

# Property Rights Institutions and Bank Performance

## Across Countries

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### **Structured Abstract:**

**Purpose** – This paper investigates the relationship between the quality of property rights institutions (PRIs) and bank financial performance in an empirical study of 136 countries over the period 1999 to 2006.

**Design/methodology/approach** – The quality of property rights institutions (PRIs) and financial accounting based measures of bank performance are obtained from the Economic Freedom of the World Project (Gwartney *et al.*, 2006), the Polity IV Project, the World Bank data indicators database and the International Monetary Fund. Several multiple regression analyses are conducted to test the study hypotheses.

**Findings** – Our results reveal that the quality of legal structure and security of property rights institutions positively (negatively) affects both bank cost efficiency (inefficiency) and profitability. The presence of a quality political structure negatively (positively) affects bank cost efficiency (inefficiency). The quality of political structure has no direct impact on bank profitability. The impact of PRIs on bank cost efficiency is more evident in the upper middle and high income group of countries than in the low and lower middle income group of countries. An appropriate level of PRI quality is essential to achieve both competition and development.

**Practical implications** – The paper highlights policy implications for international policy makers, regulators and the management of banks who are interested in banking sector development across countries.

**Originality/value** – The study investigates the fundamental importance of PRI quality in its effect on the banking sector and extends the largely US-focused literature to a broader international setting.

**Keywords** Property rights institutions, Banking industry, Banking, Cost efficiency, Profitability

**Paper type** Research paper

## **Introduction**

The banking industry plays a central role in the international allocation of financial resources and economic growth (Rajan and Zingales, 1998). Previous studies highlight the influence of the quality of property rights institutions such as the legal structure and the extent of investor protection, the degree of market development, access to external finance (La Porta *et al.*, 1997, 1998), financial transparency (Bushman *et al.*, 2004) and firm valuation (La Porta *et al.*, 2002). More recently, Gwartney *et al.* (2006) find that countries with quality PRIs enjoy faster economic growth through their enhanced ability to attract private investment. These studies are built largely on the institutional theories which highlight the importance of quality institutions in financial and economic development (North, 1981).

A number of authors assess the impact of bank specific characteristics and macroeconomic indicators on firm performance, though the evidence on the strength and direction of the relationships concerned is somewhat mixed (Berger and Humphery, 1997; Ben Naceur and Omran, 2011; Olson and Zoubi, 2011). Other empirical studies focus on the influence of some form of PRI quality on access to external capital (Rajan and Zingales, 1998), firm valuation and earnings quality (La Porta *et al.*, 2002a; Leuz *et al.*, 2003), firm growth (Beck *et al.*, 2005), operating cost savings (Ben Naceur and Omran, 2011), and firm profitability (Verriest *et al.*, 2008). However, there is a paucity of previous empirical studies dealing with the impact of institutions on the banking industry (Sufian and Habibulah, 2010). Furthermore, the use of composite indices to represent governance indicators in these studies makes it difficult to isolate the impact of individual institutions on bank performance and to compare their relative importance.

The purpose of this paper is thus to investigate the impact of PRI quality on bank performance across 136 countries, whilst controlling for country and financial market conditions. Our

empirical results indicate that the quality of the legal structure exerts a significant positive impact on bank efficiency and profitability whereas the quality of the political structure negatively affects bank cost efficiency. The quality of the political structure exerts no direct impact on bank profitability. Further, the upper middle and high income group of countries exhibit a more significant impact of PRIs on bank cost efficiency than the low and lower middle income group of countries. This paper contributes to the literature in four respects. First, it investigates the impact of PRI quality on the banking sector, which itself is of fundamental importance to the international economy. Second, it extends the largely US-focused literature to a broader international setting, and should therefore prove useful to international policy makers and regulators who are interested in banking sector development. Third, it investigates the relative importance of several types of institutional quality measure on bank performance. Fourth, it highlights policy implications for the management of banks across countries. In the remainder of the paper, we first provide a review of the relevant theoretical and empirical literature, and go on to develop the hypotheses. The data and methodology are then discussed, followed by an analysis of the empirical results. Finally, the conclusions and recommendations for future research are presented.

## **Literature Review**

### *Theoretical studies*

This study utilizes the contract and the predatory theories of rule which explain how a government can improve economic performance in a particular country (North, 1981). The contract theory focuses on the design of contractual agreements between agents in an asymmetric information environment. There are two types of rule under contract law: ‘default rules’ which

can be modified with the agreement of the parties, and ‘mandatory rules’ which cannot be overridden. In contrast, the predatory theory of rule assumes that: ‘rulers maximize wealth to the state and combine transaction cost and structural analysis to elucidate organizational differences’ (Levi, 2000, p. 829). According to North, then, the contract theory provides a platform for a government to provide an effective legal system that facilitates business transactions, whilst predatory theory encourages more government intervention to allocate resources among members of a society. However, some scholars such as Djankov *et al.* (2002) refute such theories on the basis that government intervention creates private benefits for some interest groups, though on aggregate can reduce social welfare. In this context, there are two competing views of financial development in the economic literature: the public interest view and the political economy view. The public interest view argues that there is a positive relationship between the presence of quality institutions and bank efficiency, that is, high quality institutions increase market competition and hence cost efficiency, whereas weak institutions negatively affect bank efficiency through bank restrictions. In contrast, the political economy view claims that quality institutions exert a negative impact on bank efficiency as weak institutions increase bank cost efficiency through private benefits to control shareholders and/or industry incumbents.

### *Empirical studies*

#### *The quality of the legal structure and bank performance*

Previous studies highlight the relationship between legal structure and the extent of investor protection, the efficiency of the legislative process, social institutional design, the control of business activities, and financial transparency (La Porta *et al.*, 1997; Djankov *et al.*, 2002; Bushman *et al.*, 2004). It is commonly held that common law countries provide more investor

protection than civil law countries (La Porta *et al.*, 1997) due to the respect for individual rights in the English common law system (Bushman *et al.*, 2004), and judges' freedom to deal with a changing business environment (De-Jong and Semenov, 2006). In contrast, stable civil law depends on stable legal codes and statutes that need protracted legislative processes to modify.

Furthermore, previous studies show that countries with different legal structures tend towards different modes of social institutional design and control of business activities (Djankov *et al.*, 2002). For example, Doupanik and Salter (1995) find that common law countries usually adopt microeconomic systems that focus on the survival of individual companies. They typically favour a shareholder-orientated corporate governance model which encourages financial disclosure to satisfy the needs of several stakeholders (Ball *et al.*, 2000). Conversely, civil law countries usually apply macroeconomic systems which focus on the national economy to serve the public interest (Nobes, 1987), depending on codified regulations and government intervention in the economy.

Therefore, in this study we seek to test hypothesis  $H_1$  as follows:

*H<sub>1</sub>: There is a positive relationship between the quality of the legal structure and (1) bank cost efficiency and (2) bank profitability across countries.*

#### *The quality of the political structure and bank cost efficiency*

The quality of the political structure is considered an important driver of financial and economic performance (Alesina *et al.*, 1996; Roe, 2003; Pagano and Volpin, 2000). For example, Alesina *et al.* (1996) find a positive relationship between political stability and economic growth, whilst Roe (2003) argues that the ideology of US politicians guides the legal system to introduce rules that prevent both the concentration of ownership and insider dealing. Consistent with Roe,

Pagano and Volpin (2000) argue that public policy and regulation are determined by the political interplay of economic constituencies, though claim that the political decisions underpinning new legal codes are based on economic rather than ideological principles, and thus the state is regarded as an agent of political forces rather than as an independent player. The authors view state intervention as resulting from political agreement rather than acting as its cause.

