Moral hazard, dividends, and risk in banks

Enrico Onali[+]
Bangor Business School

Abstract

In nonfinancial firms, higher risk taking results in lower dividend payout ratios. In banking, public guarantees may result in a positive relation between dividend payout ratios and risk taking. I investigate the interplay between dividend payout ratios and bank risk-taking allowing for the effect of charter values and capital adequacy regulation. I find a positive relation between bank risk-taking and dividend payout ratios. Proximity to the required capital ratio and a high charter value reduce the impact of bank risk-taking on the dividend payout ratio. My results are robust to different proxies for the dividend payout ratio and bank risk-taking.

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[+] e.onali@bangor.ac.uk. Bangor Business School, Bangor University, LL57 2DG.

1. Introduction

The literature on the determinants of dividend payout ratios tends to exclude regulated industries from the analysis. An exception is Hansen *et al.* (1994), who investigate the relation between dividend payout ratios and monitoring in the utilities industry. In this paper, I take a closer look at the determinants of dividend payout ratios of another important regulated industry: The banking industry.

The new Basel III framework imposes restrictions on dividends for undercapitalised banks (Caruana, 2010), but it is unclear whether previous versions of the framework were effective in curbing risk-shifting. To fill this gap in the literature, I provide an empirical investigation of three important research questions: Are bank risk-taking and dividend payout ratios related? Have minimum capital requirements been successful in preventing banks from using dividends as a risk-shifting device? Is a high charter value (also franchise value) a deterrent for risk-shifting via high dividend payout ratios?

These questions are crucial for policy makers that aim to mitigate the impact of moral hazard on bank safety and, due to the importance of bank safety for the real economy, for society as a whole. Moreover, these questions are key to understanding the dynamics of the relation between the dividend payout ratio and risk-taking for industries where regulators and creditors are important stakeholders. Therefore, answering these questions is of interest to banking and corporate finance academics alike, as well as policy makers and regulators.

I investigate the role of high dividend payout ratios as a risk-shifting mechanism that can exacerbate moral hazard deriving from public guarantees, allowing for the effect of capital adequacy requirements and heterogeneity in charter values. In contrast with Acharya *et al.* (2011), I do not focus specifically on the crisis period. I investigate the relation between dividend payout ratios and bank risk-taking during the years 2000-2007, before the 2008-2009 recession, to limit the influence of extraordinary regulatory measures on my analysis. Focussing

on the period 2000-2007 also mitigates concerns regarding heterogeneous responses to the implementation of Basel II.[1]

The main hypothesis tested in the paper, henceforth referred to as the risk-shifting hypothesis, posits that risk taking is positively related to dividend payout ratios, since banks can pay dividends to transfer default risk to their creditors and (when bailouts take place) to the taxpayer. For consistency with previous literature on dividend policy of nonfinancial firms, and to avoid excluding unlisted banks from the investigation, I employ dividends to net income as main proxy for the dividend payout ratio. However, robustness tests show that my results hold even when using alternative proxies for the dividend payout ratio: dividends to book value of equity, dividends to market value of equity, and dividends plus share repurchases to market value of equity.

In addition to the risk-shifting hypothesis, this paper investigates two additional hypotheses, relating to the influence of capital adequacy requirements and charter values: According to the opportunity cost hypothesis, undercapitalised banks (banks with a regulatory capital ratio close to the minimum allowed by capital adequacy regulation) should decrease dividend payout ratios to avoid future actions by the regulators. According to the charter value hypothesis, banks with high charter values should be discouraged from paying dividends to preserve the charter.

I test the three hypotheses above on a sample of 741 U.S. and EU banks, and subsequently on a sub-sample of 166 listed banks. Investigating listed banks separately has several advantages. First, for listed banks the signalling content associated with dividends (Bhattacharya, 1979; John and Williams, 1985; Miller and Rock, 1985) may affect bank dividend policy. Agency costs (Easterbrook, 1984; Jensen, 1986) and catering incentives (Baker and Wurgler, 2004) may also play a role, although evidence on the latter is mixed (Hoberg and Prabhala, 2009).[2] Second,

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[1] Basel II rules were adopted in the EU as early as 2006, but the new rules of capital adequacy requirements were not fully implemented until 2008. In the U.S., Basel II was only partially adopted, and became effective from April 2008.
[2] Hoberg and Prabhala (2009) suggest that the dividend premium may proxy for risk rather than dividend fads.

for listed banks I can employ forward-looking measures of risk taking that are based on both accounting and market based information. In particular, for the analysis regarding both listed and unlisted banks I employ an accounting measure of distance to default (the log of the Z-score), while for the analysis regarding listed banks only I employ a measure of distance to default that is based on both accounting and market data (Bharath and Shumway's distance to default) and, in robustness tests, the related concept of Expected Default Frequency (EDF).[3]

This paper contributes to the literature in several ways.

First, it provides novel evidence of a positive relation between bank risk-taking and dividend payout ratios in banking, controlling for heterogeneity in the regulatory capital position and charter value of the bank.

Second, it sheds light on the impact of capital adequacy requirements on dividend payout ratios *prior* to and during the crisis (2008-2009), while recent papers (such as Acharya *et al.*, 2011) focus only on the crisis period. I find that banks that are close to the minimum capital requirement have significantly lower dividends payout ratios than well-capitalised banks. These results are consistent with the view that capital adequacy regulations in force before Basel III were somewhat effective in offsetting the positive relation between dividend payout ratios and bank risk-taking. In this respect, I also provide evidence that Prompt Corrective Actions (PCA) in the U.S. help curb the dividend payout ratio when the bank is close to the regulatory minimum.

Third, banks with higher charter value have lower dividend payout ratios, consistent with the view that when charter value is high, banks have an incentive to preserve the charter (Keeley, 1990).

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[3] Recent papers employ distance to default measures as a proxy for bank risk-taking (for instance, Hagendorff and Vallascas, 2011).

Finally, recent empirical studies on the determinants of dividend payout ratios in nonfinancial firms (Li and Zhao, 2008; Chay and Suh, 2009) neglect the autoregressive nature of the dividend payout ratio. Since the lagged payout ratio may well be correlated with other determinants of the current dividend payout ratio, this approach can lead to omitted variable bias. I employ a dynamic panel data model to adequately model an autoregressive component in the dividend payout ratio.

My results are robust to the proxy for agency costs between insiders and outsiders (Rozeff, 1982), the legal framework of the country of origin (La Porta *et al.*, 2000; Faccio *et al.*, 2001), and inclusion of the crisis period (2008-2009) in the analysis.

The remainder of the paper is organised as follows. Section 2 reviews the literature and develops the hypotheses. Section 3 describes the methodology and the data set. Section 4 reports the main results and robustness checks. Section 5 provides concluding remarks.

2. Related Literature and Hypotheses

This section briefly reviews the literature on dividend policy of nonfinancial firms and banks, and develops the hypotheses.

2.1.   Literature on dividend policy: A brief review

Dividend policy is a key topic in the financial economics literature. Most of the literature on dividend policy is concerned with the importance of dividend policy for firm value. Miller and Modigliani (1961) introduce the idea of irrelevance of dividend policy for the value of a firm. However, their theory is grounded upon the concept of "perfect" capital markets with rational investors.

Dividend policy may be relevant for firm value because of imperfections in real financial markets. The early literature studies three main real-market imperfections (Lease *et al.*, 2000):

different tax rates on dividends and capital gains, informational asymmetries between insiders and outsiders, and agency costs. More recently, the literature has also investigated the role of the legal framework of the country of origin (La Porta *et al*., 2000), catering incentives (Baker and Wurgler, 2004), and the stage of the life-cycle of the firm (DeAngelo *et al., 2006)*. Baker *et al.* (2002) provide a useful survey of seminal contributions in the dividend policy literature.

Identifying the impact of different determinants of dividend policy unambiguously is a daunting challenge, and the empirical literature has produced mixed results with regard to the impact of tax clienteles, signalling effects, and life-cycle factors (Farrar and Selwyn, 1967; Brennan, 1970; Healy and Palepu, 1988; Grullon *et al.*, 2005; DeAngelo *et al.*, 2006; von Eije and Megginson, 2008; Denis and Osobov, 2008; De Cesari, 2012). Exploiting a unique historical setting, Turner *et al.* (2013) provide evidence that the information content of dividends is more important than agency, catering, or behavioural determinants of dividend policy.

The banking literature has so far overlooked the topic of dividend policy, with some exceptions regarding primarily the signalling power of dividend cuts and omissions in banks (Keen, 1983; Bessler and Nohel, 1996, 2000). In particular, the study of the determinants of dividend payout ratios in banking is so far an under-researched area. This paper contributes to the literature on the determinants of the dividend payout ratio, and extends the findings of studies on the effect of risk taking on the dividend payout ratio (Rozeff, 1982; Chay and Suh, 2009) to the banking sector.

I borrow from two main strands of literature to develop my hypotheses. The first strand investigates the determinants of the dividend payout ratio of nonfinancial firms. The second strand examines the relation between regulation and bank risk-taking, and illustrates why certain types of regulation produce moral hazard (which, in turn, is related to the literature on market

discipline).[4] Section 2.2 examines this latter strand of literature and develops the hypotheses tested in this paper.

