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Money laundering and bank risk: evidence from US banks

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Abstract

We test for a link between money laundering and bank risk in US banks. We find that money laundering increases bank risk according to several measures of risk, with the effect on risk only partly mitigated by large and independent executive boards and accentuated by powerful CEOs.

Keywords: Bank risk, money laundering, bank boards, CEO power, US banks

JEL classifications: G20, G21, G34

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1. Introduction

The literature on the determinants of bank risk has largely ignored the impact of engaging in money laundering (ML). This is surprising for several reasons. First, combatting money laundering is a major focus of US (and other) bank regulators concerned with the stability of the financial system. For example, the US Office of the Comptroller of the Currency views ML as posing risks to the safety and soundness of the financial industry and the safety of the nation more generally as terrorists employ ML to fund their operations.[1] The inter-governmental body, the Financial Action Task Force cites changes in money demand, prudential risks to bank soundness, contamination effects on legal financial transactions, and increased volatility of international capital flows and exchange rates due to unanticipated cross-border asset transfers as potential adverse economic consequences of money laundering.[2] One result of the focus on ML has been an extraordinary growth of anti-money laundering (AML) legislation since the mid-1980s that has imposed a heavy burden on financial institutions, especially as the legislation has shifted to the financial system the responsibility for keeping criminal money out and reporting instances when they suspect that it has entered into legitimate institutions (Levi and Reuter, 2011).[3] Second, ML exposes banks to serious reputational, operational, compliance and concentration risks that could result in significant financial costs (e.g. through fines and sanctions by regulators, termination of wholesale funding

[1] See the statement of the OCC on money laundering on its web site at: https://www.occ.gov/topics/compliance-bsa/bsa/index-bsa.html

[2] On the Financial Action Task Force, see for example, http://www.fatf-gafi.org/faq/moneylaundering/.

[3] The key US anti-money laundering legislation in recent years includes: the Bank Secrecy Act 1970; the Money Laundering Control Act (1986); the Anti-Drug Abuse Act of 1988; the Annunzio-Wylie Anti-Money Laundering Act (1992); the Money Laundering Suppression Act (1994); the Money Laundering and Financial Crimes Strategy Act (1998); the Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act of 2001 (USA PATRIOT Act); and the Intelligence Reform & Terrorism Prevention Act of 2004.

and facilities, claims against the bank, investigation costs, asset seizures and freezes, and loan losses) and the diversion of valuable management time and operational resources to resolve ML-related problems. Third, the risks to banks from ML have been increased by the growth in volume of cross-border transactions that have made banks inherently more vulnerable, by the fact that regulators are continually revising rules as their focus expands from organized crime to terrorism, and because governments have expanded their use of economic sanctions (Kittrie, 2009), targeting individual countries and even specific entities as part of their foreign policies. These risks to banks have been highlighted by several enforcement actions taken by regulators and the corresponding direct and indirect costs incurred by banks due to their lack of diligence in applying appropriate risk management policies.[4] In this context, the European Systemic Risk Board (2015) has stated that the weight of the fines and litigation expenses of financial misconduct more generally have cut severely into banks' earnings and complicated their keeping up with regulatory capital requirements.

Assessing the impact of money laundering on bank risk is complicated by the dearth of quantitative data about the extent of laundering and efforts to control it. The existing academic literature comprises mainly law review articles directed towards identifying the necessary components of an effective anti-money laundering (AML) regime and explaining laws in force to control money laundering, criminology and historical analysis, much of which is highly judgmental, macroeconomic estimates of money laundering based on the size of the underground economy,

[4] Notable recent example include HSBC having to pay a $1.9bn (£1.4bn) fine in 2012 for helping drug cartels launder money in Mexico and for contravening sanctions to do business with Iran; potential penalties included further multi-billion dollar fines or having its US banking licenses revoked, which could have crippled the bank (Withers, 2017); and in 2018 the Dutch bank ING agreeing to pay €775m in penalties for compliance failures that allowed companies to allegedly launder hundreds of millions of euros and pay bribes over six years (Arnold, 2018).

and microeconomic studies that focus on the different types of crimes and on estimating the income from each (for surveys of this literature see Reuter and Truman, 2004, and Levi and Reuter, 2011). While there are no reliable estimates of the amount of money laundered by banks,[5] an assessment of the impact of money laundering on bank risk can made by making use of data on money laundering-related enforcements by the main bank regulatory agencies. That is what we do in this paper. Specifically, we assess the impact of money laundering enforcements by the main US bank regulatory agencies on bank risk in a panel of 960 publicly listed US banks over the period 2004-2015. Our results suggest that being subject to enforcements for engaging in money laundering matters for bank risk: risk increases on several measures for banks that have been subject to enforcements for having engaged in money laundering. Our results regarding other drivers of bank risk are in line with previous research.

We make four contributions to the banking literature. First, we contribute directly to the literature on the determinants of bank risk, which have been shown to include, for example, banks' business models (Altunbaş et al., 2017), the regulatory and supervisory framework (Laeven and Levine, 2009), market competition (Beck et al., 2013), monetary and macro-prudential policy (Altunbaş et al., 2018a; Dell'Ariccia et al., 2017), and bank ownership structures (Laeven and Levine 2009). Our paper is the first that we are aware of to show that money laundering is also a significant driver of bank risk. Second, our paper is related to the growing literature on the determinants and consequences of corporate misconduct (see Cumming et al., 2015, 2018 for recent surveys) to which we contribute by focusing on the bank risk dimension of money laundering. Third, we contribute to the literature on governance in banking (for recent surveys see Srivastav and

[5] Levi and Reuter (2011) note that the Financial Action Task Force abandoned an effort to quantify the amount of money laundered through the financial system.