Some studies provide evidence on the benefits of quality property rights institutions. For example Demircuc-Kunt *et al.* (2004) investigate the relationship between bank regulation, market structure and institutions, and bank performance across countries. They find a significant positive relationship between the quality of institutions and bank efficiency. However, the use of a set of aggregate governance indicators to proxy for the quality of institutions makes it difficult to identify the individual impact of each institutional variable. Djankov *et al.* (2002) find that countries which enjoy more political freedom have less entry regulation, even after controlling for per capita income. They show that more entry regulation across countries usually benefits specific interest groups rather than increasing social welfare. More recently, Ben Naceur and Omran (2011) find that banks benefit from lower operating costs and enhanced profit opportunities in a well-developed banking and stock market environment.

Berger and Humphrey (1997) survey 120 academic studies of financial institutions across 21 countries, arguing that deregulation policies should raise efficiency given sufficient competition, thereby benefitting the whole of society. However, such policies may not always lead to efficiency improvement due to prior industry conditions across countries. First, government interventions in the banking system which may introduce political patronage can fail to provide a useful intermediation role and hence worsen the prospects for competitive market development (La Porta *et al.*, 1997).

The second reason why deregulation may not always lead to efficiency improvement is the issue of bank concentration (Athanasoglou *et al.*, 2008), as explored by the market power or efficiency structure hypotheses. The market power hypothesis states that banks in highly concentrated markets can set unfavourable prices for customers due to competitive imperfections or the existence of well-differentiated products (Berger, 1995). Berger also explains the efficiency structure hypothesis which states that firms with superior management/production technologies or more efficient production scales enjoy lower unit costs and higher unit profits which may earn them a high market share. Existing studies show that, excepting the US, the banking industry in most countries tends to be characterized by high market concentration. Accordingly, some managers may insist on maximising their own rents rather than maximising shareholder value. Even where the intention of management is to achieve greater cost efficiency, further development of a competitive market may induce banks to pay higher deposit interest rates without an equivalent decrease in bank services or an increase in deposit fees (Humphrey and Pulley, 1997). Thus, the development of quality political structures may lead to increasing operating costs which become difficult to control. Therefore, in this study we seek to test hypothesis  $H_2$  as follows:

*H<sub>2</sub>: There is a negative (positive) relationship between the quality of the political structure and bank cost efficiency (inefficiency) across countries.*

#### *The quality of the political structure and bank profitability*

There are several studies which examine the determinants of bank profitability in relation to bank specific characteristics and/or institutional factors across countries (Molyneux and Thornton,

1992; Pasiouras and Kosmidou, 2007; Athanasoglou *et al.*, 2008; Verriest *et al.*, 2008; Ben Naceur and Omran, 2011).

Molyneux and Thornton (1992) examine the determinants of bank performance across 18 European countries between 1986 and 1989 and find a significant positive relationship between the return on equity and the level of interest rates, bank concentration and the degree of government ownership, consistent with other studies for the US. Pasiouras and Kosmidou (2007) find in a study of 15 European countries over the period 1995–2001 that the profitability of both domestic and foreign banks is affected not only by bank specific characteristics but also by financial market structure and macroeconomic conditions.

More recently, authors argue that a better quality institutional environment of higher competition, lower corruption, and lower entry barriers, impacts negatively upon profit margins. For example, Verriest *et al.* (2008) measure PRI quality by means of composite indices for the quality of a country's entry regulations, level of economic freedom, governance quality, innovativeness and legal quality, and find a negative relationship between PRI quality and firm profitability in a sample of manufacturing companies located in 56 countries over the period 1999 to 2006. Sufian and Habibulah (2010) find that overall economic freedom exerts a positive impact on bank profitability in the Malaysian banking sector over the period of 1999-2007. The authors argue that a lower quality political structure may encourage firms to set higher prices and to influence politicians in order to gain private benefits (such as high entry barriers). Alternatively, there may be a trade-off between bank revenue extraction and the cost of capital, that is, lower levels of property rights may increase the revenue of individual banks but at the same time increase their cost of capital thereby reflecting negatively on the return on assets. Therefore, in this study we seek to test hypothesis  $H_3$  as follows:



*H<sub>3</sub>: There is a negative relationship between the quality of the political structure and bank profitability across countries.*

## **Data and methodology**

### *Scope of the study*

In this paper we study a sample of 136 countries drawn from four different income groups across the world. The data on bank performance are collected from the World Bank (Beck *et al.*, 2009), the International Monetary Fund (IMF) and the Bank Regulation and Supervision Survey produced by the World Bank for three years: 1999, 2002, and 2006. Data on legal structure and the security of property rights institutions are collected from the Economic Freedom of the World Project (Gwartney *et al.*, 2006). All data collected are country-level data. The sample years are all situated before the international financial crisis of 2007-2008, and thus are relatively free from any distorting effects of that crisis on international banks. We estimate some multiple regression panel models with fixed effects to test the study hypotheses for the whole sample. Furthermore, the sample is divided into two subgroups to test whether the results hold for different country income groups. All study variables are summarized and presented in Table 1. The macroeconomic variables are obtained from the World Bank data indicators database. Certain of the variables such as GDP per capita and inflation are expressed in natural logarithm form in order to enhance the goodness of fit of our models (Sufian and Habibullah, 2010). The model control variables in this paper are selected and tested based on maximizing the log likelihood function (Olson and Zoubi, 2011). Data interpolation is used to derive the return on assets and Economic Freedom of the World (EFW) indices to maintain a uniform number of

observations throughout the analysis. However, the analysis was repeated without data interpolation and the results were found to be qualitatively the same.

**[Insert Table 1 here]**

#### *The country PRI quality variables*

Previous studies use different proxy variables for legal quality such as dummy variables for common and civil law systems (Bushman *et al.*, 2004), the extent of rights of outside investors, and the degree to which citizens are able to use the legal system to solve conflicts (Beck *et al.*, 2004). In this study we use a more comprehensive set of legal structure and security of property rights variables obtained from the Economic Freedom of the World Project (Gwartney *et al.*, 2006). The variables measure the extent of government protection of persons and their rightfully acquired property. The quality of PRIs for the countries in this study is gauged by the Centre for Systematic Peace (Colorado State University) combined polity score (*POLITY2*) which is computed by subtracting the institutionalised autocracy (*AUTOC*) score from the institutionalised democracy (*DEMOC*) score. The *POLITY2* variable is a widely employed measure of PRI quality in a country as it encompasses several political variables in a single score and is computed in such a way that facilitates inter-temporal analysis across countries.

#### *Bank performance variables*

Bank performance is gauged by means of two accounting variables commonly employed in previous empirical studies: the return on assets and the cost-income ratio. Data on these variables are obtained from the World Bank data indicators database. Return on assets (*ROA*), a widely employed profitability ratio, is measured as average net income to total assets, and reflects the ability of management to utilise bank financial and real investment resources to generate profits,

thereby encompassing both management decisions and policy objectives (Sufian and Habibullah, 2010; and Olson and Zoubi, 2011). The cost-income ratio (*COSTINC*), measured as total overheads or costs of running the bank (the major element of which is normally salaries) to gross income generated before provisions, is essentially a measure of bank cost efficiency, or more precisely, cost inefficiency, as the higher this measure the lower the degree to which costs are under control in relation to income.