2.2. *Hypotheses*

Deposit insurance regulation, and public guarantees in general, may increase the likelihood of moral hazard in the form of excessive risk taking because it discourages monitoring from depositors. Deposit insurance can be thought of as a put option on the bank's assets (Merton, 1977), whose value is positively related to business risk and leverage. Under a fixed-rate system, banks can exploit the deposit insurance by increasing leverage and risk (Keeley, 1990). In the event of default, banks can exploit deposit insurance to obtain wealth from the insuring agency. Accordingly, the value of deposit insurance is positively related to default risk.

Dividends play an important role for the pricing of public guarantees. Dividends decrease the value of assets, which implies a decrease in the value of both equity and debt, but benefit only the owners of the bank – equity is 'dividend protected' (Ronn and Verma, 1986).[5] *Ceteris paribus*, higher dividend payout ratios increase default risk and the value of public guarantees (implicit or explicit). Moreover, banks tend to sell their safer assets to distribute dividends, and leave on their balance sheets the riskier assets (Acharya *et al.*, 2011).

In the absence of specific regulations that curb dividend payments in times of distress, bank owners/managers can 'loot' the public by strategically increasing dividend payout ratios, to extract wealth from bank creditors (depositors) and the insuring agency (Akerlof and Romer, 1993).

Based on these considerations, the main hypothesis tested in this paper is as follows.

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[4] Recent research has investigated whether regulations in the financial sector (particularly deposit insurance and capital adequacy regulation) impinge on the determinants of the financing decisions of banks (Gropp and Heider, 2010). This paper assumes a similar perspective, in that it investigates the dynamics of the relation between dividends and risk under bank regulations.
[5] For an analytical discussion about the pricing of public guarantees and dividends, see Appendix.

H₁: Risk-shifting hypothesis

Bank risk-taking is positively related to dividend payout ratios.

To restrain moral hazard deriving from public guarantees, bank regulators have introduced capital adequacy requirements proportional to a bank's risky assets. Capital adequacy requirements should counteract moral hazard because they force banks to internalise the adverse consequences of excessive risk taking. Undercapitalised banks can improve their capital position either by means of dividend cuts or by issuing new equity capital. Because raising new equity capital is expensive (Hellmann *et al.*, 2000) and conveys negative information to the financial market (Polonchek *et al.*, 1989), paying dividends implies foregoing the opportunity to raise the required capital (at no additional cost) by retaining earnings. High payout ratios increase the likelihood of dividend cuts in the future, which can result in large drops in bank stock returns (Lintner, 1956; Polonchek *et al.*, 1989; Bessler and Nohel, 1996). Therefore, undercapitalised banks should distribute a smaller percentage of earnings than well-capitalised banks.

H₂: Opportunity cost hypothesis

Undercapitalised banks have lower dividend payout ratios than well-capitalised banks.

Acharya *et al.* (2012) introduce a theoretical model that highlights the importance of charter values in the dynamics of the relation between risk-shifting incentives and dividends. In a nutshell, Acharya *et al.* (2012) argue that banks may pay excessive amounts of dividends because they do not internalize the negative externalities that generous dividend policies may impose on other banks (via the interbank lending channel). The model stresses that risk-shifting is more likely to occur in periods during which charter values are low, consistent with previous literature arguing that when charter values are low, banks have little to lose and the incentive to

gamble and exploit public guarantees is high (Keeley, 1990).[6] On the other hand, when charter values are high the incentive to exploit public guarantees is low because liquidation would prevent bank owners from selling the charter (i.e., the charter value would be lost). Therefore, banks with high charter values should be less inclined to engage in risk shifting via dividend payments. These considerations lead to the following testable hypothesis:

H$_3$: Charter value hypothesis

Charter value is negatively related to dividend payout ratios.

3. Methodology and Data

This section describes the methodology, data collection, and the construction of the sample.

3.1. Methodology

I investigate the nexus between dividend payout ratios and bank risk-taking using a dynamic panel data model. Previous research on the determinants of payout ratios in nonfinancial firms employs dividends to net income (*DP*) as a dependent variable. For comparability with this literature, I employ *DP* as a proxy for the dividend payout ratio for the sample including all banks. For the sub-sample of listed banks only, I employ the ratio of dividends to market value of equity (*DY*) and, in robustness tests, the total payout ratio (dividends plus share repurchases divided by the market value of equity).

DP becomes infinite when earnings are zero, and when earnings are negative there is a negative relation between dividends and the dividend payout ratio. Following Chay and Suh (2009) I drop observations for which *DP* is negative.[7] Robustness tests show that the results do not

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[6] For instance, Keeley (1990) ascribes the U.S. savings and loan crisis of the 1980s to more intense competition between banks (driven by deposit rate deregulation). Fiercer competition caused a decline in the charter value of savings and loan institutions. In such circumstances, these institutions were incentivised to exploit the put option implied by the deposit insurance scheme.

[7] Replacing these observations with a zero does not change substantially my results.

change substantially when using dividends to book value of equity (*DE*). Using *DE* eliminates the possibility of negative dividend payout ratios.

The specification of the model is as follows:

$$Y_{it} = \alpha + \rho Y_{it-1} + \boldsymbol{\beta}'\mathbf{x_{it}} + \boldsymbol{\gamma}'\mathbf{c_{it}} + \varepsilon_{it} \tag{1}$$

$$\varepsilon_{it} = \eta_i + v_{it}$$

$$E[\eta_i] = E[v_{it}] = E[\eta_i, v_{it}]$$

$$\eta_i \sim N(0, \sigma_\eta^2), \text{ and } v_{it} \sim N(0, \sigma^2)$$

where $i = 1, 2, \ldots, N$ indexes observational units (banks); $t = 1, 2, \ldots, T$ indexes time (years); Y_{it} is the proxy for the payout ratio, *DP*; $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ are vectors of coefficients; $\mathbf{x_{it}}$ is a vector of covariates, including the main explanatory variables associated with the three hypotheses; and $\mathbf{c_{it}}$ is a vector of controls. The error term ε_{it} consists of an unobserved panel-level effect η_i (fixed for each bank i) and an idiosyncratic component v_{it} (independent and identically distributed over all observations).

Due to the presence of the lagged dependent variable Y_{it-1} among the regressors, a dynamic panel data specification is required (Nickell, 1981). The generalised method of moments (GMM) estimator, developed by Arellano and Bond (1991) and refined by Arellano and Bover (1995) and Blundell and Bond (1998), eliminates η_i via differencing, and allows for $E(\Delta Y_{it-1}, \Delta v_{it}) \neq 0$ using the lagged levels of Y_{it-1} as instruments (Y_{it-2} is correlated to ΔY_{it-1} but uncorrelated to Δv_{it}). While Arellano and Bond's (1991) estimator (GMM-DIF) employs only lagged levels of Y_{it-1} as instruments in the first-differenced equation, Blundell and Bond's (1998) estimator (GMM-SYS), based upon Arellano and Bover (1995), involves a system of first-differenced and level equations, where lags of levels (in the former) and lags of the first differences (in the latter) are employed as instruments. Similar to Khan (2006) and Andres *et al.* (2009), I prefer the GMM-SYS to GMM-DIF for my analysis.

As pointed out by Roodman (2009), the GMM-SYS has one main drawback. The use of too many instruments can weaken the Hansen (1982) test of over-identifying restrictions, leading to an undersized test. To address the issue of instrument proliferation, I employ the collapsing technique suggested by Roodman (2009). This technique employs one instrument for each endogenous variable and lag length (instead of one for each time period, endogenous variable, and lag length), considerably reducing the number of instruments.

3.2. Definition of explanatory variables

In this section, I briefly define the variables employed to test H_1–H_3. I test the risk-shifting hypothesis (H_1) using several proxies for bank risk-taking: the log of the Z-score (Laeven and Levine, 2009; Schaeck *et al.*, 2012; Beck *et al.*, 2013); a forward-looking measure of distance to default (introduced by Bharath and Shumway, 2008), which I denote as *Naïve DD*; and the EDF based on *Naïve DD*. Employing only forward-looking measures based on stock price data would result in sample selection bias, while using these three measures improves the robustness of my results and allows considering both listed and unlisted banks. These three measures are defined in detail in Table 1. According to H_1, there should be a negative relation between the log of the Z-score and the dividend payout ratio, between *Naïve DD* and the dividend payout ratio, and between {$-EDF$} and the dividend payout ratio.

I test the opportunity cost hypothesis (H_2) by creating a dummy variable (*Close*) equal to one if either the tier 1 ratio (*Tier 1*) of the previous year is below 6% or the total regulatory capital ratio (*TCR*) of the previous year is below 10%, and zero otherwise. The total regulatory capital ratio is total regulatory capital divided by risk-weighted assets under Basel rules. *Tier 1* is tier 1 capital divided by risk-weighted assets under Basel rules. According to H_2, the coefficient on *Close* should be negative.

