Do ESG scores effect bank risk taking and value? Evidence from European banks

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Abstract

We examine whether environmental, social and governance (ESG) scores of European banks impact on their risk-taking behavior and on bank value. We find that high ESG scores are associated with a modest reduction in risk-taking for banks that are high or low risk-takers, and that the impact is conditional on executive board characteristics. These findings are consistent with the "stakeholder" view of ESG activities. However, high ESG scores are also associated with a reduction in bank value consistent with the "overinvestment" view of ESG whereby scare resources are diverted from investment. The decline in bank value occurs notwithstanding a positive indirect link between ESG scores and bank value through their impact on risk taking. Our results are robust to different measures of risk and value and to alternative estimation methodologies, and the key results hold for each of the sub-components of the ESG score. We conclude that there is a trade-off between reducing bank risk-taking and a more stable financial system on the one hand and bank value on the other.

Keywords: Corporate social responsibility, bank value, bank risk

JEL Classification: G21; G32; M14; Q56

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1. INTRODUCTION

Banks are prone to risk-taking due to their high leverage, limited creditor market discipline (reflecting deposit insurance and too-big-to-fail guarantees) and because they can increase rapidly and opaquely the riskiness of their assets. A widely held view is that the vulnerability of the banking sector during the 2007-2008 crisis was caused by a build-up of excessive risk (Brunnermeier 2009; DeYoung, Peng, & Yan, 2013). As bank failures can be costly to the taxpayer and have adverse effects on the real economy it is not surprising that there has been considerable debate on the extent to which governance failures have contributed to banks' excessive risk exposure. In a recent survey of the governance and risk literature, Srivastav & Hagendorff (2016) suggest that risk-taking is exacerbated by shareholder-focused governance and that mechanisms are needed to safeguard the interests of other stakeholders. One such potential mechanism is environmental, social and governance (ESG)-based activities if these contain risk-taking by bank management to better balance the interests of the investing and non-investing stakeholders in the bank. ESG-based bank governance would thus be very much in line with the "stakeholder" view of ESG activities introduced by Freeman (1984) wherein they should improve the satisfaction of stakeholders and improve financial performance and firm value. Of course, the impact of ESG activities on firm performance is controversial with the conventional view holding that they deteriorate profitability and detract from firm value by diverting scarce resources out of investment (Alexander & Buchholz, 1978; Barnea & Rubin, 1970). This "stakeholder" versus "overinvestment" debate thus raises a crucial question for the Srivastav & Hagendorff (2016)

proposal to contain bank risk by shifting away from shareholder-focused governance: What is the impact on bank risk and value of using bank resources to address social issues? Trying to answer this question reveals an important gap in the empirical banking literature, which we contribute to closing in this paper. Specifically, we examine the link between bank ESG scores on the one hand and bank risk-taking and value on the other hand in a sample of European banks over 2007-2018. Our focus is the post financial crisis period given the reforms introduced to improve banks' corporate governance that have been implemented at the international, supranational and national levels since then (e.g., Mülbert, 2009; Fernández Sánchez, Odriozola Zamanillo, & Luna, 2020). As in this period regulators and the investing public broadened the role of corporate boards to include risk oversight (OECD, 2014), we also examine how executive board characteristics (size, independence and gender composition) interact with ESG scores to impact on bank risk-taking and value. Finally, we examine whether the impact on bank risk-taking is a mechanism though which ESG scores also effect bank value indirectly. We report four key results. First, ESG scores are strongly associated with a reduction in risk-taking by European banks. Second, the impact of ESG scores on risk-taking is in part conditional on executive board characteristics, whereby it is mitigated in the presence of boards that are smaller, more independent and more gender diverse. Third, high ESG scores are strongly associated with a reduction in the value of European banks. Finally, though the overall impact of ESG scores on bank value is negative, we find a positive indirect link between ESG scores and bank value through their impact on risk-taking—i.e., ESG reduces risk-taking but not sufficiently to compensate for its adverse direct effect on bank value.

Our paper makes several contributions to the banking and ESG literature. First, we contribute to the literature on the determinants of bank risk and bank value. The former has been shown to

include, for example, banks' business models (Altunbaş, Manganelli, & Marques-Ibanez, 2017), the regulatory and supervisory framework (Laeven & Levine, 2009), market competition (Beck, De Jonghe, & Schepens, 2013), monetary and macro-prudential policy (Altunbaş, Binici, M., & Gambacorta, 2018), and bank ownership structures (Laeven & Levine 2009). Recent studies by Bolton (2013), Neitzert & Petras (2020), and Gangi, Meles, D'Angelo, & Daniele (2019) are the only ones we are aware of that link ESG to bank risk, each finding a negative association. Similarly, while there is a large literature on ESG and firm financial performance in general, only a limited number of studies have focused on the financial sector and with mixed results (e.g., Simpson & Kohers, 2002; Soana, 2011; Bolton, 2013; Wu & Shen, 2013). We contribute to this literature by showing that bank ESG scores are also a significant driver of bank risk-taking and value. Second, we contribute to the debate on governance in banking (De Haan & Vlahu, 2016; Srivastav & Hagendorff 2016) by providing evidence that ESG activities serve as a control mechanism to guide management decisions on risk-taking and that it is more effective in reducing risk-taking when boards have particular characteristics. Third, we contribute to the literature on the corporate governance and ESG nexus (Buchholtz, Brown, & Shabana, 2008; Jo, & Harjoto, 2011) by showing that banks use ESG engagement to manage conflicts of interest between stakeholders in part through the actions of the executive board and that this has implications for bank value. Fourth, we shed some light on the mechanisms through which ESG activities effect firm value, which has been shown to include, for example, corporate governance (Jo and Harjoto, 2011) and customer awareness (Servaes & Tamayo, 2013). We show that while high ESG scores are associated with a reduction in bank value overall, that reduction would be greater but for the constraining impact it has on risk-taking. Finally, our results serve as a cautionary warning to bank regulators and bank executive boards considering policies and incentives to strengthen ESG

activities, which is that a reduction in bank risk-taking would appear to involve a trade-off with bank value. More concretely, it would to disadvantage shareholders relative to other stakeholders.

The rest of the paper is organized as follows. In the next section we review the relevant literature and develop our hypotheses. Section 3 presents our methodology and data. Section 4 reports our empirical results and Section 5 concludes.