#### *Other bank-specific variables*

Previous empirical studies may be criticised for a lack of consistency in the selection of bank and industry specific characteristics (Athanasoglou *et al.*, 2008). To address this issue, we select several bank-specific control variables on the basis of maximizing the log likelihood function from a likelihood ratio test (consistent with the approach of Olson and Zoubi, 2011). First, net interest margin (*INTM*) is computed as the accounting value of a bank's net interest revenue as a proportion of its interest-bearing assets. Second, overhead cost (*OVHD*) is measured as total overhead costs divided by total assets. Third, whilst bank size can be measured in a number of different ways, we choose to measure it as deposit money bank assets scaled by gross domestic production (*DMBA*). Fourth, bank market capitalization (*MCAP*) is represented as the natural logarithm of a bank's share price multiplied by the number of shares outstanding. Fifth, bank concentration (*BCONC*) shows the assets of the three largest banks as a share of the assets of all commercial banks in a given country. Sixth, government ownership (*GOV*) is measured as the fraction of a banking system's assets that are 50% or greater government owned. Other potential control variables such as liquidity, non-performing loans, the interest spread, risk portfolio, private credit, and activity (Beck *et al.*, 2005, Athanasoglou *et al.*, 2008, Lensink *et al.*, 2008) are

found either to be insignificant or to evidence weaker significance than those control variables selected, and hence are excluded from the analysis. It might be argued in any case that the excluded variables are already proxied by the other explanatory variables included (Berger and Humphrey, 1997).

### *Macroeconomic variables*

The macroeconomic variables selected in this paper are GDP per capita, the GDP growth rate, the real interest rate, and inflation, with all variables sourced from the International Monetary Fund (World Economic Outlook database). The GDP per capita (*GDP/CAP*) variable is included to gauge the size of the economy, whilst the GDP growth rate (*GDPG*) proxies for general economic development across sample countries. The real interest rate (*RIR*) represents the lending interest rate adjusted for inflation as measured by the GDP deflator. The inflation variable is measured as the natural logarithm of average consumer index values (whereby the year 2000 base value equals 100 across countries), and is included on the basis that banks typically generate greater profits in inflationary environments (Demirguc-Kunt *et al.*, 2004).

### *The models*

We estimate four sets of models in our study. The first set of models examines the relationship between bank cost inefficiency and PRI quality. The general model specification is given in Equation 1. We estimate eight different model specifications to avoid potential multicollinearity between model variables.

$$\begin{aligned}
 \ln(CSTNC)_{it} = & \alpha + \beta_1 \ln(OVHD)_{it} + \beta_2 \ln(INTM)_{it} + \beta_3 \ln(DMBA)_{it} + \beta_4 \ln(MCAP)_{it} \\
 & + \beta_5 (BCONC)_{it} + \beta_6 (GOV)_{it} + \beta_7 \ln(GDP/CAP)_{it} + \beta_8 \ln(INF)_{it} \\
 & + \beta_9 (GDPG)_{it} + \beta_{10} (RIR)_{it} + \beta_{11} (LS)_{it} + \beta_{12} (POLITY2)_{it} + \beta_{13} (SG)_{it} + \\
 & + \beta_{14} (SM)_{it} + \beta_{15} (FT)_{it} + \beta_{16} (REG)_{it} + \beta_{17} (SI)_{it} + \varepsilon_{it}
 \end{aligned} \tag{1}$$

Where:  $\ln CSTNC$  = Natural logarithm of the cost-income ratio;  $\ln OVHD$  = Natural logarithm of overhead costs/total assets;  $\ln INTM$  = Natural logarithm of the net interest margin;  $\ln DMBA$  = Natural logarithm of deposit money bank assets/GDP;  $\ln MCAP$  = Natural logarithm of market capitalization;  $BCONC$  = Bank concentration;  $GOV$  = Government ownership of banks;  $\ln GDP/CAP$  = Natural logarithm of gross domestic product per capita;  $\ln INF$  = Natural logarithm of consumer price index;  $GDPG$  = Gross domestic product growth rate;  $RIR$  = Real interest rate;  $LS$  = Legal structure,  $POLITY2$  = Property rights institutions quality score;  $SG$  = Size of government;  $SM$  = Sound money;  $FT$  = Free trade;  $REG$  = Regulations; and  $SI$  = Summary index of size of government, legal system, sound money, freedom to trade and regulation indices.

The second set of models also examines the relationship between bank cost inefficiency and PRI quality, though this time by country income level, employing the same model specification given in Equation 1. The model specifications relate to low income, lower middle income, upper middle income, and high income groups of countries, respectively.

The third set of models estimated examines the relationship between bank profitability and PRI quality. The general model specification is given in Equation 2 and we estimate eight different model specifications to avoid potential multicollinearity between the model variables.

$$\begin{aligned}
 \ln(ROA)_{it} = & \alpha + \beta_1 \ln(OVHD)_{it} + \beta_2 \ln(INTM)_{it} + \beta_3 \ln(DMBA)_{it} + \beta_4 \ln(MCAP)_{it} \\
 & + \beta_5 (BCONC)_{it} + \beta_6 (GOV)_{it} + \beta_7 \ln(GDP/CAP)_{it} + \beta_8 \ln(INF)_{it} \\
 & + \beta_9 (GDPG)_{it} + \beta_{10} (RIR)_{it} + \beta_{11} \ln(CSTNC)_{it} + \beta_{12} (LS)_{it} + \beta_{13} (POLITY2)_{it} \\
 & + \beta_{14} (SG)_{it} + \beta_{15} (SM)_{it} + \beta_{16} (FT)_{it} \\
 & + \beta_{17} (REG)_{it} + \beta_{18} (SI)_{it} + \varepsilon_{it}
 \end{aligned} \tag{2}$$

Where the variable definitions are as above, with the addition of  $\ln ROA$  defined as the natural logarithm of the return on assets.

The fourth set of models estimated examines the relationship between bank profitability and PRI quality, though this time by country income level, with the general specification as given in Equation 2.

## Results and discussion

### *Descriptive statistics and correlation matrix of the model variables*

Table 2 presents descriptive statistics for the model variables of this paper. In our study, the quality of the legal structure and the security of property rights index (*LS*) variable is scaled from 0 to 10, where 10 represents high government protection. We observe a tendency towards a developed legal structure with a mean value of 5.63 across countries. The quality of the political structure variable (*POLITY2*) covers the entire range from -10 to +10 across countries, and it has a mean of less than 4, hence there is a tendency towards institutionalised democracy, though this is far from universal across countries. In terms of bank performance, omitting the natural logarithm prefix, banks tend to exhibit a high cost-income ratio (*COSTINC*) of almost 67%, with a low return on assets (*ROA*) of 1% (not shown in Table 2 for reasons of brevity). However, for both measures, the standard deviation is high across the sample countries, implying a very wide distribution for each variable.

**[Insert Table 2 here]**

Before modelling bank cost efficiency and profitability, it is important to examine correlations between the key model variables. The correlation matrix presented in Table 3 reveals some significant relationships across the variables. For example, bank cost inefficiency (*CSTNC*) is significantly negatively correlated with the quality of the legal structure (*LS*), returns on assets (*ROA*), overhead costs (*OVHD*), and net interest margin (*INTM*), and has a significant positive relationship with the quality of the political structure (*POLITY2*) in our sample. The return on assets variable is significantly positively correlated with net interest margin and significantly negatively correlated with bank size (*DMBA*) and the quality of legal and political structures. Importantly, PRI quality exhibits a significant correlation with several of the control variables,

and thus we need to address the potential issue of multicollinearity in the statistical analysis and modelling.

**[Insert Table 3 here]**

*An analysis of variance of the study variables*

A one way analysis of variance of bank performance characteristics and external institutional environment factors across banks in different income groups is reported in Table 4.

**[Insert Table 4 here]**

The internal bank performance characteristics and external institutional environment factors differ significantly across income groups, with the exception of our cost inefficiency measure. Similarly, other bank-specific variables differ significantly across income groups (not shown in Table 4 for reasons of brevity). The results show that the variance within groups is much greater than the variance between groups for all bank performance characteristics and institutional variables across the four income groups at the 5% level, with the exception of bank cost inefficiency (the cost to income ratio), thereby confirming the need to incorporate country income grouping into our modelling strategy.