The banking literature suggests that customer (demand) deposits contribute to a bank's charter value (Marcus, 1984; James, 1991; Hutchison and Pennacchi, 1996; Goyal, 2005; Schaeck *et al.*,

2012). To test H_3, I create a dummy variable (*High Charter*) that takes on the value one if the ratio of customer deposits to total assets is larger than the sample median (charter value is high), and zero otherwise (charter value is low). For H_3 to hold, the coefficient of *High Charter* should be negative. In the tests using listed banks only (and *Naïve DD* or *EDF* as a measure of risk taking), I employ the market-to-book ratio as a proxy for charter value (Cebenoyan *et al.*, 1999).

The existing literature about dividend policies in nonfinancial firms finds that the following firm characteristics can influence dividend policy: insider–outsider (IO) conflict (Easterbrook, 1984; Jensen, 1986; Faccio *et al.*, 2001), asset growth (Fama and French, 2001), size (Fama and French, 2001; DeAngelo *et al.*, 2004; Denis and Osobov, 2008), profitability (Fama and French, 2001; DeAngelo *et al.*, 2004; Denis and Osobov, 2008), earned equity (DeAngelo *et al.,* 2006; von Eije and Megginson, 2008; DeAngelo and DeAngelo, 2007), a recent quotation on the stock market (Cornett *et al.*, 2008), and the legal framework of the country of origin (La Porta *et al*., 2000). Consequently, I include several control variables to allow for the impact of these factors. These variables are listed and briefly defined in Table 1.

[Insert Table 1 here]

3.3. Data

Tables 2a and 2b summarise the construction of the sample for all banks and listed banks only, respectively. As reported in Table 2a, I collect consolidated bank account data for 741 banks (bank holding companies, hereafter BHCs; commercial banks; cooperative banks; and savings banks) located in either the U.S. or the European Union, hereafter EU (27 countries),[8] from the Bureau Van Dijk Bankscope database. These banks are depository institutions, and therefore are subject to PCA in the U.S., but not in the EU.

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[8] For the EU sub-sample, the only country for which there are no observations is Cyprus.

Due to data availability on Thomson One Analytics (from which I collect daily closing prices), I am able to construct *Naïve DD* for 187 banks out of the original sample of 741 banks. Data on the dependent variable and all explanatory variables is available for 166 listed banks, which constitute our final sample.

[Insert Tables 2a and 2b here]

Tables 3 and 4 report the sample composition and descriptive statistics for the whole sample (Panel A) and the sub-sample of 166 listed banks (Panel B), respectively.

For Panel A, the majority of the banks in the sample are BHCs (52%), followed by commercial banks (38%). Most of the banks are located in the U.S. (59%). The majority of the U.S. sub-sample consists of BHCs (81%, but only 9% for the EU), while the majority of the EU sub-sample comprises commercial banks (65%, but only 18% for the U.S.). Most of the sample consists of banks that were listed in at least one of the years comprising the sample period (53%). There is no significant difference between the average *DP* of U.S. and EU banks, and between the average *DP* of listed and unlisted banks. U.S. banks are less risky than EU banks in terms of *LnZ* and *SDROA*, and they have a higher average *Capital Ratio* (ratio of equity to total assets). Consistent with this latter finding, the mean for the dummy variable *Close* is lower for U.S. banks than for EU banks. *High Charter* is, on average, larger for U.S. banks than for EU banks and it is, on average, larger for listed banks than for unlisted banks.

For Panel B, the statistics are similar, but the percentage of BHC and U.S. banks increases: they comprise 71% and 63% of the sample, respectively. Only one U.S. bank is not a BHC, while the EU sample is more heterogeneous, with a prevalence of commercial banks (62%). U.S. banks have a significantly lower *DY* than EU banks. Similar to Panel A, U.S. banks are less risky than EU banks: on average, they have a significantly larger *Naïve DD* and a significantly lower *EDF* and *Close*. On the other hand, the average *High Charter* is not significantly different from that of EU banks.

Pairwise correlation analysis (unreported for the sake of space) shows that for Panel A the variable *LnZ* is negatively correlated with both *SDROA* and *Close*. This supports the validity of *LnZ* as a proxy for risk taking.[9] Banks with higher charter value exhibit higher *LnZ* values, suggesting that banks with high charter values have an incentive to avoid liquidation. For Panel B, *Naïve DD* is negatively correlated with *EDF* (the coefficient is -0.985) and positively correlated with *LnZ*, suggesting that the three proxies are likely to identify high-risk banks in a consistent manner.

4. Results

This section presents the results of the GMM-SYS regressions as well as a battery of robustness tests. The results are reported separately for the whole sample (Panel A), and for a sub-sample of listed banks (Panel B).

The rest of this section is as follows. Section 4.1 presents the main results and robustness tests for the whole sample of 741 banks, and related sub-samples. Section 4.2 reports the results for the sub-sample of 166 listed banks, using *Naïve DD* as a proxy for risk taking (I do not report the results for {−*EDF*}, since the results are the same) and dividends to market value of equity as a proxy for the payout ratio. Section 4.3 provides an analysis of the impact of share repurchases. Finally, Section 4.4 briefly discusses the main results in relation to the existing literature on dividend payout ratios in nonfinancial firms, and the banking literature on market discipline, capital adequacy regulation, and charter values.

4.1. Results for the whole sample

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[9] The validity of *LnZ* as a proxy for bank risk is also confirmed by a negative and significant correlation between *LnZ* and the ratios of loan loss provisions to total loans (Altunbas *et al.*, 2007).

This section presents the main results of the GMM-SYS regressions. First, I run the GMM-SYS models with *LnZ* and the controls (I test only H_1). Second, I test H_1 and H_2 by including in the regressions the dummy variable *Close* and the interaction term *Close* × *LnZ*. Third, I test H_1 and H_3 by including in the regressions the dummy variable *High Charter* and the interaction term *High Charter* × *LnZ*. Finally, I include *LnZ*, *Close*, *High Charter*, and the respective interaction terms to test H_1, H_2, and H_3 in the same regressions. Since cooperative banks and savings banks may pursue objectives other than profit maximization, I report separately the results for regressions run on the whole sample and for BHC and commercial banks only.[10]

Table 5 reports estimation results for the dynamic panel data models. For the sake of exposition and to preserve space, the coefficients of the control variables are not included in Table 5. I allow for endogeneity with respect to both *DP*(-1) and *LnZ* using GMM instruments. The diagnostic statistics for all specifications are consistent with the assumptions of the GMM-SYS model.

For model 1, the coefficient of *LnZ* is negative and significant, supporting H_1. For model 2, the coefficient of *LnZ* is still negative and significant. However, the coefficient of *Close* is negative and significant, suggesting that banks that are close to the regulatory minimum make lower payout ratios with respect to well-capitalised banks, consistent with H_2. For model 3, the coefficient of *LnZ* is still negative and significant. The coefficient of *High Charter* is negative and significant, supporting H_3. Finally, the results for model 4 confirm those of the other specifications.[11]

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[10] As a preliminary analysis, I investigate the appropriateness of *LnZ* as a proxy for risk taking. I run a probit regression where the dependent variable is a dummy that takes on the value one if the bank equity to total assets ratio (*ETA*) was less than 4% or 5% in either 2008 or 2009, and zero otherwise, and *LnZ* in 2007 is the independent variable. The intuition is that, if *LnZ* correctly proxies for risk taking, its current value should be negatively related to the future capital position of the bank. The coefficient on *LnZ* is negative and significant at the 1% level when either 4% or 5% is considered as a threshold for *ETA*. When I repeat the analysis considering *Tier 1* instead of *ETA*, the coefficient on *LnZ* remains negative and strongly significant. These results suggest that, while *LnZ* is an accounting-based measure, it perform reasonably well as a forward-looking risk measure. The results of this analysis are available from the author upon request.

[11] To understand whether the recession in 2008 and 2009 has had any impact on the dividend policy of banks, I extend the sample period from 2000-2007 to 2000-2009. The coefficients of a dummy variable, *Crisis*, which takes

Considering the lower bound of the coefficient on *LnZ* (-0.081), an increase in *LnZ* by one standard deviation (0.996) results in a decrease of *DP* by about 8%. Since the average *DP* is 41%, the results are economically significant for banks that are *not* close to the regulatory minimum and have low charter values. The results for *Close* and *High Charter* are also economically significant, and the results for the interaction terms suggest that capital adequacy requirements reduce moral hazard for banks with low capital ratios, while the desire to preserve the charter offsets the propensity to shift risk when the charter value is high.[12]

[Insert table 5 here]

As it is common in empirical studies, robustness checks are in order. I start with an investigation of possible heterogeneous effects due to differences in the legal framework of the country of origin, following the classification by La Porta *et al.* (1998). In this spirit, I estimate the regressions for countries with an English origin only (UK and U.S.), since banks from other countries may be too heterogeneous to be comparable. By focusing on these two countries only, I can rule out differences in dividend payout ratios that are due to poor protection of minority shareholders. As reported in Table 6, the results remain substantially unaltered regardless of whether the whole sub-sample of banks from Common Law countries or BHC and commercial banks only are considered.

[Insert Table 6 here]

Further investigation is needed with respect to the specific banking regulatory framework of the U.S. and the EU. In particular, U.S. banks may be subject to dividend restrictions due to PCA when their regulatory capital approaches the regulatory minimum. A bank cannot pay dividends

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on the value 1 if the year is either 2008 or 2009 and 0 otherwise, are insignificant. The results for the main explanatory variables do not change substantially.