2. LITERATURE AND HYPOTHESIS DEVELOPMENT

As noted above, at least two established theories can be used to support a link between bank risk-taking and bank value on the one hand and ESG-based bank governance on the other. The "stakeholder theory" (Freeman, 1984) suggests that a shift from shareholder-focused to stakeholder-focused governance would balance the interests of investing and non-investing stakeholders in banks thereby containing excessive risk-taking by management and protecting bank value. ESG-based governance should therefore be associated negatively with bank risk-taking. Most obviously this should be reflected in the nature of banks' investment portfolios and their degree of leverage, but could also include, for example, reduced risk as a result of better customer loyalty (Bebbington, Larrinaga, & Moneva, 2008) and reduced compliance costs associated with governance-related failures (Oikonomou, Brooks, & Pavelin, 2012). In contrast, under the overinvestment hypothesis ESG leads firm to divert scarce resources from the maximization of shareholders' wealth, which squeezes out investment thereby reducing bank value (Alexander & Buchholz, 1978; Barnea & Rubin 2010); it therefore predicts a negative impact of ESG on bank performance. ESG investments may also be perceived as agency costs because

managers can improve their own reputation by investing in ESG at the expense of shareholders (Barnea & Rubin, 2010). If investors adopt this view, they may give greater relevance to the increase in firms' fixed costs associated with stronger ESG in which case investors may regard such firms as riskier (Drago, Carnevale, & Gallo, 2019).

Most of the empirical evidence on ESG activities and firm risk-taking relates to nonfinancial sector institutions and has found mixed results. For example, Oikonomou, Brooks, & Pavelin (2012) find that ESG-type engagement is negatively (but weakly) related to systematic risk in a panel data set of S&P 500 firms. Lee & Faff (2009) report that leading ESG firms exhibit significantly lower idiosyncratic risk. Kim, Li, & Li. (2014) find that ESG is negatively associated with future stock price crash risk and Jo & Na (2012) find that it inversely affects firm risk in controversial industry firms (including banks) after controlling for firm-specific characteristics. Finally, Gangi, Daniele, & Varrone, (2020) report that corporate reputation has a positive impact on firms' risk-adjusted profitability and on the z score indicator of firm risk. Several studies also suggest that ESG-type engagement lowers funding costs, which might signal reduced risk-taking. These studies include Bae, Chang, & Yi (2018) in the market for syndicated loans, and Oikonomou, Brooks, & Pavelin (2014) and El Ghoul, Guedhami, Kwok, & Mishra, (2011) in the markets for corporate bonds for equity capital, respectively; and Attig, El Ghoul, Guedhami, & Suh, (2103) report that credit rating agencies assign lower risk rating to firms with good social performance. On the other hand, Menz (2010) reports weak evidence that socially responsible firms face a higher risk premium in corporate bond markets; Goss & Roberts (2011) report that low-quality borrowers that engage in ESG face higher bank loan spreads and shorter maturities; and Magnanelli & Izzo (2017) report a positive relation between CSR and the cost of external finance. Specifically, in the financial sector,

Bolton (2013) reports a negative relationship between risk-taking and ESG activities of US banks, Gangi, Meles, D'Angelo, & Daniele (2019) report that environmentally conscious banks have lower levels of insolvency risk in a multi-country sample of 142 banks, and Neitzert & Petras (2019) report that ESG engagement reduces both default and portfolio risk in a sample of 3,392 banks from 121 countries.

The empirical evidence relating to ESG activities and firm value is also mixed. Brammer, Brooks & Pavelin (2006) find that firms with higher ESG engagement realize lower shareholder value and Crisóstomo, de Souza Freire & Cortes de Vasconcellos (2011) find a strong negative relation between ESG and the value of non-financial Brazilian firms. Some studies suggest that the components of ESG activities impact differently on firm value. For example, Bird, Hall, Momentè, & Reggiani (2007) report that community- and environment-related ESG are associated with a lower book-to-market ratio and price-to-earnings ratio for US firms. Hillman & Keim (2001) find that stakeholder management leads to improved firm value, while ESG activities are negatively associated with firm value. Harjoto & Jo (2015) report from a study of the differential impact of the overall, legal, and normative ESG on firm value that high normative ESG activities (not related to law) reduces firm value. On the other hand, Galema, Plantinga, & Scholtens (2008) report that ESG stocks have higher valuations, measured by market-to-book ratios. Deng, Kang, & Low (2013) show that acquirers with high ESG engagement experience higher merger announcement returns and better post-merger operating performance; and Servaes &Tamayo (2013) find that ESG is positively associated with firm value when firms have high customer awareness. Finally, in a recent paper Harjoto & Laksmana (2018) examine the mechanism through which ESG impacts positively on firm value; they report that it serves as a control mechanism to curb excessive risk

with the impact on firm risk-taking decisions contributing to greater firm value. Banking sector studies of the impact of ESG engagement have mainly been with respect to financial performance and typically report a positive impact on profitability (e.g., Simpson & Kohers, 2002; Shen, Wu, Chen, & Fang, 2016; Brogi & Lagasio 2019), which might be expected to increase bank value. In the only bank-specific study of value that we are aware of, Bolton (2013) reports that high ESG engagement is associated positively with the value of US banks.

In light of the above discussion, we develop six hypotheses to test. Consistent with the stakeholder theory view, we can express our first three hypotheses as follows:

H1. European banks with higher ESG scores are less risky than those with lower ESG scores

H2. European banks with higher ESG are valued higher than those with weaker higher ESG

H3. The impact of higher ESG scores on bank risk-taking decisions indirectly increases bank value.

Consistent with the overinvestment view, we can express our final three hypotheses as follows:

H4. European banks with higher ESG are riskier than those with lower ESG scores

H5. European banks with higher ESG are valued less than those with lower ESG scores

H6. The impact of higher ESG scores on bank risk-taking decisions indirectly reduces bank value.

3. MODELS, METHODOLOGY AND DATA

To test hypotheses H1 and H4 we estimate the following typical model of bank risk (see, for example, Altunbaş, Manganelli, & Marques-Ibanez, 2017):

$$r_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 X_{it} + D_t + \varepsilon_i \quad (1)$$

where the dependent variable, r_{it}, measures the risk of bank *i* in period *t*, ESG_{it} is a measure of the strength of corporate social responsibility engagement, the vector $X_{i,t}$ contains bank-specific variables and executive board characteristics that have been shown to impact on bank-risk taking, and D_t, is a dummy variable equal to 1 (zero otherwise) from 2007Q3 to 2009Q2 to capture the effects of the financial crisis.