*The impact of PRI quality on cost efficiency*

Table 5 reports eight different specifications of a model of bank cost inefficiency against PRI quality and the firm-level and macroeconomic control variables. Model 1 contains the control variables alone and reveals that banks with higher overhead costs and lower interest margins tend to suffer from significantly higher cost inefficiency, consistent with the predictions of Olson and Zoubi (2011). The model captures a significant proportion of the variation in cost inefficiency, with an  $F$ -statistic significant at the 1% level, and an adjusted  $R^2$  of 0.39.

**[Insert Table 5 here]**

In model 2, we add the quality of the legal structure variable and find that it is a significant negative driver of cost inefficiency at the 5% level. Thus, as expected, the presence of quality PRIs significantly increases the cost efficiency of banks. The model produces an  $F$ -statistic significant at the 1% level, and an adjusted  $R^2$  of 0.38.

In models 3 to 8 we include the quality of the political structure and other Economic Freedom of the World (EFW) indices to investigate the relative importance of other institutions to bank efficiency, in turn, and find that the quality of the legal structure maintains its significance, with a negative impact, consistent with existing study predictions. Interestingly, adding the quality of the political structure decreases bank efficiency in model 3, while more freedom of trade reduces bank efficiency in model 6. The sound money, regulation and EFW summary index variables show no impact on bank efficiency in models 5, 7 and 8. In terms of model diagnostics, the maximum/minimum Value Inflation Factors (VIF) for the models are all below the benchmark of 5 degrees, indicating an absence of significant multicollinearity (Studenmund, 2006), and the Goldfeld–Quandt (1965) test statistic is insignificant. On the basis of the estimated models of bank cost efficiency, then, hypothesis  $H_1$  is not rejected as efficiency (inefficiency) is positively (negatively) related to the quality of legal structures. Similarly, hypothesis  $H_2$  is not rejected as efficiency (inefficiency) is negatively (positively) related to the quality of political structures. The presence of better quality political structures would appear to lead to greater industry competition, lower entry barriers, and ultimately increased costs for banks as they strive to be more competitive and retain/grow their market shares.



### *The impact of PRI quality on bank profitability*

We next analyse the drivers of bank profitability (defined here as the return on assets), focusing in particular on PRI quality. Model 1 in Table 6 shows that the cost to income ratio is a significant negative determinant of bank profitability at the 1% level, consistent with Athanasoglou *et al.* (2008), and Olson and Zoubi (2011). Overhead costs are a significant positive determinant, perhaps due to an interaction with the cost to income ratio, while government ownership exhibits a significant negative relationship with bank profitability, as expected, though only at the 10% level. Thus, more profitable banks tend to be more cost efficient and lend more in relation to their ownership structure than less profitable banks. All of the models exhibit a significant  $F$ -statistic at the 1% level.

**[Insert Table 6 here]**

Model 1 has an adjusted  $R^2$  of 0.34. We add the quality of the legal structure in model 2 and observe a significant positive impact on profitability across the models. Interestingly, the quality of the political structure has no impact in model 3 while the sound money variable in model 5 exerts a significant negative impact on bank profitability at the 5% level.

The VIF test for all models confirms the absence of significant multicollinearity and the Goldfeld-Quandt test statistic shows no sign of significant heteroscedasticity. In summary, hypothesis  $H_1$  is not rejected as bank profitability is positively related to the quality of legal structures. Conversely, hypothesis  $H_3$  is rejected due to the absence of a significant negative relationship between the quality of political structures and bank profitability across countries. This result contrasts with the findings of Verriest *et al.* (2008) for the manufacturing sector, as the banking industry is heavily regulated and supervised, thereby hindering banks from enjoying high (interest) margins compared to other sectors of the economy. The main purpose of this

regulation is to safeguard the financial system and to ensure the soundness of bank fiduciary responsibilities (Sufian and Habibulah, 2010). Thus, whilst there is evidence of a positive relationship between the quality of legal structures, efficiency and profitability in banks on an international basis, there is a positive effect between the quality of political structures and cost inefficiency though no apparent impact on bank profitability.

*The impact of PRI quality on cost efficiency by country income level*

To examine whether country income level exerts an impact on the relationship between cost efficiency in banks and PRI quality, we estimate models by country income level subgroup and report the results in the first two columns of Table 7. We present two models, with banks in low and lower middle income countries in model 1 and banks in upper middle and high income countries in model 2. Interestingly, although the quality of legal structures tends to increase (reduce) cost efficiency (inefficiency) across the country income group models, this positive (negative) impact is only a significant driver in the upper middle and high income group of countries (model 2) where it is significant at the 1% level. Further, our results show that the quality of political structures significantly reduces bank efficiency only in upper middle and high income of countries (model 2) at the 5% level. Thus, the erosion of bank efficiency as the quality of political structures increases tends to have its greatest impact in upper middle and high income countries. This latter model has an adjusted  $R^2$  of 0.45 and a significant  $F$ -statistic at the 1% level. This can be partly explained in that the existence of high quality property rights institutions in high income countries may reduce the marginal benefits from any further institutional improvements which may give rise to a nonlinear relationship between quality institutions and bank performance. This relationship would benefit from further investigation in the future.

**[Insert Table 7 here]**

In terms of the model control variables, increasing overheads tend to promote higher cost inefficiency whereas higher interest margins tend to lead to lower cost inefficiency, the latter marginally more evident in the lower income group of countries.

*The impact of PRI quality on profitability by country income level*

The third and fourth columns of Table 7 report the results of models of bank profitability after controlling for country income level. The cost to income ratio is a significant negative determinant of profitability across models 3 and 4, though at different significance levels, whilst the overhead cost is a significant positive determinant at the 1% level. Thus, more profitable banks tend to have a lower cost to income ratio which makes logical sense. Interestingly, the quality of legal structures maintains a positive impact on bank profitability across all income groups (models 3 and 4) at the 5% level. Conversely, the quality of political structures has no impact on bank profitability across country income groups. The adjusted  $R^2$  statistics are 0.39 for model 3 and 0.38 for model 4, with overall  $F$ -statistics significant at the 10% and 1% levels, respectively. Thus, PRI quality appears to exert a differing strength of impact on profitability across country income groups.

**Conclusions and recommendations**

This paper investigates the impact of PRI quality on the cost efficiency and profitability of banks across 136 countries over the period 1999 to 2006. We find that the quality of the legal structure and security of property rights institutions positively affects bank cost efficiency and profitability, consistent with our predictions. In addition, our evidence suggests that banks in

high quality political structure countries suffer from low cost efficiency, though this result relates mainly to upper middle and high income countries. It is argued that cost inefficiencies may arise here from the inability of banks to generate new sources of revenue and/or reduce operating costs to tackle the increasing competition that accompanies an increase in PRI quality. Further, we find some support for the political economy view and the market power hypothesis in upper middle and high middle income countries within which banks may suffer from lower efficiency in the face of bank concentration and/or competition. The impact of PRIs on bank cost efficiency is more evident in the upper middle and high income group of countries than in the low and lower middle income group of countries.

One implication of our results is that the cost structure of banks varies across countries with different legal and political environments. The senior management of transnational banks should employ appropriate operating income and cost strategies to respond to differences in PRI quality across countries in order to maximize shareholder wealth. International policy makers and regulators should work to reduce any competitive inequality due to international differences in PRI quality to maintain financial stability and foster financial globalization. Our study has certain limitations in that it focuses on large banks as a result of data availability issues with smaller banks, and it does not test the effect of quality institutions on different types of banks, which may limit the generalizability of our results. Future studies might include various intermediary policy channels such as taxation through which PRI quality may affect bank performance.