Hagendorff, 2016; Hagendorff, 2014) by showing that board size and board independence can mitigate but not fully offset the impact of money laundering on bank risk. Finally, we contribute to the literature on the effects of powerful CEO on firm performance (e.g., Adams et al., 2005; Abernathy et al., 2015) by showing that powerful CEOs impact adversely on bank risk taking and accentuate the adverse impact of money laundering on risk.

2. Related literature

Although we know of no studies of the impact of money laundering on bank risk, there is a burgeoning literature on the impact of financial misconduct more generally on firm behavior that is of direct relevance to our study. For example, Köster and Pelster (2018) examine the impact of financial penalties imposed for misconduct on banks' systemic risk in a sample of 68 international banks between 2007 and 2014 and find that penalties increase banks' systemic risk exposure but do not significantly affect banks' contribution to systemic risk. Additionally, the link between financial penalties and systemic risk exposure is weaker in regulatory and supervisory systems that have more prompt corrective power. Karpoff et al. (2008) show that the reputational losses for firms as the result of engaging in misconduct are much larger than the financial penalties imposed on firms. They examine the impact of penalties imposed on 585 firms targeted by SEC enforcement actions for financial misrepresentation during 1978–2002. Their point estimate of the reputational penalty (defined as the expected loss in the present value of future cash flows due to lower sales and higher contracting and financing costs) is over 7.5 times the sum of all penalties imposed through the legal and regulatory system. For each dollar that a firm misleadingly inflates its market value, on average, it loses this dollar when its misconduct is revealed, plus an additional $3.08, of

which $2.71 is due to lost reputation. Murphy et al. (2009) examine the relationship between allegations of corporate misconduct appearing in *The Wall Street Journal Index* between January 1, 1982, and December 31, 1996 and changes in profitability and risk of the alleged offender and find that misconduct allegations are associated with decreases in earnings and increases in risk. Köster and Pelster (2017) examine the impact of financial penalties on the profitability and stock performance of banks employing a dataset of 671 financial penalties imposed on 68 international listed banks over the period 2007 to 2014. They find a negative relation between financial penalties and pre-tax profitability (banks are allowed to deduct specific financial penalties from their taxable income). However, they report a positive relation between financial penalties and buy-and-hold stock returns, suggesting that investors are pleased that cases are closed and that the banks successfully manage the consequences of misconduct, and that the financial penalties imposed are smaller than the accrued economic gains from the banks' misconduct.

Most of the remaining financial misconduct literature can be grouped broadly around three themes (see Cumming et al., 2015): the circumstances that provide opportunities to commit and benefit from misconduct; external factors that impact on the incentives to engage in misconduct; and governance factors that can exacerbate or mitigate the ability to commit misconduct. One thread of the latter theme has stressed the importance of governance channels as affecting risk-taking, including executive board attributes. The board of directors is widely regarded as the cornerstone of an effective internal corporate governance framework (Fama and Jensen, 1983), having the ultimate responsibility for risk management and setting the tone for a bank's risk-taking culture. The board ensures bank stability by monitoring executives over the impact of firm policies on bank risk, evaluating whether current and future risk-exposure is consistent with risk appetite, and

designing executive incentives to promote prudent risk-taking. Most of the research in this area has been with respect to nonfinancial firms (e.g., Adams and Ferreira, 2008; Almazan and Suarez, 2003; Harris and Raviv, 2008; Hermalin and Weisbach, 1998; Raheja, 2005). However, the evidence of the impact of executive boards on bank risk-taking is ambiguous. For example, Akhigbe and Martin (2006) study the impact of the Sarbanes-Oxley Act on financial institutions and show that firms with independent boards see a decline in their stock volatility over the long term. Erkens et al. (2012) fail to find any impact of board independence on bank risk during the 2007-2009 financial crisis for a sample of large international banks. By contrast, Pathan (2009) reports that boards which are smaller and exhibit stronger shareholder rights are positively related to bank risk-taking. However, the author reports that boards characterized by a higher fraction of independent directors pursue less risky policies. Beltratti and Stulz (2012) present evidence to show that banks with a shareholder-friendly board were riskier, although the results do not hold when the authors use different measures of risk. An important element that moderates the effectiveness of boards of directors is CEO power with powerful CEOs viewed as able to influence board decisions and prevent boards from effective monitoring and implying that powerful CEOs pursue policies that result in riskier outcomes (Adams et al., 2005; Hermalin and Weisbach, 1998). The misconduct literature has stressed the incentives for CEOs to be instigators of misconduct. For example, Alexander and Cohen (1999) find that misconduct occurs less frequently among firms in which management has a larger ownership stake; Hass et al. (2015) report that the relative performance evaluation feature of CEO promotion tournaments results in a higher likelihood of CEO misconduct; Khanna et al. (2015) find that the connections CEOs develop with top executives and directors through their appointment decisions increase the risk of corporate misconduct; and Altunbaş et al. (2018b) report that the likelihood that a bank will engage in misconduct increases

if the CEO has had a relatively long tenure. In addressing the issue of the impact of money laundering enforcements on bank risk, we control for some of the governance channels raised in the misconduct literature as well as the more traditional explanators of bank risk.