[12] The results for the control variables (unreported but available upon request) are either insignificant or consistent with expectations, with the exception of the coefficient of *IPO* for model 1, which is negative.

if doing so would cause the bank to be undercapitalised. Every depository institution that is member of the Federal Deposit Insurance Corporation (FDIC) is subject to PCA.

I construct a dummy, *PCA*, which is equal to one if *Close* =1 and *U.S.* =1, and zero otherwise. As shown in Table 7, when I include *PCA* in the regressions, its coefficient is always negative and strongly significant, while the other main coefficients remain unaltered. Therefore, *PCA* further reduce the risk that dividends be used as a risk-shifting device.

[Insert table 7 here]

I run further tests to assess the robustness of the main results. The results for these tests are not reported but are available upon request.

First, I run the regressions after winsorisation of the dependent variable and all continuous explanatory variables at the first and 99th percentile. The results confirm those reported in Table 5. Second, when I replace *DP* with *DE* (dividends to equity) the results remain the same as those reported in Table 5. Finally, my results hold even after replacing the dummy variable *Listed Bank* with two other proxies for the IO–conflict: the variables *Recorded Shareholders*, and the dummies *IND1* and *IND3* (which indicate the degree of independence of the bank from large shareholders).

4.2. Results for a sub-sample of listed banks

The results reported in Table 8 confirm a positive and significant relation between risk taking and the dividend payout ratio (i.e. the coefficient on *Naïve DD* is negative and significant). The diagnostic statistics support the validity of the assumptions for the GMM regressions. Considering the lower bound of the coefficient on *Naïve DD*, an increase in *Naïve DD* by one standard deviation decreases *DY* by about 0.3%. Since the average *DY* is 2.7%, these results suggest that the impact of risk taking on the dividend payout ratio is economically significant for banks that are not close to the regulatory minimum and have low charter values. The

coefficients on *High Charter* and *High Charter × Naïve DD* are significant and with the expected sign. However, the coefficients on *Close* and *Close × Naïve DD* are insignificant, as a result of a very low number of observations for which *Close* takes on the value one (19 observations for 15 banks).

Similar to what reported in Tables 6 and 7 for the whole sample, the results remain substantially the same when only banks from the US and the UK are considered, and when *PCA* is included in the regressions. However, in this case the coefficient on *PCA* is insignificant. The results are also robust to the proxy for the IO-conflict (*Recorded Shareholders*, and the dummies *IND1* and *IND3*), and to inclusion of the 2008-2009 period.

[Insert table 8 here]

4.3. Extension: The impact of share repurchases

As a further robustness test, I examine the impact of share repurchases. Share repurchases are non-binding (unlike ordinary dividends), and therefore do not contain the same signalling content of dividends (Allen *et al.*, 2009). Due to the binding nature of dividend payments, they can address agency conflicts more effectively than share repurchases (John and Knyazeva, 2006; De Cesari, 2012). Share repurchases, on the other hand, tend to occur to pay out transitory earnings (Jagannathan *et al.*, 2000). Because share repurchases can harm the capital adequacy of a bank, and restrictions on both dividends and share repurchases are now included in the Basel III framework, I incorporate share repurchases in the analysis to further improve the robustness of my findings.[13]

I calculate the payout from share repurchases (*SP*) as the total number of shares repurchased times the average price using data from SNL Financial. I merge this dataset with data from

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[13] While share repurchases tend to be rather common in the U.S. and (to a lesser extent) in the UK, in continental Europe share repurchases are rare, and in certain countries, such as France and Germany, they were illegal or subject to very strict regulation until the late nineties (Rau and Vermaelen, 2002).

Thomson One (stock price data), and Bankscope (dividends and other accounting variables). I calculate the total payout ratio as the sum of *DY* and *SY* (*SP* divided by the market value of equity), and I denote it *TP*.[14] Table 9 reports the results of the regressions for *TP*. The results are substantially the same as those reported in Table 8 for *DY*.

[Insert table 9 here]

4.4. Discussion of the main results

My results suggest that banks that are closer to default tend to have higher payout ratios, regardless of the proxy employed for the payout ratio or for bank risk-taking.

Since for banks close to the regulatory minimum this positive relation is negligible, these results do not necessarily suggest that capital adequacy regulation prior to Basel II was ineffective in curbing risk-shifting deriving from high dividend payout ratios. However, if capital requirements are not highly correlated with the actual risk taking of the bank, high risk taking and high dividend payout ratios may persist. In unreported results, I find that a negative and significant correlation exists between *Close* and *LnZ* and *Naïve DD*, while there is a positive and significant correlation between *Close* and *EDF*. Therefore, to the extent that *LnZ*, *Naïve DD*, and *EDF* capture correctly bank risk-taking, it is unlikely that banks close to default increased their dividend payout ratio during the sample period. These results are not necessarily inconsistent with those presented by Acharya *et al.* (2011), who suggests that, during the financial crisis, banks kept paying dividends despite anticipating large losses in their portfolios. Banks may have kept paying dividends without increasing the dividend payout ratio. Therefore, my results should not be interpreted as evidence that further dividend restrictions for undercapitalised banks are unnecessary.

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[14] Since *TP* is highly leptokurtic (kurtosis is over 640) and positively skewed (skewness is over 20), I winsorise the data at the 95th percentile before running the regressions. As a result of winsorisation, excess sample kurtosis is eliminated and sample skewness is around 0.6.

The results for the sample of both listed and unlisted banks suggest that U.S. banks decrease payout ratios to a greater extent than EU banks when they are close to the minimum capital requirement. This finding is consistent with the view that PCA are useful in decreasing moral hazard, and supports the recent changes in the Basel Accord (Basel III) that impose progressive dividend restrictions on banks that are undercapitalised (Brunnermeier *et al.*, 2009; Caruana, 2010). In light of the results on the impact of charter value on payout ratios, dividend restrictions would be particularly useful in periods of high competition, when charter values are low (Keeley, 1990), or during periods of weak economic growth.

My results are also in line with the predictions put forward by Acharya *et al.* (2012), who model the theoretical relation between risk-shifting incentives, dividends, and charter values. Acharya *et al.* (2012) show that during financial crises, when charter values are low, banks may be incentivised to implement dividend policies inconsistent with maximization of social welfare. To the best of my knowledge, this is the first paper that provides evidence on the importance of different types of capital adequacy regulations and charter values on the relation between bank dividend policy and risk taking.

My findings also complement recent contributions on the relation between dividends, competition (which affects charter values), and business risk. Booth and Zhou (2009) provide evidence that firms in highly competitive environments face higher levels of risk, and this may in turn result in a lower likelihood of a dividend and smaller dividend payouts for the firms that decide to pay dividends. Similarly, Zhou *et al.* (2013) argue that the phenomenon of disappearing dividends in the U.S. (Fama and French, 2001) could be associated with competition from foreign firms. My findings show that when risk-shifting incentives are distorted by regulation (such as deposit insurance), stronger competition that decreases charter values (Keeley, 1990) *increases* dividend payout ratios.

Finally, my findings are related to the growing body of literature on 'market discipline' in banks (among others, Ellis and Flannery, 1992; Goyal, 2005; Schaeck *et al.*, 2012). My results show that capital requirements are effective in reducing risk-shifting incentives, which can be interpreted as evidence of regulator discipline. In addition to this, I provide evidence that a high ratio of customer deposits to total assets has a negative impact on the positive relation between bank risk-taking and dividend payout ratios. This latter finding can be interpreted as evidence of 'depositor discipline'.

5. Concluding Remarks

Previous literature has reported that banks kept paying dividends during the recent financial crisis, despite a call from regulators to restrain dividend payments to maintain financial stability and foster economic recovery through lending growth. This issue is important because an excessively generous bank dividend policy is inconsistent with maximization of social welfare: High dividend payout ratios can effectively transfer wealth from depositors and the taxpayer to bank shareholders (risk-shifting), resulting in substantial negative externalities in periods of economic slowdown.

In this paper, I have provided robust evidence that dividend payout ratios and bank risk-taking are positively correlated, contrary to the received wisdom reported in the literature on nonfinancial firms. However, such correlation is affected by the regulatory capital ratio and the charter value of the bank: Capital adequacy requirements and a high charter value reduce risk-shifting.

My findings bear important policy implications. First, because of regulatory capital management practices, the previous versions of the Basel framework could result in a belated response to risk-shifting, especially in countries where PCA do not exist. Under Basel III rules, banks must maintain a conservation buffer consisting of Tier 1 capital only, reducing the likelihood of regulatory capital management. If the buffer is breached, earnings distributions

(such as dividends and share repurchases) are capped. Therefore, Basel III should reduce further the likelihood of risk-shifting.

Second, in light of the findings on the role of charter values, pro-cyclicality in bank charter values should also be considered. In this respect, the new countercyclical capital buffer introduced by Basel III, which also entails restrictions on dividends and share repurchases if the buffer is breached, may only partially address the problem. Such countercyclical requirement would reduce dividend payout ratios during periods of economic growth, helping banks to withstand macroeconomic shocks. However, it is during economic slowdowns that bank charter values are low and risk-shifting through dividends and share repurchases is more likely. My findings suggest that a more thorough theoretical analysis of the impact of the countercyclical capital buffer on risk-shifting incentives is called for. Empirical studies could follow in the forthcoming years, after implementation of Basel III.

