report that the budget of internal-audit mechanisms is positively correlated with the firm size and debt leverage and (Ho and Hutchinson, 2010) claim that the more resources available to the internal audit division, greater the competence, and chance for detecting errors and omissions. However, to the best of our knowledge, there is no study directly examine the relationship between the internal audit committee budget and operational loss. Nevertheless, a higher percentage of the total budget allocated to internal audit subcommittee could potentially lead to a lower operational loss.

*Internal Control Subcommittee*

Internal control literature is primarily limited to non-financial corporations and does not suggest a conclusive result on the relationship between internal control quality and governance quality. However, there is a strong relationship between corporate internal control and operational risk (Chernobai et al., 2011). Lack of internal-control activities leads to a risk that affects all corporations (Dănescu et al., 2012) and poor financial reporting quality (Altamuro and Beatty, 2010; Tseng, 2007; Plumlee and Yohn, 2010).

The Internal-control unit of a bank is expected to ensure the protection of assets, conduct required activities following regulation, and maintain the reliability and comprehensiveness of the accounting and financial reporting system (BDDK, 2006). The unit must consist of one manager and a sufficient number of professionally qualified personnel. The number is based on the scale of the bank and the complexity of its activities determined by the regulatory body (BDDK, 2006). Even though there are structural differences between internal control and internal audit, their main objective is similar. Both departments are cost-minimizing units, seeking to decrease operational loss in a bank. There are similarities in terms of their relationship with the supervising audit committee. However, internal control is a continuous process, while an internal audit is conducted within a specified period. Therefore, an essential part of the required actions of internal control is the reports and control point examinations. As internal-control activities increase, the effectiveness of the internal-control system improves (Ratcliffe, 2009). Control points are the points within the corporate structure where the internal corporate subcommittee conducts appropriate checks and controls. Hence, similar hypotheses are proposed regarding the characteristics of the internal control sub-committee investigating budget, staff, and competency with the addition of "the number of control points" controlling for the intensity of service.

*Risk Management Subcommittee*

While the internal control unit provides an efficient and reliable internal control environment following banking strategies and regulations, the risk management unit ensures that the risk management policies and implementation procedures are followed and complied with (Hayali

et al., 2011). This study is limited to examining the risk management subcommittee and its characteristics but not the risk management system as a whole.

One of the most important functions of risk management is to produce timely and relevant risk reporting to the board of directors and senior management (Lam, 2014) that is relevant to operational risk exposure (Basel Committee, 2010)[1]. During the 2008 financial crisis, financial companies were deficient in effective internal control. They failed to provide timely and accurate reporting to the board of directors and senior management on risk management problems (Lang and Jagtiani, 2010). Numerous incidents were found that can be traced back to operational risk (Chernobai et al., 2011). However, an effective reporting process could have contributed to the detection and amendment of arising operational risk issues in advance (Institute of Operational Risk, 2010). Therefore, frequency and number of internal and external reports on risk management performance contribute substantially to effective governance within an organization (Fraser and Simkins, 2010).

Andersen (2008) suggests that the staff size of the risk management department might affect risk management capabilities and performance results. BDDK (2014) indicates that risk management departments are required to have enough skilled personnel with educational background, experience, and competent knowledge regarding the subject area. An effective risk management program is the result of appropriate staffing (Hakkarainen et al., 1997) with sufficient competency (Marchetti, 2005). Nevertheless, we cannot rule out that overcrowded staff can decrease the effectiveness of an organization because managers are overburdened.

In light of the literature on operational risk within the context of the three subcommittees, we propose the following hypothesis. The hypotheses test the impact of the characteristics of subcommittees on the operational loss as a proxy of their efficiency in terms of:

Human resource (staff):

**H1**: Higher the proportion of subcommittee staff to the bank total staff lower the operational loss would be.

Competency (certification):

**H2**: Higher the proportion of the number of certificated staff in internal audit, risk management, and internal control subcommittees to total bank staff lower the operational loss would be.

Financial resource (budget):

**H3**: Higher the percentage of aggregate budget allocated to subcommittees lower the operational loss would be.

Service (control points/reports):

**H4a**: Higher the number of reports per bank staff prepared by internal audit and risk management subcommittees lower the operational loss would be.

**H4b**: Higher the number of control points per bank staff examined by the internal control subcommittee lower the operational loss would be.