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Table 1  
Summary of variables and source of data

|  |   |                                   |
|--|---|-----------------------------------|
| Panel A: Bank performance              |   |                                   |
| <i>LnCost/Income (CSTINC)</i>          | The natural logarithm of total overhead costs to gross income.  | The World Bank                    |
| <i>LnReturn on Assets (ROA)</i>        | The natural logarithm of average net income to total assets.  | The World Bank                    |
| Panel B: Bank specific characteristics |   |                                   |
| <i>LnOverhead (OVHD)</i>               | The natural logarithm of total overhead costs divided by total assets.  | The World Bank                    |
| <i>LnNet Interest Margin(INTM)</i>     | The natural logarithm of a bank's net interest revenue as a proportion of its interest-bearing assets.  | The World Bank                    |
| <i>LnAssets/GDP (DMBA)</i>             | The natural logarithm of deposit money bank assets scaled by gross domestic production.   | The World Bank                    |
| <i>LnMarket Cap. (MCAP)</i>            | The natural logarithm of share price times the number of shares outstanding. Listed domestic companies are those domestically incorporated companies listed on a country's stock exchange(s) at the end of the year.  | The World Bank                    |
| <i>Bank Concentration (BCONC)</i>      | The assets of three largest banks as a share of the assets of all commercial banks.   | The World Bank                    |
| <i>Government ownership (GOV)</i>      | The fraction of the banking system's assets that are 50% or more government owned.  | The World Bank                    |
| Panel C: Macroeconomic environment     |   |                                   |
| <i>LnGDP/CAP (GDP/CAP)</i>             | The natural logarithm of gross domestic product per capita.   | The World Bank                    |
| <i>LnInflation (INF)</i>               | The natural logarithm of the inflation rate.  | The World Bank                    |
| <i>GDP growth (GDPG)</i>               | The natural logarithm of gross domestic product growth.   | The World Bank                    |
| <i>Real Interest rate (RIR)</i>        | The lending interest rate adjusted for inflation as measured by the GDP deflator.   | The World Bank                    |
| Panel D: Property rights institutions  |   |                                   |
| <i>Legal Structure (LS)</i>            | The extent of government protection of persons and their rightfully acquired property. It includes the level of judicial independence, impartial courts, protection of property rights, military interference in the rule of law and the political process, integrity of the legal system, legal enforcement of contracts, and regulatory restrictions on the sale of real property. Scaled from 0 to 10, where 10 represents high government protection. | Gwartney <i>et al.</i> (2006)     |
| <i>Political structure (POLITY2)</i>   | The extent of quality institution for the distribution of political power among members of a society, and constraints on executive performance. It is measured by subtracting the institutionalised autocracy score from the institutionalised democracy score. Scaled from +10 (strongly democratic) to -10 (strongly autocratic).   | Centre for Systematic Peace (CSP) |
| <i>Size of government (SG)</i>         | The extent to which countries rely on the government to allocate resources and goods and services. Scaled from 0 to 10, with 10 representing a significant sized government.  | Gwartney <i>et al.</i> (2006)     |
| <i>Sound money (SM)</i>                | The extent of the consistency of monetary policy (or institutions) with long-term price stability and the ease with which other currencies can be used via domestic and foreign bank accounts. Scaled from 0 to 10, where 10 represents more sound monetary policy.   | Gwartney <i>et al.</i> (2006)     |
| <i>Freedom to trade(FT)</i>            | The extent of international exchange restraints such as tariffs, quotas, hidden administrative restraints, and controls on exchange rates and capital. Scaled from 0 to 10, where 10 represent more freedom to trade.   | Gwartney <i>et al.</i> (2006)     |
| <i>Regulation (REG)</i>                | The extent of regulatory restraints that limit freedom of exchange in the credit, labour, and product markets. Scaled from 0 to 10, where 10 represents more freedom of exchange.   | Gwartney <i>et al.</i> (2006)     |
| <i>Summary index(SI)</i>               | An average summary index of the legal structure, size of government, sound money, freedom to trade and regulation indices. Scaled from 0 to 10, where 10 represents more economic freedom.  | Gwartney <i>et al.</i> (2006)     |
| <i>YR</i>                              | Dummy variable for the year effect that takes a value of 1, 2, or 3 if year is 1999, 2002, or 2006, respectively.   |                                   |

All data collected are country-level data

Table 2  
Descriptive statistics for the study variables

|   | Observations | Minimum | Maximum | Mean  | S.D.  |
|---|--------------|---------|---------|-------|-------|
| <b>Panel A: Bank performance</b>              |              |         |         |       |       |
| <i>LnCost/Income (CSTINC)</i>                 | 158          | -1.26   | .59     | -.45  | .30   |
| <i>LnReturn on Assets (ROA)</i>               | 158          | -8.11   | -1.96   | -4.31 | .74   |
| <b>Panel B: Bank specific characteristics</b> |              |         |         |       |       |
| <i>LnOverhead (OVHD)</i>                      | 158          | -4.78   | -1.49   | -3.2  | .62   |
| <i>LnNet Interest Margin(INTM)</i>            | 158          | -4.82   | -1.45   | -3.16 | .62   |
| <i>LnAssets/GDP (DMBA)</i>                    | 158          | -3.91   | .82     | -.95  | .93   |
| <i>LnMarket Cap. (MCAP)</i>                   | 158          | -2.7    | 6.33    | 3.36  | 1.34  |
| <i>Bank Concentration (BCONC)</i>             | 158          | .16     | 1.00    | .68   | .20   |
| <i>Government ownership (GOV)</i>             | 158          | .00     | .96     | .16   | .21   |
| <b>Panel C: Macroeconomic environment</b>     |              |         |         |       |       |
| <i>LnGDP/CAP (GDP/CAP)</i>                    | 158          | 4.5     | 11.58   | 7.99  | 1.58  |
| <i>LnInflation (INF)</i>                      | 158          | -4.07   | 10.10   | 1.48  | 1.22  |
| <i>GDP growth (GDPG)</i>                      | 158          | -11.58  | 9.92    | -.012 | 2.75  |
| <i>Real Interest rate (RIR)</i>               | 158          | -.72    | 93.92   | 7.73  | 12.08 |
| <b>Panel D: Property rights institutions</b>  |              |         |         |       |       |
| <i>Legal Structure (LS)</i>                   | 158          | 1.51    | 9.62    | 5.63  | 1.81  |
| <i>Political Structure (POLITY2)</i>          | 158          | -10     | 10      | 3.82  | 6.40  |
| <i>Size of government (SG)</i>                | 158          | 2.42    | 9.35    | 6.03  | 1.34  |
| <i>Sound money (SM)</i>                       | 158          | .00     | 9.84    | 7.85  | 1.54  |
| <i>Freedom to trade(FT)</i>                   | 158          | 2.73    | 9.78    | 6.85  | 1.05  |
| <i>Regulation (REG)</i>                       | 158          | 1.54    | 8.90    | 6.03  | 1.13  |
| <i>Summary index(SI)</i>                      | 158          | 2.35    | 8.93    | 6.48  | .93   |

Variable definitions are reported in Table 1.