3. Model and data

Our baseline specification is the following panel regression:

$$(1)\quad r_{it} = \beta_0 + \beta_1 ML_{it} + \beta_2 BSIZE_{it} + \beta_3 BINDEP_{it} + \beta_4 CEOP_{it} + \delta X_{it-1} + D_t + \varepsilon_i$$

The dependent variable, r_{it}, measures the risk of bank *i* in period *t*. We employ three measures of bank risk. The first measure is *default risk* as indicated by the z-score of each bank. The assumption here is that the failure of an individual bank could result, for example, from severe loss of reputational damage and/or the impact of severe financial penalties on bank capital. The z-score equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns. The z-score measures the distance from insolvency where insolvency is defined as a state in which losses surmount equity (E< -π) (where E is equity and π is profits). The probability of insolvency, therefore, can be expressed as prob (-ROA<CAR), where ROA (=π/A) is the return on assets and CAR (= E/A) is the capital assets ratio. If profits are normally distributed, then the inverse of the probability of insolvency equals (ROA+CAR)/σ(ROA), where σ (ROA) is the standard deviation of ROA. Following the literature, we define the inverse of the probability of insolvency as the z-score such that a higher z-score indicates that the bank is more stable.

The second measure is *systematic* risk, where, for example, money laundering in the banking sector could be so widespread so as not to be diversifiable against within the sector. For example, in its Fall 2017 semi-annual risk assessment report, the Office of the Comptroller of the Currency (OCC) stated that bank offerings based on new technological platforms create vulnerabilities that criminals can exploit as vehicles for money laundering. This measure of risk describes the average stock market reaction of each bank to movements on the overall stock market index and is constructed using a simple capital asset pricing model, based on the following equation:

$$(2)\ R_{it} = \beta_0 + \beta_1 R_t + \beta_2 int_t + \varepsilon_{it}$$

where, R_{it} is the equity return of bank *i* at time (trading day) *t*; R_t is the return of the S&P 500 index at time (trading day) *t*; and int_t is the yield on the three-month Treasury bill rate at time (trading day) *t*. β_0 is the intercept; β_1 is the systematic risk of bank *i* at time *t*; and β_2 is the interest rate risk.

The final measure of risk is a measure of *systemic risk*, which captures the reaction of individual banks to *systemic* events and measures tail dependence in the stock market returns of individual banks and equates the magnitude of tail dependence estimates as a measure of systemic risk. Money laundering may make a bank more vulnerable to systemic events, for example, because financial penalties and other costs associated with enforcements have debilitated the bank. A case in point is Deutsche Bank with widespread press reports in September 2016 that the US Department of Justice was seeking a $14 billion civil settlement for misconduct the fine was equivalent to about four-fifths of the bank's market capitalization and raised doubts about its future

viability and the systemic consequences should it fail (Stewart 2016). Systemic risk is estimated via the marginal expected shortfall (MES) following the model by Acharya et al. (2017) at a standard risk level of 5% as follows:

$$(3)\ MES_i^{5\%} = {}^{1}/_{days} \sum_t R_i$$

where $MES_i^{5\%}$ is the marginal expected shortfall of bank i in 5% worst days; $days$ is the number of 5% worst days in the market; R_i is the average return of bank i in 5% worst days.

Our key independent variable, ML_{it}, comprises regulatory enforcements and class action litigation for money laundering activities against publicly listed US banks. We compile data from the Board of Governors of the Federal Reserve System Enforcement Action database; the Office of the Comptroller of the Currency Enforcement Actions database; the Federal Deposit Insurance Corporation Enforcement Decisions and Orders database; the Stanford Law School Securities Class Action Clearinghouse Filings database; and the Office of Thrift Supervision Enforcement Order Archive. Our examination of data for 960 publicly listed banks revealed 85 enforcements involving 50 banks over 2004–2015. Table 1 shows that enforcements for money laundering were on a rising trend throughout the period and that about 34% of the banks in the sample were repeat offenders.

The variables $BSIZE_{it}$ and $BINDEP_{it}$ represent executive board size (the number of directors) and independence (the percent of outside directors), respectively, and $CEOP_{it}$ is an index of CEO power calculated by applying principal components analysis to proxies of CEO power (Adams et

al., 2005; Abernethy et al., 2015). Our four proxies are CEO tenure, where a CEOs' power is expected to increase with length of tenure because it helps build decision-making autonomy and the CEO can influence the selection of other board members (Combs et al., 2007); CEO/Chair duality, where the same person holding the CEO and Chair positions simultaneously increases CEO power because it diminishes the role of the board of directors in controlling CEO decisions (Hermalin and Weisbach, 1998) and is a 1-0 dummy with 1 indicating CEO/Chair duality; whether a CEO is also an investor in the firm because the 'convergence of interests' hypothesis predicts that share ownership binds the CEO's economic interests with those of shareholders and provides the CEO with an incentive to maximise firm performance (Fama and Jensen, 1983), and which is a 1-0 dummy with 1 indicating that the equity-based compensation of the CEO is greater than his/her the direct compensation in a given year; and the size of a CEO's network because networks have been viewed as a means for executives to protect each other on their respective boards (El-Khatib et al., 2015), and which is measured by the total number of people with whom the CEO is acquainted through current and past employment, education, and social contacts.[6] $X_{i,t-1}$ is a vector of other bank-specific characteristics that includes measures of leverage, profitability, liquidity, asset quality, capital, efficiency, bank size, and institutional ownership. Finally, D_t is a dummy variable equal to 1 during 2007 to 2008 (zero otherwise) to capture the effects on risk of the worst of the financial crisis. Descriptive statistics of the variables are given in Table 2 and variable definitions are presented in Appendix Table 2.