## Research Design

### *Data and Descriptive Analysis*

Effective corporate governance is substantially crucial for deposit banks. During financial trouble, they are prone to bank runs, and their failures have the potential to trigger a macroeconomic crisis. It is generally argued that non-deposit banks have no or minimal systemic risk in the Turkish banking system. Therefore, the data is comprised of deposit banks

1. Here, report stands for the direct reports of the risk management subcommittee to the supervising body. It should not be confused with the annual audit report.

with a valid license to collect deposits from their investors. The data provided by BRSA is submitted to the Agency by the respective sub-committees of the deposit banks. The final data set consists of annual data for the 19 largest banks that represent 91.36% of the total asset under the management of the Turkish banking sector. Primary corporate governance mechanisms are enforced on Turkish banks in 2005 after the issuance of the Banking Law on October 19th, 2005. Corporate governance mechanism information first became available in 2016. Therefore, the period of data set begins in 2006, one year after the corporate governance reform ends in 2012 due to data availability. 2008 financial turbulence is unlikely to introduce a structural brake. Its effect on the banking system was somewhat limited since banks were not permitted to hold toxic assets due to the regulatory constraints initiated after the 2001 banking crisis.

**Table 2.** Explanatory Variables

| | **Variables** | **Abb.** | **As used by** | **Measurement method** |
|---|---|---|---|---|
| Internal Audit | Staff Size | Iastaff | Zain et al., 2006 | Number of staff in internal audit department / Total Staff |
| | Reporting | Iareport | Gendron et al., 2004 | Number of Reports prepared by Internal Audit Department / Total Staff |
| | Competency | Iacert | Hanim Fadzil et al., 2005 | Number of Certificated Staff in Internal Audit Department / Total Staff |
| | Financial resource | Iabudget | Carcello et al., 2005 | Percentage of the total budget allocated to Internal Audit Department |
| Internal Control | Staff Size | Contstaff | As determined for Internal Audit | Number of Staff in Internal Control Department / Total Staff |
| | Control Point | Contcont | Agbejule and Jokipii, 2009 | Number of Control points controlled by Internal Control Department / Total Staff |
| | Competency | Contcert | As determined for Internal Audit | Number of Certificated Staff in Internal Control Department / Total Staff |
| | Financial resource | Contbudget | As determined for Internal Audit | Percentage of the total budget allocated to Internal Control Department |
| Risk Management | Staff Size | Riskstaff | Marchetti, 2005 | Number of Staff in Risk Management Department / Total Staff |
| | Reporting | Riskreport | Fraser and Simkins, 2010 | Number of Reports prepared by Risk Management / Department Total Staff |
| | Competency | Riskcert | Dickinson, 2001 | Number of Certificated Staff in Risk Management Department / Total Staff |
| | Financial resource | Riskbudget | Fraser and Simkins, 2010 | Percentage of the total budget allocated to Risk Management Department |
| IA, IC & RM (Aggregate model) | Staff Size | Totalstaff | | Number of Staff in three sub-committees / Total Staff |
| | Reporting | Totalreport | | Number of Reports prepared by three sub-committees / Total Staff |
| | Competency | Totalcert | | Number of Certificated Staff in three sub-committees / Total Staff |
| | Financial resource | Totalbudget | | Percentage of the total budget allocated to three subcommittees |
| Control Variables | Return on Assets | Roa | Anderson and Gupta, 2009; Kothari et al., 2005 | Return on Asset (Percentage) |
| | Size | Size | Klein, 2002; | Log of Total Asset |

| Variables | Abb. | As used by | Measurement method |
|---|---|---|---|
| | | Prawitt et al., 2009 | |
| Debt Ratio | Leverage | Andersen, 2008 | Total Debt/Total Assets |

The dependent variable is operational loss as a proxy for governance quality measuring the severity. The operational frequency could be an alternative measure. Unfortunately, operational loss frequency data is not reported by the banks to BRSA. Explanatory variables are the characteristics of internal audit, internal control, and risk management subcommittees. Table 2 exhibits the sources of the variables used in the literature and the measurement method for each within the limits of data availability.