Table 3  
Correlation matrix for the study variables

|                | <i>CSTNC</i> | <i>ROA</i> | <i>OVHD</i> | <i>INTM</i> | <i>DMBA</i> | <i>MCAP</i> | <i>BCONC</i> | <i>GOV</i> | <i>GDP/Cap</i> | <i>INF</i> | <i>GDPG</i> | <i>RIR</i> | <i>LS</i> | <i>POLITY2</i> | <i>SG</i> | <i>SM</i> | <i>FT</i> | <i>REG</i> | <i>SI</i> |
|----------------|--------------|------------|-------------|-------------|-------------|-------------|--------------|------------|----------------|------------|-------------|------------|-----------|----------------|-----------|-----------|-----------|------------|-----------|
| <i>CSTNC</i>   | 1            |            |             |             |             |             |              |            |                |            |             |            |           |                |           |           |           |            |           |
| <i>ROA</i>     | -.357**      | 1          |             |             |             |             |              |            |                |            |             |            |           |                |           |           |           |            |           |
| <i>OVHD</i>    | .521**       | .280**     | 1           |             |             |             |              |            |                |            |             |            |           |                |           |           |           |            |           |
| <i>INTM</i>    | .177**       | .441**     | .762**      | 1           |             |             |              |            |                |            |             |            |           |                |           |           |           |            |           |
| <i>DMBA</i>    | -.113*       | -.383**    | -.537**     | -.640**     | 1           |             |              |            |                |            |             |            |           |                |           |           |           |            |           |
| <i>MCAP</i>    | -.232**      | -.167*     | -.455**     | -.481**     | .688**      | 1           |              |            |                |            |             |            |           |                |           |           |           |            |           |
| <i>BCONC</i>   | -.052        | .127*      | .041        | -.005       | -.194**     | .088        | 1            |            |                |            |             |            |           |                |           |           |           |            |           |
| <i>GOV</i>     | .009         | -.002      | .107        | .142*       | -.184**     | -.228**     | -.088        | 1          |                |            |             |            |           |                |           |           |           |            |           |
| <i>GDP/Cap</i> | -.062        | -.225**    | -.395**     | -.559**     | .744**      | .615**      | -.138**      | -.280**    | 1              |            |             |            |           |                |           |           |           |            |           |
| <i>INF</i>     | .053         | .361**     | .373**      | .498**      | -.364**     | -.525**     | -.067        | .255**     | -.336**        | 1          |             |            |           |                |           |           |           |            |           |
| <i>GDPG</i>    | -.019        | -.021      | -.071       | -.101       | .118*       | .128*       | -.013        | -.041      | .242**         | -.013      | 1           |            |           |                |           |           |           |            |           |
| <i>RIR</i>     | .149**       | .064       | .317**      | .344**      | -.068       | -.276**     | -.105        | .057       | -.161**        | -.094      | -.066       | 1          |           |                |           |           |           |            |           |
| <i>LS</i>      | -.125*       | -.208**    | -.422**     | -.629**     | .695**      | .502**      | .085         | -.226      | .780**         | -.343**    | .168**      | -.229**    | 1         |                |           |           |           |            |           |
| <i>POLITY2</i> | .397**       | -.244**    | .164**      | -.072       | .404**      | .093        | -.136*       | -.243      | .362**         | -.119*     | .061        | .084       | .322**    | 1              |           |           |           |            |           |
| <i>SG</i>      | .050         | .032       | .127*       | .183**      | -.040       | -.033       | -.162**      | .031       | -.118*         | .028       | -.128*      | .198**     | -.247**   | .030           | 1         |           |           |            |           |
| <i>SM</i>      | -.012        | -.303**    | -.331**     | -.487**     | .565**      | .344**      | -.045        | -.388      | .568**         | -.503**    | .052        | -.080      | .529**    | .373**         | .105*     | 1         |           |            |           |
| <i>FT</i>      | .048         | -.193**    | -.223**     | -.407**     | .550**      | .310**      | -.055        | -.323**    | .655**         | -.279**    | .136*       | -.146*     | .612**    | .435**         | .026      | .598**    | 1         |            |           |
| <i>REG</i>     | -.181        | .061       | -.293**     | -.381**     | .560**      | .473**      | -.095        | -.382**    | .621**         | -.195**    | .113*       | -.223**    | .627**    | .295**         | .088      | .467**    | .514**    | 1          |           |
| <i>SI</i>      | -.069        | -.196**    | -.357**     | -.536**     | .710**      | .481**      | -.067        | -.368**    | .756**         | -.401**    | .107*       | -.148*     | .777**    | .429**         | .254**    | .805**    | .787**    | .779**     | 1         |

Variable definitions are reported in Table 1. (\*\*\*) and (\*\*) indicate significance at the 1% and 5% levels, respectively, in a 2-tailed test.

Table 4

Analysis of variance of bank performance characteristics and institutional environment across countries across all income groups

|                                      |                | Sum of Squares | Mean Square | F      | Sig. |
|--------------------------------------|----------------|----------------|-------------|--------|------|
| <b>Bank Performance:</b>             |                |                |             |        |      |
| <i>LnCost/Income (CSTNC)</i>         | Between Groups | .045           | .045        | .474   | .492 |
|                                      | Within Groups  | 35.19          | .094        |        |      |
|                                      | Total          | 35.23          |             |        |      |
| <i>LnReturn on Assets (ROA)</i>      | Between Groups | 6.09           | 6.09        | 9.51   | .002 |
|                                      | Within Groups  | 203.62         | .640        |        |      |
|                                      | Total          | 209.72         |             |        |      |
| <b>Institutional Quality:</b>        |                |                |             |        |      |
| <i>Legal Structure (LS)</i>          | Between Groups | 519.15         | 519.15      | 213.15 | .000 |
|                                      | Within Groups  | 857.32         | 2.43        |        |      |
|                                      | Total          | 1376.47        |             |        |      |
| <i>Political Structure (POLITY2)</i> | Between Groups | 2217.95        | 2217.95     | 62.37  | .000 |
|                                      | Within Groups  | 13868.41       | 35.56       |        |      |
|                                      | Total          | 16086.36       |             |        |      |
| <i>Size of Gov. (SG)</i>             | Between Groups | 10.82          | 10.82       | 5.01   | .026 |
|                                      | Within Groups  | 760.17         | 2.16        |        |      |
|                                      | Total          | 771.00         |             |        |      |
| <i>Sound Money (SM)</i>              | Between Groups | 139.47         | 139.47      | 59.68  | .000 |
|                                      | Within Groups  | 822.63         | 2.33        |        |      |
|                                      | Total          | 962.11         |             |        |      |
| <i>Free Trade (FT)</i>               | Between Groups | 114.66         | 114.66      | 115.06 | .000 |
|                                      | Within Groups  | 349.77         | .997        |        |      |
|                                      | Total          | 464.44         |             |        |      |
| <i>Regulations (REG)</i>             | Between Groups | 118.01         | 118.01      | 103.59 | .000 |
|                                      | Within Groups  | 400.99         | 1.13        |        |      |
|                                      | Total          | 519.00         |             |        |      |
| <i>Summary Index (SI)</i>            | Between Groups | 113.18         | 113.18      | 155.16 | .000 |
|                                      | Within Groups  | 256.76         | .729        |        |      |
|                                      | Total          | 369.94         |             |        |      |

Variable definitions are reported in Table 1.

Table 5  
Fixed effects models of the relationship between bank cost inefficiency and PRI quality

|                                 | Dependent variable: cost/income ( <i>COSTINC</i> ) |                     |                     |                     |                     |                     |                     |                     |
|---------------------------------|--|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                                 | (1)  | (2)                 | (3)                 | (4)                 | (5)                 | (6)                 | (7)                 | (8)                 |
| Constant                        | .113<br>(.399)                                     | -.243<br>(-.785)    | -.227<br>(-.745)    | -.172<br>(-.485)    | -.138<br>(-.418)    | -.814<br>(-2.32)    | -.040<br>(-.113)    | -.223<br>(-.553)    |
| <i>LnOverhead (OVHD)</i>        | .388<br>(8.27)***                                  | .384<br>(8.35)***   | .356<br>(7.62)***   | .386<br>(8.34)***   | .385<br>(8.36)***   | .358<br>(7.89)***   | .385<br>(8.38)***   | .385<br>(8.28)***   |
| <i>LnNet Int Margin (INTM)</i>  | -.173<br>(-3.23)***                                | -.220<br>(-3.96)*** | -.207<br>(-3.78)*** | -.220<br>(-3.94)*** | -.227<br>(-4.05)*** | -.212<br>(-3.93)*** | -.225<br>(-4.04)*** | -.221<br>(-3.94)*** |
| <i>Assets/GDP (DMBA)</i>        | .038<br>(.944)                                     | .021<br>(.528)      | .016<br>(.403)      | .023<br>(.565)      | .022<br>(.554)      | .015<br>(.381)      | .011<br>(.262)      | .021<br>(.528)      |
| <i>LnMarket Cap (MCAP)</i>      | -.019<br>(-.940)                                   | -.003<br>(-.169)    | .001<br>(.034)      | -.003<br>(-.123)    | -.005<br>(-.241)    | .000<br>(.021)      | -.002<br>(-.112)    | -.003<br>(-.166)    |
| <i>Bank Conc. (BCONC)</i>       | .020<br>(.198)                                     | .104<br>(1.01)      | .101<br>(1.00)      | .100<br>(.970)      | .0013<br>(1.09)     | .067<br>(.674)      | .090<br>(.874)      | .104<br>(1.01)      |
| <i>Gov. ownership (GOV)</i>     | .074<br>(.743)                                     | .111<br>(1.12)      | .115<br>(1.19)      | .108<br>(1.09)      | .078<br>(.752)      | .196<br>(1.98)*     | .052<br>(.464)      | .107<br>(1.00)      |
| <i>LnGDP/CAP(GDP/CAP)</i>       | .027<br>(1.38)                                     | .064<br>(2.68)***   | .044<br>(1.77)*     | .062<br>(2.52)**    | .066<br>(2.75)***   | .058<br>(2.53)**    | .063<br>(2.66)***   | .064<br>(2.66)***   |
| <i>LnInflation rate (INF)</i>   | -.002<br>(-.079)                                   | .002<br>(.097)      | .003<br>(.123)      | .000<br>(.020)**    | -.003<br>(-.127)    | .001<br>(.051)      | -.002<br>(-.090)    | .002<br>(.074)      |
| <i>GDP growth (GDPG)</i>        | -.007<br>(-.840)                                   | -.007<br>(-.784)    | -.003<br>(-.395)    | -.007<br>(-.805)    | -.007<br>(-.847)    | -.006<br>(-.745)    | -.009<br>(-1.00)    | -.007<br>(-.785)    |
| <i>Interest rate (RIR)</i>      | -.001<br>(-.542)                                   | -.001<br>(-.318)    | -.001<br>(-.533)    | -.001<br>(-.255)    | .000<br>(-.119)     | .000<br>(.034)      | -.001<br>(-.252)    | -.001<br>(-.299)    |
| <i>Legal Structure (LS)</i>     |  | -.046<br>(-2.57)**  | -.043<br>(-2.41)**  | -.047<br>(-2.60)*** | -.044<br>(-2.39)**  | -.065<br>(-3.53)*** | -.036<br>(-1.75)*   | -.045<br>(-2.03)**  |
| <i>Pol. structure (POLITY2)</i> |  |                     | .010<br>(2.44)**    |                     |                     |                     |                     |                     |
| <i>Size of Gov.(SG)</i>         |  |                     |                     | -.006<br>(-.416)    |                     |                     |                     |                     |
| <i>Sound Money (SM)</i>         |  |                     |                     |                     | -.017<br>(-.949)    |                     |                     |                     |
| <i>Free Trade (FT)</i>          |  |                     |                     |                     |                     | .091<br>(3.20)***   |                     |                     |
| <i>Regulation (REG)</i>         |  |                     |                     |                     |                     |                     | -.039<br>(-1.12)    |                     |
| <i>Summary Index (SI)</i>       |  |                     |                     |                     |                     |                     |                     | -.003<br>(-.078)    |
| <i>Year (YR)</i>                | Included   | Included            | Included            | Included            | Included            | Included            | Included            | Included            |
| <i>R<sup>2</sup></i>            | .44  | .44                 | .44                 | .47                 | .44                 | .44                 | .42                 | .41                 |
| <i>Adjusted R<sup>2</sup></i>   | .39  | .38                 | .39                 | .42                 | .39                 | .38                 | .37                 | .36                 |
| <i>Durbin-Watson</i>            | 1.68   | 1.71                | 1.73                | 1.71                | 1.68                | 1.73                | 1.69                | 1.70                |
| <i>F-statistic, (p-value)</i>   | 8.57***  | 9.30***             | 8.81***             | 8.55***             | 8.73***             | 10.06***            | 8.90***             | 8.52***             |
| <i>Max/Min VIF</i>              | 2.99/1.06  | 3.31/1.06           | 3.50/1.09           | 3.31/1.06           | 3.39/1.07           | 3.31/1.06           | 3.45/1.08           | 4.28/1.07           |
| <i>Valid N</i>                  | 158  | 158                 | 158                 | 158                 | 158                 | 158                 | 158                 | 158                 |

Variable definitions are reported in Table 1. Standardized beta coefficients are reported, with *t*-values presented in parentheses. *VIF* is the variable inflation factor. (\*\*\*), (\*\*) and (\*) indicate significance at the 1%, 5% and 10% levels, respectively, on the basis of a 2-tailed test.

Table 6  
Models of the relationship between bank profitability and PRI quality

|                                  | Dependent variable: Return on Assets ( <i>LnROA</i> ) |                     |                     |                     |                     |                     |                     |                     |
|----------------------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                                  | (1)   | (2)                 | (3)                 | (4)                 | (5)                 | (6)                 | (7)                 | (8)                 |
| Constant                         | -2.18<br>(-2.71)***                                   | -1.12<br>(-1.27)    | -1.12<br>(-1.27)    | -.484<br>(-.483)    | -.507<br>(-.548)    | -.984<br>(-.941)    | -1.71<br>(-1.68)    | -.007<br>(-.006)    |
| <i>LnOverhead (OVHD)</i>         | .551<br>(3.40)***                                     | .509<br>(3.20)***   | .514<br>(3.20)***   | .526<br>(3.30)***   | .527<br>(3.35)***   | .510<br>(3.19)***   | .497<br>(3.12)***   | .532<br>(3.35)***   |
| <i>LnNet Int Margin (INTM)</i>   | .059<br>(.377)  | .224<br>(1.35)      | .223<br>(1.33)      | .226<br>(1.36)      | .175<br>(1.05)      | .226<br>(1.35)      | .244<br>(1.46)      | .203<br>(1.22)      |
| <i>Assets/GDP (DMBA)</i>         | -.073<br>(-.630)                                      | -.027<br>(-.232)    | -.025<br>(-.219)    | -.011<br>(-.095)    | -.019<br>(-.171)    | -.026<br>(-.221)    | .004<br>(.031)      | -.021<br>(-.183)    |
| <i>LnMarket Cap (MCAP)</i>       | -.079<br>(-1.40)                                      | -.123<br>(-2.13)**  | -.124<br>(-2.13)**  | -.114<br>(-1.98)*   | -.131<br>(-2.30)**  | -.123<br>(-2.13)**  | -.126<br>(-2.18)**  | -.120<br>(-2.10)**  |
| <i>Bank Conc. (BCONC)</i>        | -.228<br>(-.814)                                      | -.485<br>(-1.67)*   | -.486<br>(-1.66)*   | -.522<br>(-1.79)*   | -.431<br>(-1.49)    | -.478<br>(-1.63)    | -.446<br>(-1.52)    | -.492<br>(-1.70)*   |
| <i>Gov. ownership (GOV)</i>      | -.525<br>(-1.86)*                                     | -.646<br>(-2.31)**  | -.649<br>(-2.31)**  | -.669<br>(-2.39)**  | -.835<br>(-2.86)*** | -.669<br>(-2.27)**  | -.475<br>(-1.50)    | -.827<br>(-2.74)*** |
| <i>LnGDP/CAP(GDP/CAP)</i>        | -.008<br>(-.152)                                      | -.124<br>(-1.80)*   | -.118<br>(-1.63)    | -.144<br>(-2.04)**  | -.112<br>(-1.63)    | -.124<br>(-1.79)*   | -.124<br>(-1.80)*   | -.133<br>(-1.93)*   |
| <i>LnInflation rate (INF)</i>    | -.008<br>(-.126)                                      | -.019<br>(-.313)    | -.019<br>(-.316)    | -.034<br>(-.551)    | -.048<br>(-.778)    | -.019<br>(-.309)    | -.007<br>(-1.17)    | -.044<br>(-.702)    |
| <i>GDP growth (GDPG)</i>         | -.023<br>(-.948)                                      | -.024<br>(-1.00)    | -.025<br>(-1.03)    | -.026<br>(-1.08)    | -.028<br>(-1.16)    | -.024<br>(-1.00)    | -.018<br>(-.730)    | -.029<br>(-1.19)    |
| <i>Interest rate (RIR)</i>       | -.008<br>(-1.26)                                      | -.009<br>(-1.51)    | -.009<br>(-1.47)    | -.008<br>(-1.31)    | -.007<br>(-1.09)    | -.009<br>(-1.52)    | -.009<br>(-1.57)    | -.007<br>(-1.24)    |
| <i>LnCost/income (CSTNC)</i>     | -1.47<br>(-6.25)***                                   | -1.34<br>(-5.67)*** | -1.32<br>(-5.49)*** | -1.35<br>(-5.73)*** | -1.37<br>(-5.87)*** | -1.32<br>(-5.40)*** | -1.31<br>(-5.55)*** | -1.34<br>(-5.71)*** |
| <i>Legal Structure (LS)</i>      |   | .140<br>(2.68)***   | .139<br>(2.66)***   | .131<br>(2.51)**    | .155<br>(2.96)***   | .145<br>(2.58)**    | .109<br>(1.87)*     | .196<br>(3.09)***   |
| <i>Pol. Structure. (POLITY2)</i> |   |                     | -.003<br>(-.274)    |                     |                     |                     |                     |                     |
| <i>Size of Gov.(SG)</i>          |   |                     |                     | -.054<br>(-1.33)    |                     |                     |                     |                     |
| <i>Sound Money (SM)</i>          |   |                     |                     |                     | -.103<br>(-2.00)**  |                     |                     |                     |
| <i>Free Trade (FT)</i>           |   |                     |                     |                     |                     | -.022<br>(-.255)    |                     |                     |
| <i>Regulation (REG)</i>          |   |                     |                     |                     |                     |                     | .116<br>(1.16)      |                     |
| <i>Summary Index (SI)</i>        |   |                     |                     |                     |                     |                     |                     | -.190<br>(-1.54)    |
| <i>Year (YR)</i>                 | Included  | Included            | Included            | Included            | Included            | Included            | Included            | Included            |
| $R^2$                            | .40   | .43                 | .43                 | .43                 | .44                 | .43                 | .43                 | .44                 |
| Adjusted $R^2$                   | .34   | .37                 | .37                 | .38                 | .38                 | .37                 | .37                 | .38                 |
| Durbin-Watson                    | 1.41  | 1.43                | 1.43                | 1.43                | 1.47                | 1.43                | 1.50                | 1.43                |
| <i>F</i> -statistic, (p-value)   | 7.48***   | 6.58***             | 6.03***             | 6.04***             | 6.34***             | 6.03***             | 7.07***             | 6.03***             |
| Max/Min VIF                      | 3.34/1.06   | 3.61/1.06           | 3.61/1.09           | 3.38/1.07           | 3.37/1.07           | 3.64/1.06           | 3.65/1.08           | 4.31/1.07           |
| Valid N                          | 158   | 158                 | 158                 | 158                 | 158                 | 158                 | 158                 | 158                 |

Details of study variables are reported in Table 1. Standardized beta coefficients are reported, with *t*-values presented in parentheses. *VIF* is the variable inflation factor. (\*\*\*), (\*\*), and (\*) indicate significance at the 1%, 5% and 10% levels, respectively, on the basis of a 2-tailed test.

Table 7

Models of the relationship between bank efficiency, bank profitability and PRI quality by country income level

|                                 | <i>LnCost/income (CSTNC)</i>                |  | <i>LnReturn on Assets (ROA)</i>             |  |
|---------------------------------|---|--|---|--|
|                                 | Low and lower middle income level countries | Upper middle and high income level countries | Low and lower middle income level countries | Upper middle and high income level countries |
|                                 | (1)   | (2)  | (3)   | (4)  |
| Constant                        | -.134<br>(-.127)                            | -.594<br>(-1.29)                             | 2.82<br>(.985)                              | .378<br>(.273)                               |
| <i>LnOverhead (OVHD)</i>        | .516<br>(3.47)***                           | .346<br>(6.49)***                            | 1.61<br>(3.36)***                           | .563<br>(2.95)***                            |
| <i>LnNet Int Margin (INTM)</i>  | -.378<br>(-3.64)**                          | -.183<br>(-2.61)**                           | -.021<br>(-.062)                            | .296<br>(1.36)                               |
| <i>Assets/GDP (DMBA)</i>        | .080<br>(.724)                              | -.004<br>(-.073)                             | .547<br>(1.81)*                             | -.037<br>(-.258)                             |
| <i>LnMarket Cap (MCAP)</i>      | -.020<br>(-.447)                            | .001<br>(.023)                               | -.282<br>(-2.32)**                          | -.134<br>(-1.77)*                            |
| <i>Bank Conc. (BCONC)</i>       | -.195<br>(-1.01)                            | .141<br>(1.19)                               | -.197<br>(-.372)                            | -.602<br>(-1.68)*                            |
| <i>Gov. ownership (GOV)</i>     | -.112<br>(-.532)                            | .111<br>(.795)                               | .335<br>(.582)                              | -.907<br>(-2.15)                             |
| <i>LnGDP/CAP(GDP/CAP)</i>       | .082<br>(1.26)                              | .093<br>(2.08)**                             | -.128<br>(-.708)                            | -.255<br>(-1.85)*                            |
| <i>LnInflation rate (INF)</i>   | -.077<br>(-1.04)                            | .013<br>(.545)                               | -.352<br>(-1.72)*                           | -.035<br>(-.489)                             |
| <i>GDP growth (GDPG)</i>        | .000<br>(-.006)                             | -.010<br>(-.991)                             | -.040<br>(-.925)                            | -.027<br>(-.876)                             |
| <i>Interest rate (RIR)</i>      | -.006<br>(-1.33)                            | -.001<br>(-.491)                             | -.033<br>(-2.75)***                         | -.009<br>(-1.08)                             |
| <i>LnCost/income (CSTNC)</i>    |   |  | -1.00<br>(-1.99)*                           | -1.55<br>(-5.16)***                          |
| <i>Legal Structure (LS)</i>     | .006<br>(.178)                              | -.069<br>(-2.73)***                          | .262<br>(2.87)***                           | .196<br>(2.50)**                             |
| <i>Pol. Structure (POLITY2)</i> | .008<br>(1.38)                              | .013<br>(2.59)**                             | .00<br>(.071)                               | -.013<br>(-.694)                             |
| <i>Year (YR)</i>                | Included                                    | Included                                     | Included                                    | Included                                     |
| $R^2$                           | .60   | .52  | .60   | .47  |
| Adjusted $R^2$                  | .40   | .45  | .39   | .38  |
| Durbin-Watson                   | 2.43  | 1.76   | 2.40  | 1.58   |
| <i>F</i> -statistic, (p-value)  | 3.35***                                     | 7.60***                                      | 2.15*                                       | 4.76***                                      |
| Max/Min VIF                     | 4.82/1.33                                   | 3.74   | 7.48/1.45                                   | 3.74/1.12                                    |
| Valid N                         | 44  | 114  | 44  | 114  |

Variable definitions are reported in Table 1. Standardized beta coefficients are reported, with *t*-values presented in parentheses. *VIF* is the variable inflation factor. (\*\*\*), (\*\*) and (\*) indicate significance at the 1%, 5% and 10% levels, respectively, on the basis of a 2-tailed test.