Our specification to test hypotheses H2 and H5 takes into account that risk-taking can adversely affect firm value (e.g., Hirshleifer & Suh, 1992; Bolton, 2013) and is as follows:

$$v_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 r_{it} + \beta_3 X_{it} + D_t + \varepsilon_i \quad (2)$$

where the dependent variable, v_{it}, measures the value of bank *i* in period *t*, and ESG_{it}, r_{it}, X_{it}, and D_t are as defined in model (1).

Finally, to test hypotheses H3 and H6 we are interested in the impact of ESG scores on bank value conditional on their effect on risk-taking, r_{it}, for which we estimate the following model:

$$r_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ESG_{it} * r_{it} + \beta_3 X_{it} + D_t + \varepsilon_i \qquad (3)$$

in which all variables are as defined in models (1) and (2).

For robustness, we present results employing several measures of bank risk and bank value commonly used in the empirical literature. Bank risk is measured by the z-score of each bank (e.g., Laeven & Levine, 2009; Altunbaş, Manganelli, & Marques-Ibanez, 2017), the CDS spread (e.g., Drago, Di Tommaso, & Thornton, 2017; Drago, Carnevale, & Gallo, 2019), and the ratio of banks nonperforming loans to total loans (e.g., Schulte & Winkler, 2019). Bank value is measured by Tobin's q, (e.g., Gompers, Ishii, & Metrick, 2003; Bolton 2013), the book value of capital (e.g., Abuzayed, Molyneux, & Al-Fayoumi, 2009) and, indirectly, from banks' equity price (e.g., Khanna & Sonti, 2004). The strength of corporate social responsibility engagement is measured by the ESG scores published by ASSET4-Thomson Reuters, which is considered to be one of the most diligent and trustworthy sources of firm corporate social responsibility engagement (Stellner, Klein, & Zwergel, 2015) covering more than 4,500 companies around the world. The vector $X_{i,t}$ contains executive board characteristics and other bank-specific variables that have been shown to impact on bank-risk taking, and includes board size (Erkens, Hung, Matos, 2012; Berger, Imbierowicz, & Rauch, 2016), independence (Pathan, 2009; Vallascas, Mollah, & Keasey, 2016), and gender diversity (Cardillo, Onali, & Torluccio 2020; Owen, & Temesvary, 2018), and measures of bank size, capital, loan provisions, leverage, liquidity, efficiency, and profitability (Altunbaş, Manganelli, & Marques-Ibanez, 2017; Altunbaş, Thornton, J., & Uymaz, 2019). Finally, D_t, is a dummy variable equal to 1 (zero otherwise) from 2007Q3 to 2009Q2 to capture the effects of the financial crisis. Our data on European bank characteristics are from Bureau van

Dijk Bank Focus and Asset4-Thomson Reuter, which provide us with quarterly data for 81 banks headquartered in 19 European countries over 2007Q3 to 2018Q4. Variable definitions and sources are given in Table 1 and summary statistics for the variables are presented in Table 2.

We first run fixed effects estimates, but we suspect the results to be biased because of endogeneity. At least two sources of endogeneity can be pointed out here. The first is the inverse causality between some covariates and the dependent variable. For example, Hong, Kubik, & Scheinkman (2012) present evidence showing that financially constrained firms are less likely to spend resources on ESG-type activities and that when financial constraints are relaxed their spending on ESG increases. In this case, ESG is partly driven by bank risk and value rather than the converse. A second source of endogeneity is the omitted variable bias, since we are certainly not controlling for all the determinants of risk-taking and value. To mitigate these concerns, we focus on estimates based on an instrumental variables approach, system GMM (Arellano & Bond 1991; Arellano & Bover 1995).[1] The dynamic panel GMM estimator relies on a set of "internal" instruments contained within the panel itself—i.e., past values of ESG and bank risk (bank value) can be used as instruments for current realizations of ESG, which eliminates the need for external instruments. We report two specification tests. The first is the Hansen (1982) test of over-identifying restrictions, which examines the validity of the instruments by analyzing the sample analogue of the moment conditions used in the estimation procedure. The second test is the Arellano & Bond (1991) test for the hypothesis of no autocorrelation in the error term where the presence of second-order autocorrelation in the differenced residuals implies that the estimates are inconsistent.

[1] The fixed effects results support the conclusions from the GMM methodology and are available from the authors on request.

4. EMPIRICAL RESULTS

4.1. ESG and bank risk

Estimates of equation (1) are reported in Table 3. The results reported in columns (1), (3) and (5) strongly support the view that high ESG scores are associated with reduced bank risk-taking—i.e., they support H1 rather than H4. The impact of ESG on risk-taking is negative and statistically significant for each measure of bank risk after controlling for executive board characteristics and balance sheet variables, which broadly supports the stakeholder view of ESG and an ESG-based approach to bank governance in order to reduce risk-taking. However, the economic impact of ESG on bank risk-taking is quite modest. A one standard deviation increase in the ESG score (0.32) reduces bank risk only by between 0.01-0.02 percentage point (where the sample means for the risk measures are: z score, 1.08; CDS spread, 5.09; and NPL, 5.37).[2] The statistical significance of the coefficients on the executive board variables suggests that larger boards increase risk-taking behavior (Jensen, 1993), but that more independent and gender diverse boards are associated with less risk-taking behavior, which consistent with prior studies on board and gender diversity effects (Pathan 2009; Huang, & Kisgen, 2013). The coefficients on the bank balance sheet variables are mostly statistically significant and in line with the literature on bank risk. For example, higher levels of capital and liquidity provide buffers that reduce the probability of a bank distress and reduce bank risk (Gambacorta & Mistrulli, 2004), and more profitable banks are less risky because it is easier to accumulate capital via higher retained earnings (Flannery & Rangan 2008). In contrast, loan provisioning increases bank risk because it may be used to smooth earnings and

[2] For example, -0.01=-0.03(coefficient on ESG in the z-score measure of risk estimate) * 0.32(the standard deviation on the ESG score reported in Table 2).

inhibit outside monitoring (Bushman & Williams, 2012); leverage increases risk-taking because banks do not internalize the losses imposed on depositors and bondholders (Dell'Aricca, Laeven, & Suarez, 2017); large banks are riskier because they are considered as "too big to fail" (Morrison, 2011); and inefficient banks are riskier because they reduce the scope for strengthening capital levels (Berger & De Young, 1997). Finally, and not surprisingly, the financial crisis was associated with an increase in bank risk-taking. In the system GMM estimates, the Arellano-Bond and Hansen test statistics indicate, respectively, that there is no second order serial correlation in the disturbances and that the instruments used are not correlated with the residuals.