Further research could also investigate the impact of corporate governance and ownership structure on risk-shifting incentives. For instance, the literature on managerial entrenchment predicts higher dividend payout ratios for firms where the executives are entrenched. Thus, for banks where managers are entrenched the problem of risk-shifting could be more intense, and regulatory monitoring should increase accordingly. Similarly, in group-affiliated banks outside shareholders could require higher dividend payout ratios to dampen expropriation from controlling shareholders. An assessment of the costs and benefits of restrictions on dividends and share repurchases in such cases is a challenging task, because stronger protection of depositors may lead to expropriation of outside shareholders. Theoretical and empirical contributions in this direction could help policy makers develop regulations that strike a balance between safeguarding the interest of outside shareholders and maintaining financial stability.

Appendix

Analytical explanation of the relationship between the value of common equity, dividends, and risk.

In this appendix I give a brief account of the models by Merton (1974, 1977) on the pricing of corporate debt and of the cost of deposit insurance, and how they relate to dividend payments and risk. For details regarding the models, I refer the reader to Merton (1974, 1977), and Ronn and Verma (1986).

The model on the pricing of corporate debt developed by Merton (1974) is based on the isomorphic relation between common equity of a levered firm and a common stock call option. The model on the pricing of deposit insurance developed by Merton (1977) relies upon the isomorphic relation between loan guarantees and common stock put options, and can be applied to any guarantee of a third party on behalf of the borrower, such as guarantees of a parent company for a loan made by a third party to one of its subsidiaries.

Assume that the value of assets of a bank at time t (A_t) follows a Geometric Brownian motion:

$$d\mathit{ln}(A_t) = \mu dt + \sigma dW_t \tag{A1}$$

where μ is the instantaneous expected return on assets, σ is the instantaneous standard deviation of returns, and W_t is a Wiener process. The payoff of a European call option with strike price X on the expiration date, t^*, is the greater between 0 and the difference between A_{t*} and X, or MAX[0, A_{t*} − X], while the payoff of a European put option is MAX[0, X − A_{t*}]. In a frictionless market, the 'no arbitrage opportunities' condition (Black and Scholes, 1972) holds:[15]

$$C_t = A_t N(d_1) − X e^{-rT} N(d_2)$$

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[15] The 'no arbitrage opportunities condition' states that '[…] in equilibrium a riskless hedge cannot yield a return greater than the short term interest rate in the market, the option must be priced such that market participants could not establish this hedge and expect to realize a sure profit.' (Black and Scholes, 1972, p.400).

$$d_1 = [ln(A_t/X) + (r + 0.5\sigma^2)\,T]/\,\sigma T^{0.5}$$

$$d_2 = d_1 - \sigma T^{0.5} \qquad\qquad (A2)$$

$$P_t = C_t + Xe^{-rT} - A_t \qquad\qquad (A3)$$

where C_t is the price of the call option (for one share), P_t is the price of the put option (for the same share), r is the short-term rate of interest, T is the duration of the option (time to expiration), and N(.) is the value of the cumulative distribution function of the standard Normal distribution. According to Merton (1977), the face value of debt of a corporation, D, can be seen as the strike price of a call, or X in equation (A2). In such circumstances, the equity value of the bank, E_t, can be calculated using:

$$E_t = A_t N(d_1) - De^{-rT} N(d_2) \qquad\qquad (A4)$$

where D is the face value of debt. The cost of deposit insurance, G_t, can be modelled according to (A3), but with an adjustment to consider the fraction of the bank liabilities that consists of insured deposits, $\eta = D_1/D$. If all pre-insurance debt is of equal seniority, depositors (in the absence of deposit insurance) will receive the lower between the future value of deposits, $FV(D_1)$, and the pro-rated fraction of the value of the total assets of the bank, $A_t\eta$. The payoff generated by the deposit insurance at maturity is $MAX[0, FV(D_1) - A_t\eta]$ (Ronn and Verma, 1986). The deposit insurance premium can be modelled as follows:

$$G_t = N(h_2) - (1 - \delta)(A_t/De^{-rT})N(h_1)$$

$$h_1 = \{ln[D/A_t(1 - \delta)] - T(r + 0.5\sigma^2)\}\,/\sigma T^{0.5}$$

$$h_2 = h_1 + \sigma T^{0.5} \qquad\qquad (A5)$$

where G_t is the premium of the deposit insurance per each dollar of insured deposits, equivalent to the value of a put with a strike price equal to total debt (D) divided by D_1, δ is the dividend

per dollar of A_t, assuming that dividends are paid once for each period. Equation (A5) shows that, ceteris paribus, a larger δ increases G_t because it decreases A_t. Note that in equation (A4) dividends do not decrease the value of equity because equity is dividend-protected (Ronn and Verma, 1986). If deposit insurance exists in the banking system, banks that pay dividends can increase the value of deposit insurance by paying dividends. Banks are also incentivised to increase the debt-to-assets ratio, because this decreases A_t/De^{-rT}.

The value of a debt in a leveraged bank which pays dividends is:

$$F_t = De^{-rT} [N(f_2) + (1 - \delta)(A_t/De^{-rT})N(f_1)]$$

$$f_1 = - \{0.5\sigma^2T - \ln[De^{-rT}/ A_t(1 - \delta)]\} /\sigma T^{0.5}$$

$$f_2 = - \{0.5\sigma^2T + \ln[De^{-rT}/A_t(1 - \delta)]\} /\sigma T^{0.5} \tag{A6}$$

Therefore, dividends reduce the value of bank assets and the overall amount that debt holders can claim in the event of liquidation. Dividends reduce the value of debt because debt, unlike equity, is not dividend-protected. Given the face value of uninsured debt, $D_2 = D - D_1$, dividends decrease the probability that uninsured debt holders will be repaid if the bank collapses. Assume that, in the event of a default, all insured depositors are paid by the deposit insurance scheme, so that uninsured debt holder can claim the total of the assets of the bank, A_t. Then, the future value of uninsured debt for banks that do not pay dividends is:

$$FV(D_2) = \min[A_t, D_2] \tag{A7}$$

For banks that pay dividends, the future value of uninsured debt is:

$$FV(D_2)^* = \min[(1 - \delta)A_t, D_2] \tag{A8}$$

Note that for any $\delta > 0$, if $(1 - \delta)A_t < D_2$, then $FV(D_2)^* < FV(D_2)$. Paying dividends benefits common shareholders because they receive cash while debt holders do not, and dividends

reduce the probability that uninsured debt holders will be paid in full. This effect is stronger for banks for which D_2 is large. As D_2 increase (for instance, because of the issuance of hybrid capital instruments, as in Acharya *et al*, 2011), $De^{-rT}N(d_2)$ in equation (A4) approaches $A_tN(d_1)$, and $E_t \rightarrow 0$. Therefore, banks may increase the debt-to-assets ratio to increase G_t (to the extent that this is allowed by capital adequacy regulation), but in so doing the value of equity would decrease, as it would be for a call option with a larger strike price. Banks with $E_t \rightarrow 0$ may attempt to increase E_t by increasing business risk, which in the BS-model can be represented by σ (Merton, 1973). More risk increases the payoff of a call option conditional on the option being exercised. This can be easily shown taking the first derivative of (A4) with respect to σ (also called Vega):[16]

$$\partial E_t/\partial \sigma = A_t n(d_1) T^{0.5} \tag{A9}$$

Where $n(.)$ is the probability density function of the standard Normal distribution. Given that $A_t \geq 0$, $n(d_1) \geq 0$, and $T^{0.5} \geq 0$, it follows that an increase in business risk brings about a higher value of E_t. What is the impact of business risk on the current value of debt, F_t? As shown in Merton (1974), $F_t = A_t - E_t$. Therefore, there is a negative relation between F_t and E_t. Due to the positive relation between σ and E_t (equation A9), it follows that F_t is negatively related to σ, i.e. an increase in business risk decreases the current value of the debt (see also Merton, 1974, p. 455). Therefore, as said in the introduction, ceteris paribus dividends and the issuance of debt decrease the capital ratio and incentivise risk taking.

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[16] For a derivation of (A9), please refer to Garven (2009), pp. 13-14.

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Table 1. Explanatory variables in regressions on payout ratios (*DP*, *DY*, and *TP*): Definitions and expected sign of the coefficients.