Banks vary in characteristics -small to large, domestic to multi-national, retail-focused to corporate-banking focused. To decrease this heterogeneity, variables are normalized with the total staff. Total staff is chosen for normalization because human-based risk lies at the root of the operational risk and all systems. Operational risk is described as the risk of loss caused by inappropriate or erroneous internal processes, human-borne actions, and systems, or by external incidents (Hsu, Backhouse, & Silva, 2014). Governance, principles, and policies are designed to reduce the risk arising from the human factor. This normalization also enables us to reduce the potential bias in the data set due to banks' size and structure.

Turkish banks try to collect operational risk loss data according to the Basel criteria and classification. Although they do not use these data for calculating regulatory capital-adequacy ratios as of March 2015, they still comply with the Basel criteria. Following Angela et al. (2009), the operational loss is normalized for each bank by dividing it with the total assets under management. The data are collected from banks' internal governance departments and provided by BRSA.

Although the independent variables are normalized by total staff to mitigate the bias, the control variables employed also help to neutralize bank-specific differences in the current sample that tend to affect the dependent variable (Gürbüz et al., 2010). We borrow the control variables from the earnings-management and corporate governance literature. Literature documents, mainly three variables, have an impact on operational loss; log of total assets, leverage, and return on assets (ROA). Prawitt et al. (2009) state that overall investment in specific corporate governance mechanisms is related to total assets. Wang and Hsu (2013) report that the scope and complexity of a company increase the possibility of an operational incident leading to a loss. The business risk of a bank is under the influence of its current financial leverage. It is regarded as a comprehensive tool to manage risk, which may have an impact on the effectiveness and performance of corporate governance (Andersen, 2008; Bhagat and Bolton, 2008). Controlling for the effect of the performance is also essential for econometric analysis (Kothari et al., 2005). Financial performance could be indicated by the return on assets since the operational loss is part of profitability.

The signs of the correlation coefficients are consistent with the model results which are presented in the next section. The correlation coefficient matrix reveals that the coefficients are below 50% for the majority of the pairs. Correlation coefficients between budget and staff number of the subcommittees are relatively higher which implies that larger subcommittees are allocated larger portions of the total budget as would be expected. The LSDVC unbalanced panel data method explained in detail below does not contain a constant term. Therefore, Table 5 reports Uncentered Vector Inflation Factor test results. VIF values remain below the generally excepted threshold of 10 for all variables but one (internal audit staff/iastaff).

**Table 4.** Descriptive Statistics (as Defined at Table 2)

| Variable | Obs | Mean | Median | Std. Dev. | Min | Max |
|---|---|---|---|---|---|---|
| **oplossx** | 129 | 0.0299 | 0.0002 | 0.1376 | 0.0000 | 1.2633 |
| **iastaff** | 128 | 0.0107 | 0.0099 | 0.0037 | 0.0024 | 0.0196 |
| **iacert** | 128 | 0.0010 | 0.0005 | 0.0013 | 0.0000 | 0.0069 |
| **iabudget** | 118 | 0.0115 | 0.0119 | 0.0052 | 0.0030 | 0.0230 |
| **iareport** | 128 | 0.1028 | 0.0531 | 0.1278 | 0.0152 | 0.6493 |
| **contstaff** | 128 | 0.0081 | 0.0080 | 0.0040 | 0.0008 | 0.0209 |
| **contcert** | 128 | 0.0045 | 0.0001 | 0.0187 | 0.0000 | 0.1188 |
| **contbudget** | 116 | 0.0076 | 0.0063 | 0.0057 | 0.0000 | 0.0268 |
| **contcont** | 128 | 0.1209 | 0.0705 | 0.1276 | 0.0000 | 0.5628 |
| **riskstaff** | 128 | 0.0020 | 0.0015 | 0.0014 | 0.0000 | 0.0076 |
| **riskcert** | 128 | 0.0002 | 0.0001 | 0.0003 | 0.0000 | 0.0015 |
| **riskbudget** | 115 | 0.0060 | 0.0026 | 0.0143 | 0.0000 | 0.0761 |
| **riskreport** | 128 | 0.0027 | 0.0013 | 0.0037 | 0.0000 | 0.0186 |
| **totalstaff** | 128 | 0.0208 | 0.0195 | 0.0072 | 0.0047 | 0.0386 |
| **totalcert** | 128 | 0.0057 | 0.0010 | 0.0189 | 0.0000 | 0.1240 |
| **totalbudget** | 118 | 0.0247 | 0.0207 | 0.0184 | 0.0044 | 0.0984 |
| **totalreport** | 128 | 0.3394 | 0.1772 | 0.4345 | 0.0159 | 2.2684 |
| **roa** | 129 | 0.0127 | 0.0124 | 0.0062 | 0.0353 | 0.0008 |
| **size** | 129 | 10.404 | 11.451 | 2.2879 | 13.069 | 6.2949 |
| **leverage** | 129 | 0.8825 | 0.8837 | 0.0248 | 0.9335 | 0.7805 |