To gather more information on how executive boards might condition the effects of ESG on bank risk-taking, we expand the baseline estimates to include interaction variables—i.e., by multiplying the ESG score by the executive board characteristic variables. These results are reported in columns (2), (4) and (6) of Table 3. For each measure of risk-taking the coefficient on the ESG score remains negative and statistically significant but executive board characteristics have different conditioning effects. The coefficient on $ESG * Board\ size$ interaction is positive and statistically significant in each case and indicates that a one standard deviation increase in Board size counters the negative effect of a 1 percentage point increase in the ESG score on bank risk by between 0.01-0.32 percentage point (where the mean board size in the sample of banks is 13.88 directors).[3] However, in each case the coefficient on the interaction variable is substantially smaller than the coefficient on the ESG score, indicating that larger boards but do not offset the beneficial impact of ESG on bank risk. In contrast, the coefficients on $ESG * board\ independence$ and $ESG * board\ gender\ diversity$ are negative, statistically significant, and quite large. They

[3] 0.32=0.062(coefficient on the interaction term for the z score estimate) * 5.22(the standard deviation on executive board size reported in Table 2).

indicate that a one standard deviation increase in board independence accentuates the effect of a 1 percentage point increase in the ESG score by between 3.87-21.81 percentage points, and for board gender diversity it accentuates the effect of the ESG score on risk-taking by between 4.68-23.95 percentage points.

4.2. ESG and bank value

Columns (1), (3) and (5) of Table 4 report estimates of equation (2), which is the impact of ESG scores on each measure of bank value. In each case, the coefficients on the ESG score are negative and statistically significant and thus supports H5 rather than H2. In contrast to our results for bank risk, these results are in line with the "overinvestment" view of ESG in that ESG may have detracted from European banks' value by diverting scarce resources out of investment. This result is in line with some of the studies of nonfinancial firms mentioned above ESG but contrasts with Bolton's (2013) finding of a positive relation in the case of US banks. However, once again the economic impact of the ESG score on the value of European banks is relatively small, with a one standard deviation increase reducing bank value by between 0.02-0.56 (where the sample means for bank value are: Tobin's q, 9.27; book value of capital, 2.24, and the equity price, 2.95).

The results from estimating equation (3) are reported in columns (2), (4) and (6) of the Table 4. Here we are interested in whether the impact of the ESG score on bank value is conditional on its impact on bank risk-taking, as reflected in the coefficient on the interaction term $ESG_{it} * r_{it}$. For reasons of parsimony we only report results from regressions in which the risk variable is measured

by the z score though estimates using the other bank risk measures produced similar results.[4] In each case, the coefficient on the interaction term is positive and statistically significant. The results suggest a positive indirect link between ESG scores and bank value through the impact of ESG on risk taking. It seems that strong ESG engagement contains excessive risk taking by banks, which adds to their value, thereby supporting our hypothesis H3 rather than H6. However, the magnitude of this positive indirect effect does not compensate for the negative direct impact on bank value that results from ESG activities squeezing out investments. Our result is broadly in line with the findings of Harjoto & Laksmana (2018) that ESG impacts on firm value by serving as a control mechanism to curb excessive risk-taking (though in their case the direct impact of ESG on firm value is also positive). As for the other coefficients in equation (3), the results in Table 4 also suggest that risk-taking by bank management impacts negatively on all measures of bank value, that larger and more gender diverse executive boards are associated with lower bank value, and that higher value banks have more capital and better asset quality, are more leveraged and more profitable, and are smaller than other banks.

4.3. Robustness

Our results in support of H1, H3 and H5 are robust to several different measures of bank risk and bank value to and alternative estimation techniques (GMM and fixed effects (not reported)). As an additional robustness test, we examine whether the impact of ESG effects risk-taking and value differently in European banks at different levels of bank risk and bank value. For example, Harjoto & Laksmana (2018) report that stronger ESG performance is associated with lower levels of risk-

[4] The results from the regressions using the other measures of bank risk are available from the authors on request.

taking activities for US firms with risk-taking above the industry median, and some evidence that ESG performance increases risk-taking for firms with risk-taking below the industry median. We examine whether ESG impacts risk-taking and value differently for European banks depending upon whether their measures of risk and value are above or below the median for all banks in the sample. For reasons of parsimony we report results using only the z score and Tobin's q as measures of risk and value, respectively, though the results from employing the other measures of risk and value do not change the conclusions.[5] These estimates are reported in Table 5 and indicate that ESG has a negative impact on bank risk-taking and bank value in both high and low risk-taking banks and high and low value banks. However, the impact is not symmetrical with ESG being associated with a larger reduction in risk-taking in higher risk banks and a larger reduction in value for high value banks. Thus, a one standard deviation increase in the ESG score reduces bank risk-taking by 5.91 percentage points in banks with z-scores above the industry median and by 1.22 percentage points in banks with z-scores below the median; and it reduces bank value by 24.35 percentage points in banks with Tobin's q above the industry median and by 2.67 percentage points in banks with Tobin's q below the industry median. In addition, in the Tobin's q estimates, the impact of ESG on mitigating risk-taking ($ESG * z\ score$) is greater in higher value banks than in lower value banks, though the overall direct impact of ESG on bank value remains strongly negative.

Finally, it might be that some types of ESG engagement matter in different ways for risk-taking and value (e.g., Bird, Hall, Momentè, & Reggiani, 2007). As a further robustness test, we examine whether the different components of ESG impact differently on European bank risk-taking and

[5] These results are also available from the authors on request.

value. The Thompson-Reuters measure of ESG engagement comprises three main sub-components: environmental engagement (resource use, emissions, and innovation), governance (management, shareholders and ESG strategy), and social (workforce, human rights, community and product responsibility). In Tables 6 (bank risk) and 7 (bank value) we report results from baseline estimates for the impact of each subcomponent of the ESG score on each measure of bank risk and value. The coefficients on each of the sub-components are negative and statistically significant in all estimates. In other words, environmental, governance and social engagement by European banks all serve to reduce risk-taking but also to reduce bank value.