Proxy	Definition	Expected sign of the coefficient
LnZ	Natural logarithm of the Z-score: $LnZ_{it} = \ln(Z_{it}) = \ln[(ROA_{it} + E_{it} / TA_{it}) / SDROA_{it}]$ where Return on Assets (ROA) is the net income of bank i in period t plus the loan loss provision of bank i in period t divided by the total assets of bank i in period t. The variable E_{it} is the total equity (including common and preferred share capital and equity reserves) and TA_{it} is the total assets of bank i in period t. Finally, ROA volatility is calculated as $$SDROA_{it} = \sqrt{\frac{1}{T-1}\sum_{t=-1}^{t+1}\left(ROA_{it} - \overline{ROA_i}\right)^2} \quad \text{with} \quad \overline{ROA_i} = \frac{1}{T}\sum_{t=-1}^{T-2}ROA_{it} \quad \text{and T = 3.}$$	Negative (risk-shifting hypothesis)
Naïve DD	$$Naive\ DD = \frac{\ln\left(MVT / naive\ debt\right) + \left(\mu - 0.5 naive\ \sigma_V^2\right)}{naive\ \sigma_V}$$ Where *naïve debt* is the face value of bank i debt at time t (subscripts omitted for readability), which approximates the market value of bank's debt. σ_E is the annualized monthly standard deviation of returns, and *MVE* the market value of equity. The volatility of debt is: *naïve* $\sigma_D = [0.05 + 0.25\sigma_E]$, and the total value of the firm is: $MVT = [MVE + naive\ debt]$. The volatility of assets is: *naïve* $\sigma_V = [\sigma_E(MVE/MVT) + naive\ \sigma_D(naive\ debt /MVT)]$. The expected return on the bank's assets, *naïve* μ, is the annual bank stock return	Negative (risk-shifting hypothesis)
Expected Default Frequency (EDF)	$\Phi(-Naive\ DD)$, where $\Phi(.)$ is the cumulative standard normal distribution function. *Naïve DD*	Positive (risk-shifting hypothesis) Negative for (−*EDF*)
Close	Dummy variable: 1 if *Tier 1* < 6% or *TCR* < 10%, and 0 otherwise	Negative (opportunity cost hypothesis)
High Charter	Dummy variable: 1 if the ratio of customer deposits to total assets is larger than the sample median, and 0 otherwise. For the subsample of 166 listed banks, the dummy is based on the market-to-book ratio.	Negative (charter value hypothesis)
Proxies for Insider–Outsider (IO) conflict and other control variables		
Recorded Shareholders	Number of recorded shareholders in 2009[c]	Positive
Listed Bank	Dummy variable: 1 if bank i is listed on the stock market in period t, and 0 otherwise	Positive/Negative
IND1	Dummy variable: 1 if there is no shareholder with more than 25% of total ownership in 2009,[c] and 0 otherwise	Positive
IND2	Dummy variable: 1 if there is a shareholder with more than 25% of total ownership but no shareholder with more than 50% of total ownership in 2009,[c] and 0 otherwise	Excluded from regressions to avoid perfect collinearity
IND3	Dummy variable: 1 if there is a shareholder with more than 50% of total ownership in 2009,[c] and 0 otherwise	Negative
Profitability	Net income of bank i in year t plus the loan loss provision of bank i in year t divided by the total assets of bank i in year t. I prefer using ROA over return on equity because it does not take into account the effect of leverage on profitability and risk.	Positive
Loan Growth	Log of loans of bank i in period t minus log of loans of bank i in period t - 1	Negative
Size	Log of assets of bank i in period t	Positive
Earned Equity	Retained earnings of bank i in period t divided by the total equity of bank i in period t	Positive
IPO	Dummy variable: 1 if bank i went public in period t, and 0 otherwise	Positive
U.S.	Dummy variable: 1 if bank i has its headquarters in the U.S. and 0 otherwise	Positive

I report the expected sign of the coefficients on the basis of the findings of previous literature. *Notes continue in next page*

[a] The IO conflict should be stronger in cases where the shareholding base is more dispersed. The number of recorded shareholders and listing on a stock exchange should be positively related to shareholding dispersion, and should therefore lead to higher payout ratios. However, quotation on a stock exchange can act as a monitoring device for shareholders (Easterbrook, 1984). Thus, the expected coefficient of *Listed Bank* may be positive or negative (or insignificant). The dummy variables *IND1*, *IND2*, and *IND3* are independence indicators. Because *Listed Bank*, *Recorded Shareholders*, and the independence indicators are highly correlated, they are included one at a time in my multivariate analysis.

[b] To allow for earnings management, I calculate the ROA as the sum of net income and loan loss provisions, divided by total assets. However, the pairwise correlation between the unadjusted ROA and the adjusted ROA is 0.8178, (significant at the 1%), and therefore the results are likely to hold, irrespective of the proxy chosen.

[c] Bankscope provides data for these variables only as of the last accounting year available. However, because these data tend to be sticky, it is unlikely that this has affected my results.

Table 2.Construction of the sample: 741 U.S. and EU banks, sample period 2000–2007, annual data.

	Search criterion	Number of banks
Panel A: All banks.		
Step 1	Geographic: U.S. and EU (27) , for the period 1999-2008	25,104
Step 2	Specialisation: BHCs, commercial banks, cooperative banks, savings banks	22,585
Step 3	Consolidated accounts: C1 and C2 in Bankscope	3,974
Step 4	Information availability: listing on a stock exchange (listed, unlisted, or delisted)	3,968
Step 5	Information availability: dividends for year t and for year $t-1$	1,193
Step 6	Information availability: other explanatory variables	741
Panel B: Sub-sample of 166 listed banks.		
Step 7	Information availability on Thomson Analytics	187
Step 8	Information availability: dividends for year t and for year $t-1$	184
Step 9	Information availability: other explanatory variables	166

Table 3. Descriptive statistics: 741 U.S. and EU banks, sample period 2000–2007, annual data.

		U.S.	EU	Listed	Unlisted	All
Sample composition	All Banks	435	306	396[a]	352	741
	BHCs	354	29	287	99	383
	Commercial	78	200	89	193	278
	Cooperative	1	44	16	29	45
	Savings	2	33	4	31	35
DP	Obs	2234	679	1705	1208	2913
	Mean	0.415	0.382	0.406	0.408	0.407
	SD	0.810	0.397	0.555	0.932	0.735
	p50	0.339	0.306	0.356	0.268	0.333
	p1	0.000	0.000	0.000	0.000	0.000
	p99	2.323	1.886	1.669	2.564	2.106
LnZ	Obs	2234	679	1705	1208	2913
	Mean	4.328[***]	3.786	4.305[***]	4.056	4.201
	SD	0.934	1.078	0.943	1.050	0.996
	p50	4.323	3.794	4.309	4.121	4.216
	p1	1.675	1.338	1.992	1.329	1.539
	p99	6.596	6.641	6.587	6.627	6.596
Capital Ratio	Obs	2234	679	1705	1208	2913
	Mean	0.098[***]	0.077	0.091[**]	0.095	0.093
	SD	0.039	0.051	0.037	0.050	0.043
	p50	0.091	0.068	0.089	0.086	0.088
	p1	0.054	0.017	0.028	0.022	0.026
	p99	0.262	0.237	0.179	0.315	0.255
SDROA	Obs	2234	679	1705	1208	2913
	Mean	0.003[**]	0.004	0.002[***]	0.004	0.003
	SD	0.007	0.016	0.006	0.014	0.010
	p50	0.001	0.002	0.001	0.002	0.001
	p1	0.000	0.000	0.000	0.000	0.000
	p99	0.022	0.036	0.016	0.028	0.023
Profitability	Obs	2234	679	1705	1208	2913
	Mean	0.014[***]	0.012	0.013[*]	0.014	0.014
	SD	0.012	0.011	0.008	0.015	0.011
	p50	0.013	0.011	0.012	0.012	0.012
	p1	0.002	-0.002	0.003	-0.003	0.001
	p99	0.051	0.047	0.036	0.059	0.051
Close	Obs	2234	679	1705	1208	2913
	Mean	0.016[***]	0.090	0.031	0.036	0.033
	SD	0.124	0.286	0.174	0.185	0.179
	p50	0	0	0	0	0
	p1	0	0	0	0	0
	p99	1	1	1	1	1
High Charter	Obs	2234	679	1705	1208	2913
	Mean	0.623[***]	0.178	0.554[***]	0.469	0.519
	SD	0.485	0.383	0.497	0.499	0.500
	p50	1	0	1	0	1
	p1	0	0	0	0	0
	p99	1	1	1	1	1

All the statistics are shown for banks for which *DP* and the explanatory variables (including the first lag of the payout ratio, *DP*(-1)) are available. Observations for which the payout ratio is negative are dropped. Table 1 reports a detailed description of each variable in the regressions.

[a] Seven banks went public or were delisted during the sample period (three BHCs and four commercial banks). For this reason, they appear as both listed and unlisted, respectively, causing the sum of the banks in the columns Listed and Unlisted to be 748 instead of 741.

The superscripts ***, **, and * indicate the means of the two sub-samples (U.S. and EU, or Listed and Unlisted) are significantly different at the 1%, 5%, and 10% levels, respectively, according to a two-sample t-test with unequal variances.

Table 4. Descriptive statistics: Sub-sample of 166 US and EU listed banks, sample period 2000-2007, annual data.