We initially estimate equation (1) using panel least squares with fixed time and bank effects with the bank-specific variables lagged one period to mitigate possible endogeneity bias that might

[6] The coefficients for each component (proxy), their eigenvalues, and the proportion of the variance explained are reported in Appendix Table I.

result, for example, from inverse causality between some covariates and the dependent variable (e.g., banks with a reputation for excessive risk-taking might attract staff more likely to engage in money laundering) and omitted variable bias. For robustness, we also present results using the dynamic Generalized Method of Moments (GMM) panel methodology to obtain consistent estimates of the relationship between misconduct and bank default risk (Arellano and Bond, 1991; Blundell and Bond, 1998).

4. Empirical results

Results for the baseline estimates of equation (1) for each measure of bank risk are reported in Table 3. The coefficients on the money laundering variable are positive and statistically significant for each measure of risk in both sets of estimates, indicating that money laundering is associated with an increase in bank risk. The economic size of the coefficients is modest in the case of default risk but more substantial for systematic and systemic risk. A one standard deviation change in the money laundering variable (0.244) associated with increases of 0.10, 0.13, and 0.11 in the default, systemic and systemic measures of risk, respectively, where the respective sample means of the risk measures are -7.90, 0.02, and 0.48. The coefficients on board size and independence are negative and generally statistically significant and the economic size of the coefficients is smaller than for money laundering. A one standard deviation change in board size (3.869) reduces bank risk by 0.05 and 0.07 on the default and systemic measures of risk, respectively, and a one standard deviation change in board independence (0.129) reduces risk by 0.02, 0.07, and 0.01 on the default, systematic and systemic measures of risk, respectively. Large and more independent boards appear to act in the interests of regulators and other stakeholders who are concerned with the safety of the

bank, but they do not fully offset the impact on risk of money laundering. More CEO power is associated with an increase in bank risk, with the economic size of the coefficient larger than that for money laundering and the board variables. A one standard deviation in change in CEO power (1.227) increases by risk by 1.00, 0.43, and 0.11 on the default, systematic and systemic measures of risk, respectively. This suggests that CEOs face similar incentives as shareholders towards risk-taking as suggested by Jensen and Meckling (1976).

The coefficients on the other bank-specific variables are mostly statistically significant. Higher levels of capital and liquidity provide buffers that reduce the probability of a bank distress and reduce bank risk (Bernanke and Lown, 1991; Gambacorta and Mistrulli, 2004), and more profitable banks are less risky because it is easier to accumulate capital via higher retained earnings (Flannery and Rangan 2008). In contrast, loan provisioning increases bank risk suggesting that it is designed to smooth earnings and inhibit outside monitoring (Bushman and Williams, 2012); leverage increases risk-taking because banks do not internalize the losses imposed on depositors and bondholders (Dell'Ariccia et al., 2017); large banks are riskier because they are considered as "too big to fail" (Afonso et al., 2014); inefficient banks are riskier because they reduce the scope for strengthening capital levels (Berger and De Young, 1997); and a larger proportion of institutional ownership increases bank risk consistent with the short-termism theory of institutional investors (Callen and Fang, 2013). Finally, the financial crisis was associated with an increase in bank risk taking.

In Tables 4-6, we look more closely at the accentuation of bank risk by CEO power and the mitigation of risk by executive boards. We report results from adding interaction variables—i.e.,

by multiplying the CEO power and executive board variables by the money laundering dummy. In these results, the coefficients on money laundering and the governance variables reflect their conditional effects on bank risk. In Table 4 the coefficient on the money laundering dummy remains positive and statistically significant for each measure of bank risk. The coefficient on the $Money\ laundering * CEO\ power$ interaction is also positive in each case though not statistically significant in the panel least squares estimates in the default and systematic measures of risk. The results indicate that a one standard deviation increase in CEO power raises the effect of a 1 percentage point increase in money laundering on bank risk by 0.41 , 0.039 and 0.74 for the default, systematic and systemic measures of risk on the GMM estimates and raises systemic risk by 0.91 percentage point in the panel least squares estimate.[7] Thus, CEO power accentuates the adverse impact of money laundering on bank default risk.

In Table 5, we report results in which the interaction variable is $Money\ laundering * Board\ size$. Again, the coefficient on the money laundering dummy remains positive and statistically significant for each measure of bank risk. The coefficients on the interaction term are negative in all estimates but statistically significant only for default (GMM estimate) and systemic risk (both estimates). A one standard deviation increase in board size reduces the effect of a 1 percentage point increase in money laundering on default risk by 0.35 percentage point and on systemic risk by between 0.31 to 0.37 percentage point. In Table 6, we report results in which the interaction variable is $Money\ laundering * Board\ independence$. The coefficient on the money laundering dummy remains positive and statistically significant for each measure of bank risk. The coefficients on the interaction term are negative in all estimates and are statistically

[7] 0.41=0.331(coefficient on the interaction term from GMM estimate)*1.227(the standard deviation on the CEO power index reported in Table 2).

significant for all measures of risk in the case of the GMM estimates and significant for systemic risk in the panel least squares estimate. A one standard deviation increase in board independence reduces the effect of a 1 percentage point increase in money laundering on bank risk by about 0.01 percentage point for each measure of risk.

Overall, the impact of money laundering on bank risk is statistically significant, positive and generally substantial. The results indicate that the interaction with the executive boards variables shows a negative and significant effect, which means that the magnitude of the effect of money laundering is lower for banks with large and independent boards than for other banks. In contrast, the coefficient on the interaction with CEO power is positive and statistically significant implying that the magnitude of the effect of money laundering is greater for banks with more powerful CEOs. As the coefficients on money laundering and on $Money\ laundering * CEO\ power$ are much larger than those on the executive board variables and interaction terms, board size and independence mitigate but do not offset the adverse impact of money laundering enforcements on bank default risk.

5. Conclusions

The banking literature on the determinants of risk-taking has largely ignored the potential role of money laundering. Our results suggest that money laundering enforcements are associated with an increase in bank risk on several measures of risk and that the effect is only partly mitigated by large and independent executive boards and is accentuated by the presence of powerful CEOs. Banks with powerful CEOs warrant the particular attention of regulators engaged in AML efforts,

especially when boards of directors are small and not independent.

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TABLE 1 Money laundering cases of publicly listed US banks, 2004–2015.

Panel A: Time distribution of money laundering cases

	Database				
Year	**FED**	**OCC**	**FDIC**	**OTS**	**Total**
2004	5				5
2005	1	2		2	5
2006		2			2
2007	1			1	2
2008				1	1
2009	2		1	1	4
2010	2	3	1		6
2011		1		8	9
2012	4	4	2		10
2013	4	8	1		13
2014	2	5	3		10
2015	9	5	4		18
Total	30	30	12	13	85

Panel B: Banks engaged repeatedly in money laundering

	Once	**More than once**	**More than twice**	**Total**
Number of banks	33	12	5	50

Sources: Board of Governors of the Federal Reserve System (FED) Enforcement Action database (https://www.federalreserve.gov/apps/enforcementactions/search.aspx); the Office of the Comptroller of the Currency (OCC) Enforcement Actions database (http://apps.occ.gov/EASearch/); the Federal Deposit Insurance Corporation (FDIC) Enforcement Decisions and Orders database (https://www5.fdic.gov/edo/DataPresentation.html); the Office of Thrift Supervision (OTS) Enforcement Order Archive (https://www.occ.treas.gov/static/ots/enforcement/ots-enforcement-order-listing.xlsx).

TABLE 2 Descriptive statistics

Variables	**N**	**Mean**	**Median**	**Standard deviation**	**Minimum**	**Maximum**
Bank risk:						
Default risk (z score)	4620	-7.900	-7.661	4.682	-65.150	5.530
Systemic risk	4620	0.019	0.015	0.788	-9.216	15.490
Systematic risk	4620	0.485	0.324	0.752	-9.918	7.578
Money laundering	4620	0.023	0.000	0.244	0.000	8.000
CEO power index	4620	0.000	-0.160	1.227	-3.064	3.945
Board size	4620	11.038	10.000	3.869	3.000	33.000
Board independence	4620	0.765	0.790	0.129	0.261	1.000
Liquidity	4620	22.970	21.730	11.120	0.820	58.820
Leverage	4620	79.400	82.760	13.240	8.044	94.990
Loan provisions	4620	0.206	0.086	0.380	0.020	5.0150
Capital	4620	10.330	9.370	5.363	0.070	65.420
Efficiency	4620	69.890	66.750	19.590	6.360	197.400
Profitability	4620	0.548	0.840	1.784	-9.990	9.510
Size	4620	0.317	-0.133	1.917	-4.416	8.027
Institutional investors	4620	32.590	25.680	26.640	0.050	100.00

Descriptive statistics are derived from the average values of annual data unless otherwise stated. Bank risk, board size and independence, and bank specific variables are calculated from the average values for each bank from 2004 to 2015. The z-score is defined the inverse of the probability of insolvency where a higher z-score indicates that the bank is more stable.