5. DISCUSSION AND CONCLUSIONS

There is only a very limited empirical literature on the impact of banks' ESG activities on their risk-taking behavior and value. Additional research in this area is important to properly assess recent calls for a corporate social responsibility-based approach to bank governance that would shift banks from shareholder-focused governance to safeguarding the interests of stakeholders more broadly. In this paper we have tried to contribute to closing this gap in the literature by examining the impact on the risk-taking and value of European banks in the post financial crisis period of banks using resources to address social issues. Of particular interest is whether ESG engagement by these banks is a potential mechanism for containing excessive risk taking and, if so, the distribution of any resulting benefits and costs among bank stakeholders. We report four main findings. First, high ESG scores are associated with a modest reduction in risk-taking and this finding holds whether European banks are high or low risk takers. Second, the impact of ESG scores on bank risk-taking is in part conditional on executive board characteristics whereby risk-

taking is mitigated in the presence of boards that are smaller, more independent and more gender diverse. Thus, the size and composition of bank boards is central to ESG managing to contain risk-taking. These first two findings are consistent with the "stakeholder" view of ESG. Third, we find that high ESG scores are associated with a modest reduction in the value of European banks, which is consistent with the "overinvestment" view of ESG. Finally, though the overall impact of ESG on bank value is negative, we find a positive indirect link between ESG scores and value through the mitigating effect of ESG on risk-taking; that is, ESG reduces risk-taking but not sufficiently to overcome the adverse direct impact it has on value. Overall therefore, we find that ESG activities, and ESG-based bank governance in particular, supported by smaller, independent and gender diverse executive boards, may well reduce risk-taking by European banks, and thereby support financial stability. However, this comes at the cost of reducing the value of banks by diverting scarce resources out of investment. Our results are robust to a variety of measures of bank risk and bank value and to alternative estimation methodologies, and the key results also hold for each of the sub-components of ESG. We believe that our results serve as a cautionary warning to regulators, corporate boards and other bank stakeholders considering promoting ESG activities, which is that there may be a trade-off between reduced bank risk-taking and a more stable financial system on the one hand, and bank value on the other.

We recognize that our study has a number of shortcomings. In particular, the results are drawn from a relatively small number of banks (81) across 19 European countries and therefore may not be reflective of the behavior of national banking systems as a whole. Second, the mechanisms through which ESG activities effect risk-taking and bank value are worthy of more exploration, including in particular the nature of the bank investments that appear to be crowded out by ESG. Moreover, as

arrive at a different result from a recent study on the relationship between ESG activities and the value of US banks, more single country studies of European banking systems could shed light on the extent to which the “overinvestment” effect of ESG is a truly a feature of European rather than US banking. It would also be informative to determine whether the effects of ESG activities on bank risk and value have changed in the post-crisis period in light of banking reforms that have been put in place.

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TABLE 1. Data sources and variable definitions

Variables	Source	Description
Z score	Orbis bank Focus	Return on assets plus the capital asset ratio divided by the standard deviation of asset returns at given year
CDS spread	Orbis bank Focus	Premium paid to seller quoted in basis points per year of the contract's notional amount
Nonperforming loans	Orbis bank Focus	Ratio of nonperforming loans to total loans
Tobin's q	Authors' calculation from data in Orbis bank Focus	Market value of a bank divided by the book value of assets
Book value of capital	Orbis bank Focus	Value of capital per share as shown in each bank's balance sheet
Equity price	Orbis bank Focus	Quarterly average of daily stock price (in US dollars)
CSR score	Asset4	Equal-weighted rating, based on the information in ASSET4's economic, environmental, social, and corporate governance pillars at given year
Board size	Asset4	The number of directors sitting on the board at given year
Board independence	Asset4	The percentage of independent non-executive directors on the board at given year
Board gender	Asset4	Percent of females on executive board at given year
Leverage	Orbis bank Focus	The ratio of total book value of liabilities to total assets at given year
Profitability	Orbis bank Focus	The ratio of earnings before interest and taxes (to book value of total assets at given year
Leverage	Orbis bank Focus	The ratio of total book value of liabilities to total assets at given year
Loan provisions	Orbis bank Focus	The ratio of loan loss provision to total loans at given year
Capital	Orbis bank Focus	The ratio of tier 1 capital to risk-weighted assets at given year
Efficiency	Orbis bank Focus	The ratio of operating expenses to total operating income at given year
Total assets	Orbis bank Focus	Natural logarithm of total assets at given year
Crisis dummy	Authors' calculation	Binary variable that equals to 1 during the period 2007Q3 to 2009Q2

TABLE 2. Summary statistics

Variable	Mean	Median	Standard deviation	Maximum	Minimum
z score	1.08	1.39	8.50	24.90	-9.78
Nonperforming loans	5.37	2.47	9.19	78.43	0.00
CDS spread	5.09	5.03	1.02	1.92	8.04
Tobin's Q	9.27	6.10	2.39	23.97	0.31
Book value of capital	2.24	1.85	1.02	-4.09	8.14
Equity price (in logs)	2.95	2.67	1.79	0.01	12.78
CSR score	0.64	0.80	0.32	0.97	0.03
Loan provisions	1.16	0.69	2.87	57.54	-0.66
Capital	13.26	12.9	4.26	35.25	-7.30
Liquidity	41.00	41.21	27.29	99.64	1.01
Size	16.03	16.09	2.22	22.00	8.44
Leverage	27.61	26.91	14.26	70.18	0.00
Efficiency	6.91	5.19	17.13	86.95	-0.97
Profitability	0.72	0.46	3.35	27.20	0.16
Board size	13.88	13.00	5.22	44.00	3.00
Board independence	73.30	80.00	29.36	100.00	0.00
Board gender diversity	17.35	14.29	13.00	60.00	0.00
Countries	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden, and United Kingdom.				

Note: The sample period is 2007Q1 to 2017Q4. All bank-specific variables are from BankScope. Data for real GDP are from the OECD macroeconomic database; the central bank policy interest rate and large-scale asset purchases data are from the online databases of the central banks.

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Book value of capital	2.24	1.85	1.02	-4.09	8.14
Equity price (in logs)	2.95	2.67	1.79	0.01	12.78
CSR score	0.64	0.80	0.32	0.97	0.03
Loan provisions	1.16	0.69	2.87	57.54	-0.66
Capital	13.26	12.9	4.26	35.25	-7.30
Liquidity	41.00	41.21	27.29	99.64	1.01
Size	16.03	16.09	2.22	22.00	8.44
Leverage	27.61	26.91	14.26	70.18	0.00
Efficiency	6.91	5.19	17.13	86.95	-0.97
Profitability	0.72	0.46	3.35	27.20	0.16
Board size	13.88	13.00	5.22	44.00	3.00
Board independence	73.30	80.00	29.36	100.00	0.00
Board gender diversity	17.35	14.29	13.00	60.00	0.00
Countries	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden, and United Kingdom.				