		U.S.	EU	All
	All Banks	106	60	166
	BHCs	105	13	118
Sample composition	Commercial	1	37	38
	Cooperative	0	7	7
	Savings	0	3	3
	Obs	400	132	532
	Mean	0.027***	0.054	0.034
DY	SD	0.018	0.094	0.051
	p50	0.025	0.031	0.026
	p1	0.000	0.000	0.000
	P99	0.082	0.550	0.190
	Obs	400	132	532
	Mean	0.387***	0.278	0.360
Naïve DD	SD	0.409	0.397	0.408
	p50	0.285	0.120	0.251
	p1	0.000	0.000	0.000
	P99	1.679	1.839	1.690
	Obs	400	132	532
	Mean	0.363***	0.403	0.373
EDF	SD	0.129	0.125	0.129
	p50	0.388	0.452	0.401
	p1	0.047	0.033	0.045
	P99	0.500	0.500	0.500
	Obs	400	132	532
	Mean	0.003***	0.136	0.036
Close	SD	0.050	0.344	0.186
	p50	0.000	0.000	0.000
	p1	0.000	0.000	0.000
	P99	1.000	1.000	1.000
	Obs	400	132	532
	Mean	0.570	0.606	0.579
High Charter	SD	0.496	0.490	0.494
	p50	1	1	1
	p1	0	0	0
	P99	1	1	1

All the statistics are shown for banks for which *DY* and the explanatory variables (including the first lag of the payout ratio, *DY*(-1)) are available. Table 1 reports a detailed description of each variable. The superscripts ***, **, and * indicate the means of the two sub-samples (U.S. and EU) are significantly different at the 1%, 5%, and 10% levels, respectively, according to a two-sample t-test with unequal variances.

Table 5. Regression results for the dividend payout ratio (*DP*): 741 U.S. and EU banks, sample period 2000–2007.

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Whole sample				**BHC and commercial banks**			
DP(-1)	0.304***	0.300***	0.283**	0.276**	0.303***	0.300***	0.277**	0.272**
	(0.109)	(0.111)	(0.122)	(0.125)	(0.1102)	(0.113)	(0.124)	(0.128)
LnZ	-0.081***	-0.084***	-0.134**	-0.142**	-0.084***	-0.084***	-0.152**	-0.156**
	(0.030)	(0.030)	(0.058)	(0.060)	(0.031)	(0.031)	(0.063)	(0.063)
Close		-0.562***		-0.704***		-0.569***		-0.730***
		(0.184)		(0.242)		(0.202)		(0.251)
Close **x** *LnZ*		0.114***		0.151**		0.113**		0.156**
		(0.043)		(0.059)		(0.048)		(0.062)
High Charter			-0.534**	-0.562**			-0.619**	-0.633**
			(0.246)	(0.250)			(0.261)	(0.260)
High Charter **x** *LnZ*			0.116**	0.123**			0.136**	0.139**
			(0.058)	(0.059)			(0.062)	(0.061)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observ.s	2913	2913	2913	2913	2,749	2,749	2,749	2,749
Banks	741	741	741	741	661	661	661	661
Wald χ^2	74.66	93.49	84.31	102.1	78.00	98.17	92.09	109.6
Hansen	14.98	14.70	16.24	15.72	14.42	14.20	15.03	14.57
Hansen p-value	0.243	0.259	0.180	0.204	0.275	0.288	0.240	0.266
Number of instruments	28	30	30	32	28	30	30	32
m1	-1.715	-1.709	-1.665	-1.656	-1.699	-1.695	-1.642	-1.635
m2	0.576	0.545	0.563	0.527	0.533	0.512	0.513	0.484
m1 p-value	0.086	0.088	0.096	0.098	0.0893	0.0901	0.101	0.102
m2 p-value	0.564	0.586	0.573	0.598	0.594	0.609	0.608	0.628

Table 5 reports the results for equation (1), where the dependent variable is the ratio of dividends to net income (*DP*). Standard errors are reported in parentheses. The variable *LnZ* (natural logarithm of the Z-score) is considered to be endogenous. In specifications 2 and 4, *Close* is a dummy variable equal to one if *Tier 1* < 6% or *TCR* < 10%, and zero otherwise. In specifications 3 and 4, *High Charter* is a dummy variable equal to one if the ratio of customer deposits to total assets is larger than the sample median, and zero otherwise. Controls include the variables *Loan Growth*, *Size*, *Earned Equity*, *IPO*, *Listed Bank*, *U.S.*, and year dummies. Table 1 reports a detailed description of each variable in the regressions. Notations m1 and m2 refer to tests for the absence of first- and second-order autocorrelation in the first-differenced residuals, respectively. Under the null hypothesis, m1 and m2 are asymptotically distributed as standard normal variables with mean zero and variance one. The statistic m2 being significantly different from zero is not consistent with the assumption of no serial correlation across disturbances (the assumptions of the GMM-SYS model are invalid). Hansen refers to the test statistic for over-identifying restrictions, distributed asymptotically as χ^2(df) when the null hypothesis of exogeneity of the instruments is satisfied. All GMM-SYS regressions are estimated using a two-step approach and standard errors are adjusted using Windmeijer (2005) small-sample variance correction (Roodman, 2006). The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 6. Regression results for the dividend payout ratio (*DP*) – English Origin and English Origin with only BHC and Commercial banks. Sample period 2000-2007.

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	English Origin (Whole sample)				English Origin (BHC and commercial banks)			
DP(-1)	0.401***	0.403***	0.358***	0.359***	0.397***	0.399***	0.350***	0.351***
	(0.093)	(0.093)	(0.117)	(0.117)	(0.093)	(0.093)	(0.116)	(0.116)
LnZ	-0.098***	-0.098***	-0.194***	-0.193***	-0.099***	-0.100***	-0.199***	-0.197***
	(0.029)	(0.029)	(0.057)	(0.056)	(0.029)	(0.029)	(0.057)	(0.057)
Close		-0.562***		-0.809***		-0.561***		-0.819***
		(0.148)		(0.222)		(0.148)		(0.222)
Close x *LnZ*		0.094***		0.153***		0.094***		0.155***
		(0.032)		(0.050)		(0.032)		(0.050)
High Charter			-0.888***	-0.874***			-0.913***	-0.899***
			(0.254)	(0.249)			(0.256)	(0.251)
High Charter x *LnZ*			0.191***	0.188***			0.196***	0.194***
			(0.058)	(0.057)			(0.058)	(0.057)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observ.s	2,287	2,287	2,287	2,287	2,272	2,272	2,272	2,272
Banks	464	464	464	464	460	460	460	460
Wald χ^2	104.8	257.2	109.0	246.4	104.9	252.9	108.3	245.3
Hansen	9.283	9.409	9.162	9.205	9.000	9.122	8.766	8.806
Hansen p-value	0.679	0.668	0.689	0.685	0.703	0.692	0.723	0.719
Number of instruments	28	30	30	32	28	30	30	32
m1	-1.872	-1.875	-1.808	-1.813	-1.867	-1.870	-1.799	-1.804
m2	0.998	1.006	1.075	1.084	0.988	0.997	1.056	1.067
m1 p-value	0.061	0.061	0.071	0.070	0.062	0.061	0.072	0.071
m2 p-value	0.318	0.314	0.282	0.278	0.323	0.319	0.291	0.286

Table 6 reports the results for equation (1), where the dependent variable is the ratio of dividends to net income (*DP*). Standard errors are reported in parentheses. The variable *LnZ* (natural logarithm of the Z-score) is considered to be endogenous. In specifications 2 and 4, *Close* is a dummy variable equal to one if *Tier 1* < 6% or *TCR* < 10%, and zero otherwise. In specifications 3 and 4, *High Charter* is a dummy variable equal to one if the ratio of customer deposits to total assets is larger than the sample median, and zero otherwise. Controls include the variables *Loan Growth*, *Size*, *Earned Equity*, *IPO*, *Listed Bank*, *U.S.*, and year dummies. Table 1 reports a detailed description of each variable in the regressions. Notations m1 and m2 refer to tests for the absence of first- and second-order autocorrelation in the first-differenced residuals, respectively. Under the null hypothesis, m1 and m2 are asymptotically distributed as standard normal variables with mean zero and variance one. The statistic m2 being significantly different from zero is not consistent with the assumption of no serial correlation across disturbances (the assumptions of the GMM-SYS model are invalid). Hansen refers to the test statistic for over-identifying restrictions, distributed asymptotically as χ^2(df) when the null hypothesis of exogeneity of the instruments is satisfied. All GMM-SYS regressions are estimated using a two-step approach and standard errors are adjusted using Windmeijer (2005) small-sample variance correction (Roodman, 2006). The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 7. Regression results for the dividend payout ratio (*DP*) – Effects of PCA: 741 U.S. and EU banks, sample period 2000–2007.