TABLE 3 Money laundering, governance and bank risk: baseline estimates

	Default risk		**Systematic risk**		**Systemic risk**	
	PLS	**GMM**	**PLS**	**GMM**	**PLS**	**GMM**
Lag of risk indicator		0.714***		0.263***		0.499***
		(0.012)		(0.019)		(0.013)
Money laundering	0.149*	0.414**	0.085**	0.536***	0.908*	0.466***
	(0.086)	(0.200)	(0.034)	(0.198)	(0.490)	(0.254)
CEO power	0.286***	0.818***	0.030*	0.354***	0.304***	0.094***
	(0.084)	(0.164)	(0.017)	(0.037)	(0.102)	(0.028)
Board size	-0.197***	-0.013*	-0.013*	-0.019**	-0.145***	-0.002
	(0.045)	(0.007)	(0.007)	(0.009)	(0.054)	(0.004)
Board independence	-0.028	-0.142***	-0.005	-1.773***	-0.099***	-1.201***
	(0.036)	(0.025)	(0.025)	(0.245)	(0.038)	(0.220)
Capital	-0.150***	-0.099***	-0.001	-0.011**	-0.019	-0.003***
	(0.051)	(0.011)	(0.005)	(0.005)	(0.044)	(0.001)
Liquidity	-0.028**	-0.017**	-0.06***	-0.010***	-0.070***	-0.010*
	(0.013)	(0.007)	(0.002)	(0.003)	(0.012)	(0.004)
Loan provision	0.008	0.668***	0.062*	0.116*	0.054	0.091**
	(0.127)	(0.151)	(0.036)	(0.069)	(0.095)	(0.053)
Funding	0.039***	0.005***	0.003	0.013***	0.002	0.006*
	(0.012)	(0.003)	(0.002)	(0.002)	(0.013)	(0.003)
Efficiency	0.004	0.036***	0.001**	0.001	0.007**	0.001
	(0.004)	(0.004)	(0.000)	(0.001)	(0.003)	(0.001)
Profitability	-0.341	-0.143***	-0.001	-0.003	-0.008	-0.004
	(0.066)	(0.022)	(0.011)	(0.010)	(0.025)	(0.014)
Size	0.145	0.378	0.404***	0.220**	1.627***	0.248***
	(0.135)	(0.262)	(0.041)	(0.101)	(0.544)	(0.063)
Institutional ownership	0.031**	0.008**	0.007***	0.017***	0.002	0.005***
	(0..005)	(0.003)	(0.001)	(0.002)	(0.004)	(0.001)
Crisis dummy	2.824***	2.465***	0.139***	0.048**	0.214**	0.026
	(0.095)	(0.060)	(0.023)	(0.022)	(0.098)	(0.019)
R^2	0.252		0.245		0.163	
Observations	6187	3736	6112	4963	6109	5605
Arellano-Bond test for AR(2) (p-value)		0.558		0.463		0.513
Hansen test for overidentification		0.894		0.899		0.860

Notes: Panel least squares (PLS) estimates are unbalanced panel regressions with bank and time fixed effects; independent variables are lagged one period to mitigate endogeneity problems. GMM estimates are system GMM and the Arellano-Bond test for AR(2) is the test for the absence of autocorrelation of the error terms at first and second order, respectively. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively.

TABLE 4 Money laundering, governance and bank risk with misconduct-CEO power interaction

	Default risk		**Systematic risk**		**Systemic risk**	
	PLS	**GMM**	**PLS**	**GMM**	**PLS**	**GMM**
Lag of risk indicator		0.713**		0.233***		0.441***
		(0.011)		(0.022)		(0.013)
Money laundering	0.574*	0.919***	0.150**	0.608***	1.001*	1.066***
	(0.300)	(0.130)	(0.061)	(0.211)	(0.533)	(0.351)
Money laundering*CEO	0.033	0.331***	0.003	0.032*	0.746*	0.606***
power	(0.064)	(0.104)	(0.015)	(0.018)	(0.388)	(0.149)
CEO power	-0.121***	0.633***	0.054**	0.251***	0.303***	0.115***
	(0.041)	(0.131)	(0.023)	(0.038)	(0.105)	(0.033)
Board size		-0.011	-0.001	-0.028***	-0.143**	-0.029***
		(0.007)	(0.010)	(0.010)	(0.055)	(0.007)
Board independence		-0.138***	-0.005	-1.471***	-0.087**	-1.149***
		(0.025)	(0.003)	(0.550)	(0.038)	(0.220)
Capital	-0.407***	-0.101***	-0.010**	-0.009**	-0.025	-0.002
	(0.144)	(0.011)	(0.005)	(0.004)	(0.052)	(0.001)
Liquidity	0.330***	-0.030***	-0.001	-0.007**	-0.067***	-0.009*
	(0.082)	(0.005)	(0.002)	(0.003)	(0.012)	(0.005)
Loan provisions	-0.805***	0.636***	0.109***	0.058	0.047	0.102*
	(0.305)	(0.145)	(0.038)	(0.077)	(0.098)	(0.059)
Funding	-0.030*	0.004	0.007**	0.010***	0.051***	0.004
	(0.012)	(0.003)	(0.003)	(0.002)	(0.016)	(0.003)
Efficiency	0.004	0.035***	0.002***	0.007***	0.007**	0.001
	(0.004)	(0.004)	(0.001)	(0.001)	(0.003)	(0.001)
Profitability	-0.179**	-0.152***	-0.018*	-0.023**	-0.002	-0.009
	(0.073)	(0.022)	(0.011)	(0.009)	(0.026)	(0.007)
Size	0.103	0.299	0.288***	0.347***	1.568***	0.249***
	(0.127)	(0.267)	(0.067)	(0.102)	(0.553)	(0.060)
Institutional ownership	-0.050***	0.009***	0.007***	0.014***	0.002	0.177***
	(0.009)	(0.003)	(0.002)	(0.002)	(0.004)	(0.064)
Crisis dummy	2.785***	2.389***	0.209***	0.022	0.295***	0.005***
	(0.091)	(0.060)	(0.032)	(0.024)	(0.099)	(0.001)
R^2	0.251		0.244		0.161	
Observations	6187	3815	6112	5282	6109	5008
Arellano-Bond test for AR(2) (p-value)		0.198		0.257		0.121
Hansen test for overidentification		0.888		0.749		0.799

Note: Panel least squares (PLS) estimates are unbalanced panel regressions with bank and time fixed effects; independent variables are lagged one period to mitigate endogeneity problems. GMM estimates are system GMM and the Arellano-Bond test for AR(2) is the test for the absence of autocorrelation of the error terms at first and second order, respectively. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively.