Note: The sample period is 2007Q1 to 2017Q4. All bank-specific variables are from BankScope. Data for real GDP are from the OECD macroeconomic database; the central bank policy interest rate and large-scale asset purchases data are from the online databases of the central banks.

TABLE 3. Dynamic GMM estimates of corporate social responsibility and bank default risk: dependent variable bank z-score

Risk indicator:	z-score		CDS spread		Nonperforming loans	
	1	2	3	4	5	6
Lag of risk indicator	-0.101***	-0.101***	0.837***	0.889***	0.831***	0.736***
	(0.009)	(0.009)	(0.042)	(0.034)	(0.014)	(0.017)
CSR score	-0.030*	-0.354***	-0.769**	-2.088**	-0.015***	-0.026***
	(0.018)	(0.106)	(0.358)	(1.040)	(0.004)	(0.002)
Board size	0.006***	0.039***	0.005	-0.030	0.001***	0.007***
	(0.002)	(0.003)	(0.013)	(0.025)	(0.000)	(0.001)
Board independence	-0.075**	-0.743***	-0.146	0.166	0.002	-0.087***
	(0.032)	(0.060)	(0.368)	(0.663)	(0.006)	(0.016)
Board gender diversity	-0.921***	-1.497***	-0.849***	-1.155***	-0.081***	-0.315***
	(0.087)	(0.173)	(0.277)	(0.019)	(0.014)	(0.033)
CSR* Board size		0.062***		0.063**		0.011***
		(0.006)		(0.032)		(0.001)
CSR* Board gender diversity		-1.435***		-1.842***		-0.367***
		(0.275)		(0.376)		(0.050)
CSR* Board independence		-0.743***		0.560		-0.132***
		(0.060)		(0.852)		(0.024)
Capital	-1.926***	-0.549**	-0.594**	-1.631***	-0.081***	-0.083***
	(0.222)	(0.278)	(0.277)	(0.909)	(0.030	(0.037)
Liquidity	-0.352***	-0.258***	-0.359**	-0.520***	0.015**	0.002
	(0.042)	(0.042)	(0.145)	(0.175)	(0.006)	(0.006)
Loan provision	0.695***	0.617***	0.372	-0.336	0.298***	0.307***
	(0.068)	(0.065)	(0.464)	(0.361)	(0.017)	(0.017)
Leverage	0.006	0.278***	1.244***	0.398**	0.101***	0.197***
	(0.075)	(0.080)	(0.436)	(0.182)	(0.014)	(0.018)
Efficiency	-0.354***	-0.251***	-1.704***	-0.918***	-0.034***	-0.028***
	(0.054)	(0.052)	(0.307)	(0.197)	(0.008)	(0.009)
Profitability	-0.454***	-0.443***	-0.038	-0.009	-0.082***	-0.109***
	(0.005)	(0.005)	(0.041)	(0.021)	(0.007)	(0.008)
Size	-0.024***	0.001	-0.216***	-0.097***	-0.006***	-0.007***
	(0.005)	(0.006)	(0.044)	(0.031)	(0.002)	(0.001)
Crisis dummy	0.102***	0.123***	0.515***	0.348***	0.006**	0.013*
	(0.010)	(0.010)	(0.074)	(0.061)	(0.002)	(0.003)
Intercept	-0.639***	0.207	0.871	3.188**	0.043**	0.018
	(0.109)	(0.166)	(0.974)	(1.280)	(0.021)	(0.031)
Observations	1289	1,495	1,289	1,188	2175	2175
AR(2) test (p-value)	0.355	0.455	0.654	0.343	0.153	0.134
Hansen test (p-value)	0.244	0.754	0.464	0.575	0.567	0.321

Note. ***, **, and * indicate statistical significance at the 1 and 5% levels, respectively. The Hansen (1982) test reports *p* -values for the null hypothesis that the instruments used are not correlated with the error term. The Arellano-Bond (1991) test reports *p* -values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation.

TABLE 4. Dynamic GMM estimates of corporate social responsibility and bank value

Value indicator:	Tobin's q		Book value of capital		Equity price	
	1	2	3	4	5	6
Lag of value indicator	0.949***	0.949***	1.010***	0.962***	1.001***	0.997***
	(0.021)	(0.021)	(0.011)	(0.023)	(0.004)	(0.005)
CSR	-1.764**	-1.800**	-0.051***	-0.351***	-0.266***	-0.254**
	(0.781)	(0.803)	(0.016)	(0.122)	(0.057)	(0.121)
Bank risk (z-score)	0.010	-0.065**	-0.058**	-0.150*	-0.490**	1.340*
	(0.015)	(0.028)	(0.023)	(0.082)	(0.192)	(0.774)
CSR*bank risk (z-score)		0.099**		0.081**		-0.295**
		(0.047)		(0.037)		(0.121)
Board size	-0.001	-0.000	0.010	0.228	0.534	0.712
	(0.050)	(0.050)	(0.212)	(0.288)	(0.522)	(0.710)
Board independence	0.161	0.127	0.054*	0.339***	0.308***	0.331**
	(0.644)	(0.667)	(0.030)	(0.090)	(0.090)	(0.130)
Board gender diversity	-1.006**	-1.020**	-0.232***	-0.364**	-0.437**	-0.593**
	(0.501)	(0.505)	(0.067)	(0.143)	(0.181)	(0.240)
Capital	2.467***	2.532***	0.471**	0.426*	0.913***	0.876**
	(0.215)	(0.622)	(0.198)	(0.236)	(0.215)	(0.412)
Liquidity	0.136	0.121	0.029	0.045	0.009	-0.264**
	(0.399)	(0.407)	(0.027)	(0.035)	(0.100)	(0.130)
Loan provision	-0.345**	-0.350**	-0.160***	-0.137**	-0.336**	-0.319**
	(0.165)	(0.166)	(0.065)	(0.056)	(0.165)	(0.161)
Leverage	0.224*	0.327**	-0.082	0.229***	1.436***	1.732***
	(0.127)	(0.138)	(0.050)	(0.070)	(0.180)	(0.249)
Efficiency	-0.250	-0.189	0.027	0.009	0.825**	1.168***
	(0.954)	(1.005)	(0.042)	(0.051)	(0.121)	(0.162)
Profitability	0.048***	0.048***	0.002***	0.004***	0.007***	0.006***
	(0.009)	(0.009)	(0.000)	(0.000)	(0.001)	(0.002)
Size	-0.308**	-0.399***	-0.022***	-0.040***	-0.059***	-0.068***
	(0.127)	(0.033)	(0.007)	(0.009)	(0.017)	(0.024)
Crisis dummy	2.283***	2.281***	-0.030**	-0.036**	-0.207***	-0.247***
	(0.351)	(0.351)	(0.013)	(0.015)	(0.028)	(0.034)
Intercept	-1.294	-1.108	-0.438***	-1.028***	-0.682**	-0.600
	(3.752)	(3.872)	(0.124)	(0.188)	(0.318)	(0.490)
Observations	2,265	2,265	2,281	2,281	2,253	2,253
AR(2) test (p-value)	0.463	0.532	0.422	0.322	0.234	0.297
Hansen test (p-value)	0.645	0.424	0.674	0.543	0.750	0.674