**Source:** Research finding.

**Table 5.** Correlation Matrix

| | Dependent Variable | Internal Audit Subcommittee | | | | Internal Control Subcommittee | | | | Risk Management Subcommittee | | | | Control Variables | | | VIF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | oploss | ia staff | ia report | ia cert | ia budget | cont staff | cont cont | cont cert | cont budget | risk staff | risk report | risk cert | risk budget | roa | size | lev. | |
| oploss | 1 | | | | | | | | | | | | | | | | |
| iastaff | -0.17 | 1 | | | | | | | | | | | | | | | 20.5 |
| iareport | -0.08 | 0.38 | 1 | | | | | | | | | | | | | | 2.20 |
| iacert | 0.25 | -0.10 | -0.18 | 1 | | | | | | | | | | | | | 1.85 |
| iabudget | -0.24 | 0.62 | 0.23 | -0.18 | 1 | | | | | | | | | | | | 9.30 |
| contstaff | 0.14 | 0.48 | 0.20 | -0.11 | 0.48 | 1 | | | | | | | | | | | 9.39 |
| contcont | 0.25 | 0.10 | 0.23 | 0.13 | 0.19 | 0.26 | 1 | | | | | | | | | | 3.31 |
| contcert | 0.00 | -0.14 | -0.02 | 0.12 | 0.01 | -0.07 | 0.07 | 1 | | | | | | | | | 1.88 |
| contbudget | -0.01 | 0.29 | -0.04 | -0.13 | 0.68 | 0.56 | 0.18 | 0.10 | 1 | | | | | | | | 4.27 |
| riskstaff | 0.19 | 0.32 | -0.02 | 0.08 | 0.07 | 0.20 | 0.41 | -0.16 | 0.07 | 1 | | | | | | | 5.84 |
| riskreport | 0.24 | 0.50 | 0.14 | 0.04 | 0.22 | 0.35 | 0.38 | -0.12 | 0.14 | 0.57 | 1 | | | | | | 2.88 |
| riskcert | -0.04 | -0.04 | 0.15 | 0.13 | 0.05 | 0.02 | 0.39 | -0.06 | 0.04 | 0.38 | 0.12 | 1 | | | | | 1.72 |
| riskbudget | -0.06 | 0.23 | 0.17 | -0.14 | 0.22 | 0.35 | -0.10 | -0.06 | 0.01 | -0.09 | -0.03 | -0.08 | 1 | | | | 1.21 |
| roa | -0.16 | 0.07 | 0.11 | -0.23 | -0.07 | 0.00 | -0.28 | -0.06 | -0.12 | -0.27 | -0.09 | -0.25 | 0.03 | 1 | | | |
| size | -0.17 | -0.45 | -0.43 | -0.02 | -0.13 | -0.20 | -0.40 | 0.22 | -0.01 | -0.45 | -0.57 | -0.08 | 0.15 | -0.25 | 1 | | |
| leverage | -0.08 | 0.15 | -0.13 | 0.01 | 0.14 | 0.17 | -0.32 | -0.05 | 0.23 | -0.12 | -0.07 | -0.23 | 0.16 | -0.18 | 0.27 | 1 | |

**Source:** Research finding.

Figures 3, 4, 5, and 6 display the trend of annual means of explanatory variables between 2006 and 2012. In terms of human resources, the Internal Audit subcommittee seems to have the steadiest characteristics regarding the number of staff, service, and competency. It is the only subcommittee which does not experience a decline in the budget during the 2008 crisis. The service provided by the Internal Control subcommittee increases significantly over the period. Although the total staff remains the same, the competency of the internal control subcommittee increases dramatically. An increase of competency is valid for all internal governance mechanisms; risk management subcommittee being the lowest. The risk management subcommittee is also the unit that receives the lowest and most volatile financial resource. Overall, we observe dynamism in subcommittee characteristics, especially in terms of competency and degree of service provided throughout 2006-2012.

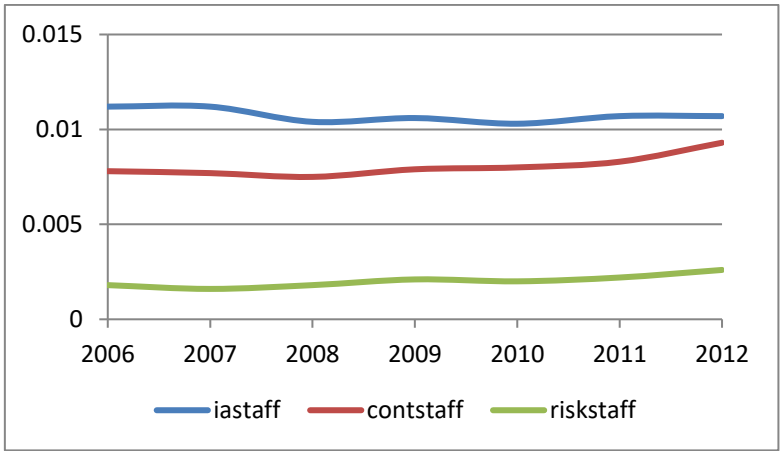


**Figure 3.** Human Resource (Staff)
**Source:** Research finding.

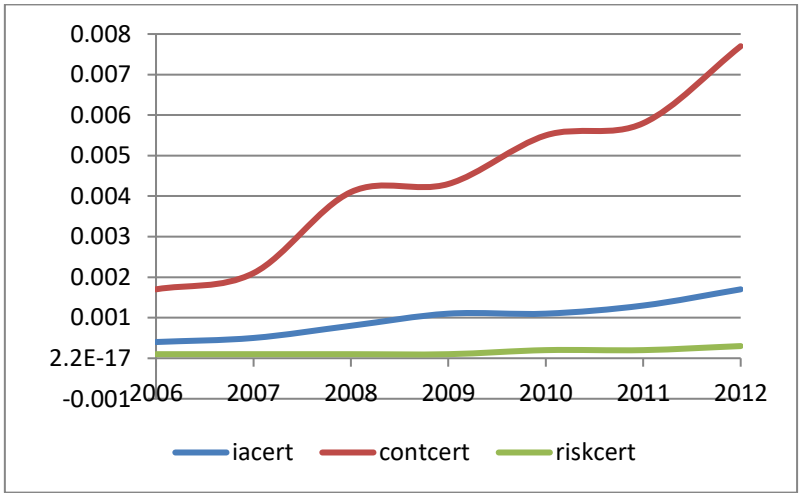


**Figure 4.** Competency (Certified Staff)
**Source:** Research finding.

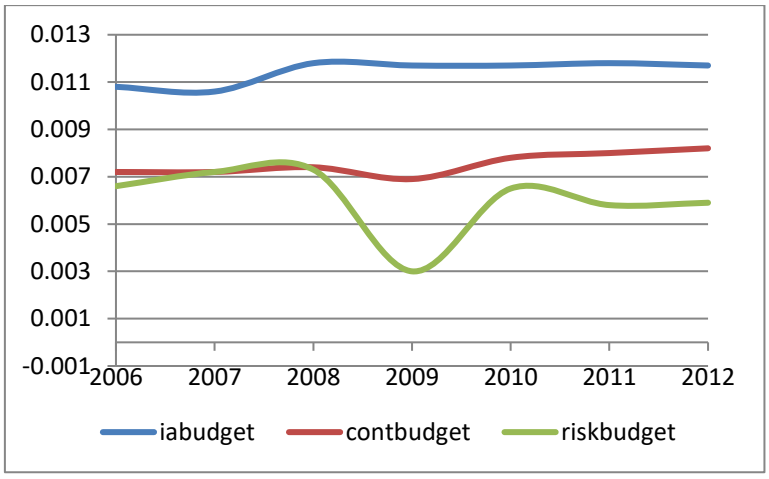


**Figure 5.** Financial Resources (Budget)
**Source:** Research finding.

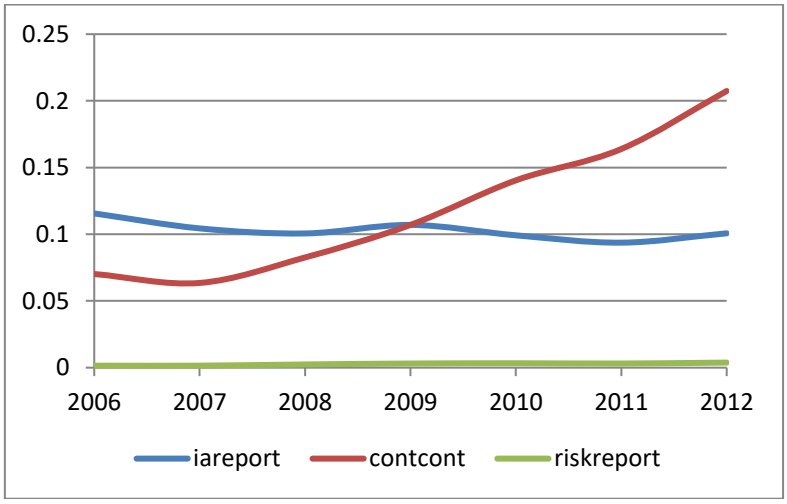


**Figure 6.** Service Intensity (Control Point / # of Reports)
**Source:** Research finding.

*Analytical Framework*

The Static OLS model has unobserved effects. It is biased because the dependent and the lagged dependent variable is a function of the unobserved effect (Baltagi, 2013). Fixed-effect panel-data regression models eliminate unobserved effects. We use the dynamic panel data model since the dynamic panel model is particularly designed for the case where "T" (time) is smaller than "N" (sample) to control for dynamic-panel bias (Bond, 2002; Baum, 2006; Roodman, 2009; Baltagi, 2013). The flexible framework of dynamic panel data is also suitable for working with unbalanced panels and multiple endogenous variables. We reckon into the lagged dependent variable to consider this dynamic equation. The model contains a lagged dependent variable (oplosst-1) as an explanatory variable. In that case, we could face the problem of endogeneity because of the inclusion of the lagged dependent variable, and the results could be biased since dependent and lagged dependent variables are both correlated with the time-demeaned error terms (Reinhard and Li, 2010). On the other hand, when the lagged dependent variable and the firm-fixed effects are taken together, they introduce a bias that could be significant for the short panel (Flannery and Hankins, 2013).

The solution of these two problems (endogeneity and short term bias) is using a "Corrected Least Squares Dependent Variable" (LSDVC) estimator (Bun and Kiviet, 2003) which may

also handle unbalanced panels (Bruno, 2005). LSDVC is an autoregressive panel-data model and clears the individual effects. While other dynamic approaches lead to loss of information because of adopting correction in an unbalanced panel (Growitsch and Stronzik, 2009), LSDVC performs better compared to the OLS, Fixed Effects, and the GMM methods. Flannery and Hankins (2013) showed that LSDVC is also a sufficient choice for short time data in corporate finance. It removes an approximated small sample bias (Kiviet, 1995). Although it is not primarily designed to work with endogenous regressors, Flannery & Hankins (2013), indicate that LSDVC functions well to overcome the endogeneity problem. They document that the bias with an endogenous independent variable is small when LSDVC is used. Hence, we would use the least-squares dummy variable (bias) corrected method (LSDVC). LSDVC is a particularly competitive choice against other estimators, under some degree of endogeneity and shortfall of previous difference-GMM and System-GMM models due to small sample (Flannery and Hankins, 2013). Following Sung and Song (2017), LSDVC estimations were conducted to avoid autocorrelation and endogeneity problems in the model and to overcome the limitations of the finite sample. Besides, the bootstrapped estimation-error method (50 iterations) was utilized to correct the poor approximation of estimated asymptotic standard errors, which lead to unsound t-statistics.

Although studies based on LSDVC do not require the endogeneity test, we still conducted Durbin and Wu-Hausman test (STATA based). DWH tests the existence of endogeneity of the independent variable against the dependent variable of oploss (Operational loss), where the null hypothesis refuses the endogeneity. Results refused the existence of endogeneity.

The unbalanced panel data models are as follows;

Internal Control:

$$oploss_{it} = \beta_1 oploss_{i,t-1} + \beta_2 contstaff_{i,t} + \beta_3 contcert_{i,t} + \beta_4 contbudget_{i,t} + \beta_5 contcont_{i,t} + \beta_6 roa_{i,t} + \beta_7 size_{i,t} + \beta_8 leverage_{i,t} + u_i + e_{i,t} \quad (1)$$

Internal Audit:

$$oploss_{it} = \alpha_1 oploss_{i,t-1} + \alpha_2 iastaff_{i,t} + \alpha_3 iacert_{i,t} + \alpha_4 iabudget_{i,t} + \alpha_5 iareport_{i,t} + \alpha_6 roa_{i,t} + \alpha_7 size_{i,t} + \alpha_8 leverage_{i,t} + u_i + e_{i,t} \quad (2)$$

Risk Management:

$$oploss_{it} = \lambda_1 oploss_{i,t-1} + \lambda_2 riskstaff_{i,t} + \lambda_3 riskcert_{i,t} + \lambda_4 riskbudget_{i,t} + \lambda_5 riskreport_{i,t} + \lambda_6 roa_{i,t} + \lambda_7 size_{i,t} + \lambda_8 leverage_{i,t} + u_i + e_{i,t} \quad (3)$$

Aggregate Model, (Internal Control, Internal Audit, Risk Management combined)

$$oploss_{it} = \gamma_1 oploss_{i,t-1} + \gamma_2 totalstaff_{i,t} + \gamma_3 totalcert_{i,t} + \gamma_4 totalbudget_{i,t} + \gamma_5 totalreport_{i,t} + \gamma_6 roa_{i,t} + \gamma_7 size_{i,t} + \gamma_8 leverage_{i,t} + u_i + e_{i,t} \quad (4)$$

## Empirical Results

Table 7 shows the results of the corrected least squared dummy variable (LSDVC) dynamic panel data models on the relationship between corporate governance mechanisms and operational loss.

**Table 7.** The Results of LSDVC Model [a]

| | Internal Audit | Internal Control | Risk Management | Aggregated |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Coefficient** | **Coefficient** | **Coefficient** |
| oplossx L1 | 2.731*** | 2.763*** | 2.416*** | 2.527*** |
| iastaff | -45.910*** | | | |
| iacert | -0.151 | | | |
| iabudget | 3.086 | | | |
| iareport | -0.887*** | | | |
| contstaff | | -32.135*** | | |
| contcert | | 5.736 | | |
| contbudget | | -44.830*** | | |
| contcont | | -0.743*** | | |
| riskstaff | | | - 84.048*** | |
| riskcert | | | -27.023 | |
| riskbudget | | | -2.637 | |
| riskreport | | | 2.205 | |
| totalstaff | | | | -28.499*** |
| totalcert | | | | 8.385 |
| totalbudget | | | | -2.967*** |
| totalreport | | | | -0.169*** |
| roa | 5.303* | 5.936** | -2.437 | 4.505* |
| size | 0.721*** | 0.168*** | 0.433* | 0.074*** |
| leverage | -1.803*** | -4.648*** | -1.639*** | -2.707*** |
| N | 115 | 115 | 115 | 115 |
| Adjusted $R^2$ | LSDVC method does not report $R^2$ (STATA based) | | | |

**Source:** Research finding.
[a]. $p \leq 0{,}05$; ** $p \leq 0{,}01$ and *** $p \leq 0{,}001$.
**Note**: Bias correction up to order O(1/NT^2)

Results indicate that funding is not unanimously a dominant factor to improve the quality of internal governance units independently. Increasing funding improves governance quality in an economically significant amount only for internal control subdivision (-44.830), suggesting that excess financial resource allocation could not fully substitute for the lack of sufficient human resources. Nevertheless, the aggregate model result implies that an adequately funded internal governance mechanism, in general, could function better (-2.967) at reducing the operational loss. Hence, hypothesis 3 cannot be rejected for the internal control unit alone and aggregate internal governance.

Consistent with the general argument, more reports prepared by internal auditors and more banking processes and operations control conducted by the internal control unit could lead to a lower operational loss. Higher service intensity enhances the internal audit unit and internal control unit, decreasing the effect on operational loss (-0,151 and -0,743 respectively) but not significantly affecting the governance performance of the risk management unit. Service intensity enhances the ability of the internal governance mechanism in general at mitigating operational loss. However, we do not suggest that the more reports prepared, the better internal control functions better the internal governance would function. Our results rather indicate that a search for an optimum number of reports and control points could be beneficial for each financial institution. The effect is economically marginal compared to the effect of adequate

staffing. Hence, hypothesis 4a is rejected for the risk management subcommittee.

One interesting result could be that although it is arguably the most notorious mechanism of all three, the risk management unit's performance improves only by one of the examined factors; the budget. However, this does not rule out the possibility that the risk management subcommittee affects the internal governance through interactions between these units. According to Banking Law no: 5411, banks are obliged to establish and operate adequate and efficient internal-audit, internal-control, and risk management systems that function in harmony within the scope and structure of their activities. When units are evaluated together, their aggregate effect on operational loss could be seen. For example, particular software developed for risk management units could be used by other units, and this can provide a positive externality. In particular, an external-loss database in a risk management unit helps internal-audit and internal-control units to create their risk-based scenarios and examination plans. Moreover, the cooperation between the risk management unit and the other internal governance units can influence the contribution of knowledge, skillset, and cooperative efforts of the risk management unit. This can hinder the role of risk management departments. Since the risk management department is mandatory for all banks, we are unable to study the marginal contribution of the risk management unit.

*Implication of Results*

This study is considered to contribute to the perspective of regulators and policymakers. Lessons learned from the erroneous activities of corporate governance in the banking industry are reflected in the regulations and guidelines issued by the Basel Committee and the Financial Stability Board. They are enforced on banks to tighten their corporate governance policies. Regarding Regulatory Authorities and Supervisory Agencies, in harmony with guidelines and regulations of the Basel Committee, results suggest that the regulations may be enforced on banks to, (1) increase the capacity of human resources of internal governance units and subcommittees, and (2) broaden the scope of the internal control system and reporting facilities of the bank and (3) allocate adequate resources and appropriate budget to support the internal governance mechanisms.

Rather than relying on templates of organizational structures, tailor-made bank-specific construction of the scale and scope of these subcommittees' roles and responsibilities (i.e., number of reports and control points) could play an active role in their effectiveness. In light of the results, assuming that the appointed staff has a relevant industry background, subsequent certification of the staff might not make a significant contribution to the effectiveness of these subdivisions. This finding posits a question on the efforts to increase the number of certified staff after 2008. Nevertheless, the trend of the examined subcommittee characteristics implies that since 2008, internal governance mechanisms have evolved towards benefiting banks' internal governance.

## Conclusion

The recent financial crisis revealed that the existence of risk management processes and mechanisms alone is not sufficient to overcome the significant operational loss. Following this, regulators suggested that a robust corporate governance structure helps to control operational risk. This robustness stands on the chosen characteristics of these internal control mechanisms and the characteristics of the individuals appointed to these subcommittees. Like many Basel compliant countries, the Turkish banking system has adopted required units of the internal corporate governance framework. These units, monitored by the appointed subcommittees, are constructed under the audit committee to jointly work at decreasing operational loss besides

other responsibilities. This study focuses on the impact of the characteristics of subcommittees working under supervising audit committees (internal audit, internal control, and risk management departments) in the Turkish banking sector on operational loss. We seek to understand which elements could impact the efficiency of the internal control mechanisms at mitigating operational loss.

Results overall suggest that besides having these subcommittees as part of the internal governance mechanism, how they are structured impacts their effect on operational risk management. Adequately staffed internal governance mechanisms have a significant effect on reducing operational losses in banks. Considering that the individuals who are appointed to positions in these subcommittees have sufficient background and tenure in the industry, subsequent mandatory certification does not make a statistically significant contribution. Prior industry experience seems to be a sufficient factor that determines the governance skills of the members. Excess funding could be a substitute for adequate staffing only to a certain degree. The second most important factor for reducing operational losses in banks is the internal structure of these units. Internal governance mechanism could be improved if the staff executes the duties with an adequate number of control points and reporting activity. Reporting to senior-level management and various boards in banks ensure that banks' shareholders experience fewer surprises. Nevertheless, our study does not suggest an optimum number of reports or control points. Results are robust when tests are repeated with aggregated data to capture potential cooperation between and contribution of the individual units.

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