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Whole sample				BHC and commercial banks			
DP(-1)	0.311***	0.303***	0.290**	0.280**	0.309***	0.303***	0.285**	0.276**
	(0.109)	(0.110)	(0.121)	(0.124)	(0.110)	(0.112)	(0.124)	(0.126)
LnZ	-0.081***	-0.083***	-0.133**	-0.140**	-0.083***	-0.084***	-0.152**	-0.156**
	(0.030)	(0.030)	(0.058)	(0.059)	(0.031)	(0.031)	(0.063)	(0.063)
Close		-0.529***		-0.666***		-0.564***		-0.723***
		(0.188)		(0.237)		(0.209)		(0.248)
Close x *LnZ*		0.124***		0.160***		0.132***		0.177***
		(0.043)		(0.058)		(0.049)		(0.063)
High Charter			-0.524**	-0.551**			-0.609**	-0.625**
			(0.243)	(0.249)			(0.259)	(0.260)
High Charter x *LnZ*			0.114**	0.121**			0.134**	0.138**
			(0.058)	(0.059)			(0.062)	(0.062)
PCA	-0.207***	-0.186***	-0.205***	-0.196***	-0.204***	-0.183**	-0.202***	-0.203***
	(0.044)	(0.066)	(0.053)	(0.069)	(0.044)	(0.074)	(0.054)	(0.077)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observ.s	2913	2913	2913	2913	2,749	2,749	2,749	2,749
Banks	741	741	741	741	661	661	661	661
Wald χ^2	141.4	147.9	127.7	159.5	146.0	140.6	132.7	161.2
Hansen	15.14	15.02	16.39	16.04	14.60	14.52	15.12	14.85
Hansen p-value	0.234	0.240	0.174	0.189	0.264	0.269	0.235	0.250
Number of instruments	29	31	31	33	29	31	31	33
m1	-1.725	-1.717	-1.679	-1.668	-1.710	-1.702	-1.657	-1.646
m2	0.620	0.571	0.616	0.561	0.577	0.533	0.567	0.512
m1 p-value	0.084	0.086	0.093	0.095	0.087	0.089	0.098	0.100
m2 p-value	0.535	0.568	0.538	0.574	0.564	0.594	0.571	0.609

Table 7 reports the results for equation (1), where the dependent variable is the ratio of dividends to net income (*DP*). Standard errors are reported in parentheses. The variable *LnZ* (natural logarithm of the Z-score) is considered to be endogenous. In specifications 2 and 4, *Close* is a dummy variable equal to one if *Tier 1* < 6% or *TCR* < 10%, and zero otherwise. In specifications 3 and 4, *High Charter* is a dummy variable equal to one if the ratio of customer deposits to total assets is larger than the sample median, and zero otherwise. *PCA* is a dummy equal to one if *Close*=1 and *U.S.*=1, and zero otherwise. Controls include the variables *Loan Growth*, *Size*, *Earned Equity*, *IPO*, *Listed Bank*, *U.S.*, and year dummies. Table 1 reports a detailed description of each variable in the regressions. Notations m1 and m2 refer to tests for the absence of first- and second-order autocorrelation in the first-differenced residuals, respectively. Under the null hypothesis, m1 and m2 are asymptotically distributed as standard normal variables with mean zero and variance one. The statistic m2 being significantly different from zero is not consistent with the assumption of no serial correlation across disturbances (the assumptions of the GMM-SYS model are invalid). Hansen refers to the test statistic for over-identifying restrictions, distributed asymptotically as χ^2(df) when the null hypothesis of exogeneity of the instruments is satisfied. All GMM-SYS regressions are estimated using a two-step approach and standard errors are adjusted using Windmeijer (2005) small-sample variance correction (Roodman, 2006). The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 8. Regression results for the dividends to market value of equity ratio (*DY*) using BS (2008) 'naïve' distance to default measure: 166 listed banks, sample period 2000–2007.

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Whole sample				**BHC and commercial banks**			
DY(-1)	0.445***	0.438***	0.332***	0.333***	0.512**	0.506**	0.422**	0.423**
	(0.140)	(0.139)	(0.116)	(0.117)	(0.210)	(0.211)	(0.185)	(0.185)
Naïve DD	-0.008***	-0.008**	-0.047***	-0.045***	-0.008***	-0.008***	-0.033***	-0.033***
	(0.003)	(0.003)	(0.014)	(0.014)	(0.002)	(0.002)	(0.011)	(0.011)
Close		-0.006		-0.005		-0.008		-0.005
		(0.006)		(0.006)		(0.006)		(0.006)
Close x *Naïve DD*		0.007		0.004		0.007		0.002
		(0.017)		(0.024)		(0.027)		(0.031)
High Charter			-0.017***	-0.016***			-0.013***	-0.013***
			(0.005)	(0.003)			(0.003)	(0.003)
High Charter x *Naïve DD*			0.046***	0.045***			0.033***	0.033***
			(0.015)	(0.015)			(0.011)	(0.011)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observ.s	532	532	532	532	511	511	511	511
Banks	166	166	166	166	156	156	156	156
Wald χ^2	121.8	119.2	148.5	144.4	145.2	144.6	193.7	194.3
Hansen	8.114	7.686	7.492	7.086	7.820	7.747	6.409	6.409
Hansen p-value	0.618	0.659	0.678	0.717	0.646	0.653	0.780	0.780
Number of instruments	22	24	24	26	22	24	24	26
m1	-1.087	-1.093	-1.357	-1.342	-1.203	-1.203	-1.374	-1.372
m2	-1.068	-1.065	-0.727	-0.742	-0.233	-0.219	0.308	0.307
m1 p-value	0.277	0.274	0.175	0.180	0.229	0.229	0.169	0.170
m2 p-value	0.286	0.287	0.467	0.458	0.816	0.827	0.758	0.759

Table 8 reports the results for equation (1), where the dependent variable is the ratio of dividends to market value of equity (*DY*). Standard errors are reported in parentheses. The variable *Naïve DD* is considered to be endogenous. In specifications 2 and 4, *Close* is a dummy variable equal to one if *Tier 1* < 6% or *TCR* < 10%, and zero otherwise. In specifications 3 and 4, *High Charter* is a dummy variable equal to one if the market-to-book ratio is larger than the sample median, and zero otherwise. Notations m1 and m2 refer to tests for the absence of first- and second-order autocorrelation in the first-differenced residuals, respectively. Under the null hypothesis, m1 and m2 are asymptotically distributed as standard normal variables with mean zero and variance one. The statistic m2 being significantly different from zero is not consistent with the assumption of no serial correlation across disturbances (the assumptions of the GMM-SYS model are invalid). Hansen refers to the test statistic for over-identifying restrictions, distributed asymptotically as χ^2(df) when the null hypothesis of exogeneity of the instruments is satisfied. All GMM-SYS regressions are estimated using a two-step approach and standard errors are adjusted using Windmeijer (2005) small-sample variance correction (Roodman, 2006). The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 9. Regression results for the total payout ratio (*TP*) using BS (2008) 'naïve' distance to default measure: 166 listed banks, sample period 2000–2007.

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Whole sample				**BHC and commercial banks**			
TP(-1)	0.567***	0.585***	0.556***	0.572***	0.543***	0.556***	0.534***	0.544***
	(0.089)	(0.092)	(0.086)	(0.089)	(0.092)	(0.094)	(0.088)	(0.089)
Naïve DD	-0.008***	-0.008***	-0.032***	-0.031***	-0.008***	-0.008***	-0.034***	-0.034***
	(0.002)	(0.002)	(0.011)	(0.011)	(0.002)	(0.002)	(0.010)	(0.011)
Close		-0.007*		-0.006		-0.008		-0.006
		(0.004)		(0.004)		(0.005)		(0.005)
Close x *Naïve DD*		0.004		0.002		0.004		0.004
		(0.017)		(0.019)		(0.024)		(0.026)
High Charter			-0.011***	-0.010***			-0.011***	-0.011***
			(0.003)	(0.003)			(0.003)	(0.003)
High Charter x *Naïve DD*			0.030***	0.029***			0.033***	0.032***
			(0.010)	(0.011)			(0.010)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observ.s	532	532	532	532	511	511	511	511
Banks	166	166	166	166	156	156	156	156
Wald χ²	326.2	324.6	486.1	475.9	342.8	335.0	469.9	466.2
Hansen	4.720	5.124	4.188	4.771	5.018	5.173	3.655	3.925
Hansen p-value	0.944	0.925	0.964	0.942	0.930	0.922	0.979	0.972
Number of instruments	22	24	24	26	22	24	24	26
m1	-3.168	-3.138	-3.555	-3.521	-3.158	-3.145	-3.581	-3.564
m2	0.165	0.192	0.423	0.436	0.123	0.152	0.583	0.588
m1 p-value	0.002	0.002	0.000	0.000	0.002	0.002	0.000	0.000
m2 p-value	0.869	0.848	0.672	0.663	0.902	0.880	0.560	0.556

Table 9 reports the results for equation (1), where the dependent variable is the total payout ratio (*TP*): Dividends plus share repurchases divided by the market value of equity. Standard errors are reported in parentheses. The variable *Naïve DD* is considered to be endogenous. In specifications 2 and 4, *Close* is a dummy variable equal to one if *Tier 1* < 6% or *TCR* < 10%, and zero otherwise. In specifications 3 and 4, *High Charter* is a dummy variable equal to one if the market-to-book ratio is larger than the sample median, and zero otherwise. Notations m1 and m2 refer to tests for the absence of first- and second-order autocorrelation in the first-differenced residuals, respectively. Under the null hypothesis, m1 and m2 are asymptotically distributed as standard normal variables with mean zero and variance one. The statistic m2 being significantly different from zero is not consistent with the assumption of no serial correlation across disturbances (the assumptions of the GMM-SYS model are invalid). Hansen refers to the test statistic for over-identifying restrictions, distributed asymptotically as χ²(df) when the null hypothesis of exogeneity of the instruments is satisfied. All GMM-SYS regressions are estimated using a two-step approach and standard errors are adjusted using Windmeijer (2005) small-sample variance correction (Roodman, 2006). The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.