Note. ***, **, and * indicate statistical significance at the 1 and 5% levels, respectively. The Hansen (1982) test reports *p* -values for the null hypothesis that the instruments used are not correlated with the error term. The Arellano-Bond (1991) test reports *p* -values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation.

TABLE 5. Dynamic GMM estimates of corporate social responsibility, bank risk and bank value above and below industry median risk and value levels

	Above median		Below median	
	z score	Tobin's q	z score	Tobin's q
Lag of risk/value indicator	0.649***	0.937***	0.038*	0.117**
	(0.020)	(0.024)	(0.021)	(0.046)
CSR	-0.584***	-2.406**	-0.643**	-1.410*
	(0.127)	(1.073)	(0.253)	(0.779)
Z-score		0.073		-0.073
		(0.048)		(0.047)
CSR*Z-score		0.127**		0.284***
		(0.061)		(0.082)
Board size	0.062	0.193***	0.076	0.094*
	(0.082)	(0.073)	(0.058)	(0.050)
Board independence	-0.895	1.187	0.787	0.555
	(1.556)	(0.753)	(0.943)	(1.264)
Board gender	-0.361**	-2.941*	-0.301**	-4.184***
	(0.169)	(1.679)	(0.147)	(1.404)
Capital	-0.340***	0.120**	-0.202**	0.432***
	(0.122)	(0.055)	(0.101)	(0.064)
Liquidity	0.944	0.741	0.483	0.313
	(1.310)	(0.908)	(1.231)	(0.445)
Loan provision	0.273***	-0.475**	0.371	-0.351**
	(0.052)	(0.221)	(2.043)	(0.166)
Leverage	0.687***	-1.956	-0.173	0.655***
	(0.261)	(1.807)	(0.216)	(0.183)
Efficiency	-0.121***	-1.114	-0.059***	1.658
	(0.041)	(4.807)	(0.010)	(1.066)
Profitability	-0.133***	0.048***	-0.493***	0.030**
	(0.015)	(0.015)	(0.118)	(0.013)
Size	-0.660***	-0.790***	-0.032***	-0.510***
	(0.206)	(0.267)	(0.003)	(0.140)
Crisis dummy	0.397***	0.819**	0.401***	0.644**
	(0.058)	(0.370)	(0.065)	(0.327)
Intercept	14.115***	6.883	-2.985	7.355**
	(4.032)	(4.505)	(3.119)	(3.135)
Observations	1,226	1,018	1,086	1,247
AR(2) test (p-value)	0.424	0.422	0.553	0.148
Hansen test (p-value)	0.652	0.743	0.653	0.964

Note. ***, **, and * indicate statistical significance at the 1 and 5% levels, respectively. The Hansen (1982) test reports *p* -values for the null hypothesis that the instruments used are not correlated with the error term. The Arellano-Bond (1991) test reports *p* -values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation.

TABLE 6. Dynamic GMM estimates of the components of corporate social responsibility and bank risk

Bank risk measure:	z score			CDS spread			Nonperforming loans		
Lag of risk indicator	0.764***	0.762***	0.766***	0.819***	0.855***	0.830***	0.821***	0.839***	0.816***
	(0.015)	(0.015)	(0.015)	(0.027)	(0.033)	(0.021)	(0.019)	(0.018)	(0.018)
Governance	-0.042**			-0.005**			-0.017***		
	(0.020)			(0.002)			(0.004)		
Environmental score		-0.049***			-0.019***			-0.019***	
		(0.017)			(0.004)			(0.004)	
Social score			-0.059***			-0.001			-0.040***
			(0.019)			(0.001)			(0.005)
Board size	0.013	0.060	0.071	-0.008	-0.015	-0.019***	0.174***	0.095**	0.053
	(0.097)	(0.097)	(0.098)	(0.009)	(0.011)	(0.005)	(0.047)	(0.041)	(0.043)
Board independence	-0.368**	0.477***	0.441***	-0.999***	-1.218***	-0.223*	-0.080	0.911	-0.096
	(0.160)	(0.145)	(0.147)	(0.224)	(0.289)	(0.117)	(0.741)	(0.660)	(0.665)
Board gender diversity	-3.406	2.977	4.160	-0.436**	-0.823*	-0.290**	-2.408*	-2.582*	-3.666**
	(3.146)	(3.435)	(3.568)	(0.178)	(0.453)	(0.118)	(1.280)	(1.495)	(1.496)
Capital	-0.154**	-0.188**	-0.202**	-0.022**	-0.046**	-0.037***	0.020	0.023	0.029
	(0.077)	(0.079)	(0.080)	(0.010)	(0.020)	(0.007)	(0.042)	(0.038)	(0.039)
Liquidity	-0.645	-0.078	0.321	0.018	-0.085	-0.221**	0.703	0.773	0.353
	(1.432)	(1.454)	(1.479)	(0.052)	(0.222)	(0.087)	(0.666)	(0.484)	(0.483)
Loan provision	0.753**	0.693*	0.909**	0.077	-0.876*	0.352	0.320***	0.310***	0.304***
	(0.378)	(0.386)	(0.404)	(0.351)	(0.449)	(0.248)	(0.018)	(0.017)	(0.017)
Leverage	0.486***	0.713***	0.685***	1.580***	1.851***	0.446***	0.814***	0.772***	1.087***
	(0.146)	(0.138)	(0.136)	(0.347)	(0.419)	(0.134)	(0.153)	(0.147)	(0.152)
Efficiency	-1.434***	-1.469***	-1.460***	-0.663***	-1.072***	-0.552***	-0.032***	0.007	-0.016*
	(0.260)	(0.259)	(0.260)	(0.170)	(0.302)	(0.126)	(0.009)	(0.009)	(0.009)
Profitability	-0.041**	-0.050***	-0.056***	0.001	-0.003	0.001	-0.049***	-0.073***	-0.096***
	(0.017)	(0.017)	(0.018)	(0.002)	(0.003)	(0.001)	(0.012)	(0.011)	(0.011)
Size	-0.506***	-0.522***	-0.543***	-0.049**	-0.140**	0.014	-0.670***	-0.690***	-0.918***
	(0.032)	(0.036)	(0.035)	(0.025)	(0.062)	(0.023)	(0.154)	(0.146)	(0.127)
Crisis dummy	0.202***	0.201***	0.175***	0.575***	0.617***	0.559***	0.906***	1.397***	1.775***
	(0.048)	(0.048)	(0.049)	(0.048)	(0.061)	(0.038)	(0.305)	(0.327)	(0.331)
Intercept	11.034*	-4.939	-4.936	2.230***	3.249**	1.609***	4.275	4.974**	8.524***
	(5.852)	(5.990)	(5.857)	(0.493)	(1.296)	(0.552)	(2.649)	(2.388)	(2.041)
Observations	2,275	2,275	2,275	1,170	1,170	1,167	2,175	2,175	2,175
AR(2) test (p-value)	0.522	0.322	0.432	0.319	0.495	0.527	0.522	0.586	0.134
Hansen test (p-value)	0.655	0.775	0.564	0.145	0.573	0.446	0.652	0.643	0.613