TABLE 5 Money laundering, governance and bank risk with misconduct-board size interaction

	Default risk		**Systematic risk**		**Systemic risk**	
	PLS	**GMM**	**PLS**	**GMM**	**PLS**	**GMM**
Lag of risk indicator		0.687***		0.233***		0.423***
		(0.011)		(0.062)		(0.013)
Money laundering	0.220*	1.053***	0.111**	1.262**	0.927*	0.475*
	(0.124)	(0.104)	(0.043)	(0.496)	(0.500)	(0.269)
Money laundering*board size	-0.018	-0.090**	-0.006	-0.096	-0.097***	-0.081***
	(0.023)	(0.042)	(0.006)	(0.070)	(0.037)	(0.023)
CEO power	-0.206***	0.509***	0.031*	0.091***	0.293***	0.074**
	(0.070)	(0.170)	(0.017)	(0.026)	(0.102)	(0.035)
Board size	-0.140***	-0.014**	-0.013*	-0.012	-0.140**	-0.032***
	(0.036)	(0.007)	(0.007)	(0.015)	(0.054)	(0.012)
Board independence	-0.046	-0.120***	-0.005	-0.708	-0.096**	-0.152
	(0.035)	(0.022)	(0.007)	(0.816)	(0.038)	(0.246)
Capital	-0.400***	-0.103***	-0.001	-0.046*	-0.018	-0.001
	(0.088)	(0.011)	(0.005)	(0.026)	(0.044)	(0.001)
Liquidity	-0.035***	-0.017**	-0.006***	-0.016**	-0.070***	-0.003
	(0.010)	(0.007)	(0.002)	(0.008)	(0.012)	(0.004)
Loan provisions	0.798***	0.946***	0.062*	0.041	0.055	0.080
	(0.218)	(0.125)	(0.036)	(0.062)	(0.098)	(0.055)
Funding	0.028**	0.007**	0.003	0.009***	0.004	0.009***
	(0.014)	(0.003)	(0.002)	(0.002)	(0.013)	(0.003)
Efficiency	0.010***	0.015***	0.001*	0.007***	0.007**	0.001
	(0.004)	(0.002)	(0.000)	(0.002)	(0.003)	(0.001)
Profitability	-0.090	-0.333***	-0.001	-0.086***	-0.009	-0.011*
	(0.071)	(0.014)	(0.011)	(0.022)	(0.025)	(0.007)
Size	3.357***	0.137	0.404***	0.492*	1.619***	0.327***
	(0.262)	(0.247)	(0.041)	(0.298)	(0.543)	(0.058)
Institutional ownership	0.018***	0.010***	0.007***	0.019***	0.002	0.004***
	(0.005)	(0.003)	(0.001)	(0.002)	(0.004)	(0.001)
Crisis dummy	3.057***	2.508***	0.139***	0.041	0.220***	0.038***
	(0.095)	(0.056)	(0.023)	(0.031)	(0.099)	(0.018)
R^2	0.252		0.245		0.161	
Observations	6187	4582	6112	5689	6109	5008
Arellano-Bond test for AR(2) (p-value)		0.533		0.129		0.130
Hansen test for overidentification		0.797		0.806		0.824

Notes: Panel least squares (PLS) estimates are unbalanced panel regressions with bank and time fixed effects; independent variables are lagged one period to mitigate endogeneity problems. GMM estimates are system GMM and the Arellano-Bond test for AR(2) is the test for the absence of autocorrelation of the error terms at first and second order, respectively. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively.

TABLE 6 Money laundering, governance and bank risk with misconduct-board independence interaction

	Default risk		**Systematic risk**		**Systemic risk**	
	PLS	**GMM**	**PLS**	**GMM**	**PLS**	**GMM**
Lag of risk indicator		0.633***		0.347***		0.438***
		(0.011)		(0.043)		(0.014)
Money laundering	0.205*	1.934***	0.126**	1.268*	0.928*	1.061*
	(0.118)	(0.331)	(0.043)	(0.564)	(0.500)	(0.543)
Money laundering*board	-0.036	-0.112***	-0.009	-0.120**	-0.123**	-0.090**
independence	(0.023)	(0.039)	(0.007)	(0.054)	(0.050)	(0.037)
CEO power	-0.199***	0.199***	0.029*	0.119***	0.291****	0.093**
	(0.073)	(0.109)	(0.017)	(0.019)	(0.102)	(0.041)
Board size	-0.130***	-0.008	-0.013*	-0.020*	-0.141**	-0.068**
	(0.036)	(0.008)	(0.007)	(0.011)	(0.054)	(0.029)
Board independence	-0.147***	-0.118***	-0.005	-2.474***	-0.097**	-0.752***
	(0.037)	(0.023)	(0.007)	(0.341)	(0.038)	(0.256)
Capital	-0.188***	-0.151***	-0.003	-0.024	-0.017	-0.003**
	(0.056)	(0.013)	(0.004)	(0.021)	(0.044)	(0.001)
Liquidity	-0.031**	-0.038***	-0.006***	-0.002	-0.070***	-0.009**
	(0.013)	(0.007)	(0.002)	(0.002)	(0.012)	(0.004)
Loan provisions	0.816***	1.090***	0.063*	0.105***	0.055	0.033
	(0.253)	(0.125)	(0.035)	(0.038)	(0.095)	(0.054)
Funding	0.033**	0.015***	0.001	0.004***	0.004	0.008***
	(0.014)	(0.003)	(0.002)	(0.001)	(0.013)	(0.003)
Efficiency	0.010***	0.016***	0.001*	0.002**	0.007**	0.001
	(0.004)	(0.002)	(0.000)	(0.001)	(0.003)	(0.001)
Profitability	-0.140*	-0.307***	-0.001	-0.001	-0.009	-0.018
	(0.085)	(0.013)	(0.011)	(0.011)	(0.025)	(0.015)
Size	3.205***	0.110	0.404***	0.407***	1.621***	0.303***
	(0.312)	(0.261)	(0.041)	(0.041)	(0.543)	(0.064)
Institutional ownership	0.003	0.011***	0.007***	0.011***	0.002	0.004***
	(0.005)	(0.003)	(0.001)	(0.002)	(0.004)	(0.001)
Crisis dummy	2.998***	2.423***	0.131***	0.056**	0.219**	0.034*
	(0.086)	(0.065)	(0.022)	(0.027)	(0.098)	(0.019)
R^2	0.253		0.245		0.162	
Observations	6187	4544	6112	5689	6109	5008
Arellano-Bond test for AR(2) (p-value)		0.199		0.146		0.177
Hansen test for overidentification		0.857		0.839		0.792

Notes. Panel least squares (PLS) estimates are unbalanced panel regressions with bank and time fixed effects; independent variables are lagged one period to mitigate endogeneity problems. GMM estimates are system GMM and the Arellano-Bond test for AR(2) is the test for the absence of autocorrelation of the error terms at first and second order, respectively. ***, **, and * indicate statistical significance at the 1, 5 and 10% levels, respectively.

APPENDIX 1 CEO power measure: principal components analysis

	First component	**Second component**	**Third component**	**Fourth component**
CEO tenure	0.308	0.917	0.198	0.161
CEO ownership	0.573	-0.282	-0.193	0.745
CEO duality	0.514	-0.281	0.749	-0.308
CEO network size	0.559	0.042	-0.601	-0.601
Eigenvalue	1.500	0.961	0.817	0.722
Proportion of variance explained	0.375	0.240	0.204	0.180

Notes: This table presents the results of applying principle components analysis to four proxies of power based on CEO ability to exercise decision-making power. CEO tenure is the number of years the CEO has served in position at given year. CEO ownership is a binary variable equal to 1 if the equity-based compensation of the CEO is greater than the direct compensation of the CEO at given year. CEO duality is a dummy variable equal to 1 if the CEO is also the Chairman in a given year. CEO network size is the number of CEO's with whom the selected CEO overlaps while in employment, other activities, or education roles at the same company, organization, or institution in a given year. The eigenvectors are reported in orthonormal form.

A**PPENDIX TABLE 2** Variable definitions

Variables	**Description**
Default risk (z-score)	Return on assets plus capital asset ratio divided by total by the standard deviation of return on assets at given year.
Systematic risk	Coefficient of the return of S&P 500 index in the estimation of the two-index market model at given year.
Systemic bank risk	Marginal expected shortfall in 5 percent worst days at given year.
Money laundering	The number of enforcements for money laundering offences
CEO power	Derived from the application of Principal Components analysis to four proxies for CEO power: CEO tenure; CEO ownership; CEO duality; CEO network size (see below)
CEO tenure	The number of years the CEO has served in position at given year.
CEO ownership	Binary variable that is 1 if the equity-based compensation of the CEO is greater than the direct compensation of the CEO at given year.
CEO duality	Binary variable that is 1 if the CEO is also chairman in given year, otherwise 0.
CEO network size	The number of CEO's with whom the selected CEO overlaps while in employment, other activities, or education roles at the same company, organization, or institution at given year.
Board size	The number of directors sitting on the board at given year.
Board independence	The percentage of independent non-executive directors on the board at given year.
Leverage	The ratio of total book value of liabilities to total assets at given year.
Profitability	The ratio of earnings before interest and taxes (to book value of total assets at given year.
Liquidity	The ratio of liquid assets to total assets at given year.
Loan provisions	The ratio of loan loss provision to total loans at given year.
Capital	The ratio of risk-weighted capital to total assets at given year.
Efficiency	The ratio of operating expenses to total operating income at given year.
Total assets	Natural logarithm of total assets at given year.
Financial crisis dummy	Binary variable that is 1 in financial crisis years (between 2007 and 2008).