Note. ***, **, and * indicate statistical significance at the 1 and 5% levels, respectively. The Hansen (1982) test reports *p* -values for the null hypothesis that the instruments used are not correlated with the error term. The Arellano-Bond (1991) test reports *p* -values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation.

TABLE 7. Dynamic GMM estimates of the components of corporate social responsibility and bank value

Bank value measure:	Tobin's q			Book value of capital			Equity price		
Lag of value indicator	0.865***	0.633***	0.641***	1.003***	1.012***	1.002***	0.996***	1.006***	0.999***
	(0.020)	(0.014)	(0.013)	(0.011)	(0.012)	(0.012)	(0.003)	(0.004)	(0.004)
Governance	-0.019***			-0.031*			-0.002***		
	(0.007)			(0.016)			(0.001)		
Environmental score		-0.016***			-0.055***			-0.003***	
		(0.006)			(0.015)			(0.001)	
Social score			-0.039***			-0.041***			-0.002***
			(0.006)			(0.014)			(0.001)
z-score	-0.006	0.012	0.007	-0.030	-0.068	-0.040	-0.004*	-0.007***	-0.006***
	(0.007)	(0.008)	(0.005)	(0.054)	(0.054)	(0.051)	(0.002)	(0.002)	(0.002)
Board size	0.013	0.055	0.066	0.679**	0.048	0.317	-0.002	0.010*	0.004
	(0.049)	(0.049)	(0.044)	(0.267)	(0.204)	(0.221)	(0.005)	(0.005)	(0.005)
Board independence	-0.028	-0.005	-0.001	-0.022	0.065**	0.016	0.003***	0.004***	0.003***
	(0.018)	(0.005)	(0.005)	(0.028)	(0.030)	(0.032)	(0.001)	(0.001)	(0.001)
Board gender diversity	-0.041***	-0.081***	-0.063***	-0.201***	-0.259***	-0.215***	-0.004**	-0.004**	-0.004**
	(0.012)	(0.010)	(0.010)	(0.067)	(0.068)	(0.066)	(0.002)	(0.002)	(0.002)
Capital	0.188***	0.610***	0.534***	0.381*	0.602***	0.361	-1.117*	-1.122*	-1.755***
	(0.043)	(0.036)	(0.034)	(0.213)	(0.218)	(0.228)	(0.603)	(0.617)	(0.640)
Liquidity	-0.948	-1.055	-0.777	-0.098***	-0.055*	-0.065**	-0. 013	0.011	0.001
	(0.592)	(0.668)	(0.574)	(0.032)	(0.031)	(0.028)	(0.010)	(0.010)	(0.001)
Loan provision	-0.052***	-0.134***	-0.136***	-0.195***	-0.090	-0.121**	-0.026	-0.044***	-0.041**
	(0.014)	(0.012)	(0.012)	(0.063)	(0.066)	(0.062)	(0.017)	(0.017)	(0.016)
Leverage	0.025*	0.042***	0.032**	-0.055	-0.077	-0.099*	1.257***	1.458***	1.290***
	(0.013)	(0.013)	(0.013)	(0.051)	(0.047)	(0.053)	(0.172)	(0.181)	(0.180)
Efficiency	-0.018	-0.796	-0.833	-0.063	-0.012	0.014	0.088***	0.082***	0.086***
	(0.109)	(0.725)	(0.819)	(0.051)	(0.046)	(0.044)	(0.012)	(0.013)	(0.012)
Profitability	0.042***	0.088***	0.102***	0.137***	0.174***	0.154***	0.047***	0.023***	0.020***
	(0.014)	(0.008)	(0.008)	(0.031)	(0.033)	(0.033)	(0.001)	(0.002)	(0.002)
Size	-0.442***	-0.941***	-1.177***	1.091***	-2.662***	-1.519**	0.022	-0.072***	-0.047***
	(0.152)	(0.148)	(0.128)	(0.545)	(0.717)	(0.593)	(0.015)	(0.018)	(0.017)
Crisis dummy	2.595***	1.365***	1.311***	-0.046**	-0.033**	-0.026**	-0.216***	-0.227***	-0.217***
	(0.232)	(0.197)	(0.189)	(0.023)	(0.013)	(0.013)	(0.028)	(0.028)	(0.028)
Intercept	6.614**	12.749***	15.259***	-13.261	-54.650***	-31.466***	0.134	-1.045***	-0.465
	(2.859)	(2.464)	(2.207)	(8.743)	(12.791)	(11.180)	(0.272)	(0.336)	(0.303)
Observations	2,265	2,265	2,265	2,281	2,281	2,281	2,253	2,253	2,253
AR(2) test (p-value)	0.642	0.355	0.421	0.763	0.643	0.753	0.123	0.542	0.532
Hansen test (p-value)	0.921	0.754	0.771	0.876	0.842	0.215	0.541	0.743	0.662

Note. ***, **, and * indicate statistical significance at the 1 and 5% levels, respectively. The Hansen (1982) test reports *p* -values for the null hypothesis that the instruments used are not correlated with the error term. The Arellano-Bond (1991) test reports *p* -values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation.