Bank Efficiency, Financial Depth, and Economic Growth*

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Abstract

The positive relation between financial development and economic growth seems to have weakened in recent years and when analyzing only developed countries. We suggest here that banks' relative ability to intermediate funds cost-efficiently is a quality-based measure of financial development that complements conventional quantity-based measures. We test this quality finance-growth nexus for a comprehensive sample of more than 100 countries during 1996–2005. We find an independent and economically significant effect of higher mean cost efficiency for economic growth, suggesting that the interaction between better banking and deeper capital markets is indeed most beneficial. However, conditional marginal effects imply that the positive effects of deepening capital markets are only significant beyond a certain efficiency threshold of approximately 70 percent. The quality effect is stronger in developed economies, while mere quantity expansion is also beneficial in developing economies.

Key words: Bank performance, economic growth, bank efficiency

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Introduction

There is a sizable amount of theoretical literature on the relationship between financial development and economic growth. The mechanisms by which financial development affects real growth, however, often differ among theories. An intuitive illustration is Pagano's (1993) overview study. Using a simple "AK" model, he shows that financial intermediation can affect real growth by increasing the savings rate (e.g., De Gregorio, 1994; Jappelli and Pagano, 1994), improving the allocational efficiency of investments (e.g., Bencivenga and Smith, 1991; Greenwood and Jovanovic, 1990; Levine, 1991; and Saint-Paul, 1992a and 1992b), and by enhancing the functional efficiency of the banking system (e.g., Viaene, 1993; Sussman, 1993; and Gupta and Lensink, 1996, chapter 6). Related to the banking-efficiency channel, Graff and Karmann (2006) argue that financial intermediaries need to allocate scarce resources efficiently when providing their products and services. Because banks in particular employ highly skilled human capital, their inefficient intermediation crowds out the use of productive factors in other sectors that could potentially foster economic growth and development.

The empirical literature on finance and growth is also enormous. Since the seminal work of King and Levine (1993), many studies have tested the so-called finance-growth nexus. In a comprehensive overview article, for example, Levine (1997) surveys no fewer than 280 studies. Although some authors argue that finance merely reacts to economic development, most of the empirical evidence reports a robust, positive, causal effect of finance on growth (e.g., Levine et al., 2000). The vast majority of empirical studies employ volume measures of finance and implicitly focus on the quantity effects of financial development on economic growth. In Pagano's framework, this relates to the savings-growth effect of financial

development. Frequently employed data assembled by the World Bank and presented in Beck et al. (2000) measures monetization (such as M2 over GDP), aggregate bank credit relative to GDP, credit to the private sector over GDP, and others. Most of these ratios proxy the quantity effect of financial development.

Some of these proxies, albeit in an imperfect manner, can also say something about the allocational efficiency of financial development, which Cho (1988), Schiantarelli et al. (1994), and Galindo et al. (2007) test explicitly. In some recent empirical studies, important improvements include, for example, the distinction between markets and institutions (Arestis et al., 2001; Beck and Levine, 2002), government versus private bank ownership (Beck and Levine, 2002), the regulatory stance (Bekaert et al., 2005), or societal norms (Garretsen et al., 2004). Despite the enormous number of empirical papers focusing on the finance-growth nexus, it is surprising that almost none deal with the effect of financial development on growth via the banking-efficiency channel. The few exceptions analyze samples of very small banks (Berger et al., 2004) or consider only the relation between bank efficiency and regional growth in individual countries (Lucchetti et al., 2001).

The main contribution of this paper is to derive a measure for intermediation quality at the individual bank level and test whether banks' relative ability to convert resources into financial products and services affect the extent of financial development and growth. Using a comprehensive global dataset, covering up to 139 countries, the paper attempts to extend the understanding and insight on the literature on finance-growth nexus.[1]

[1] We include 152 countries to estimate efficiency scores. For the estimation of economic growth, the number of countries varies between 95 and 139. The difference in number of observations is caused by the lack of observations in "Stock market total value traded to GDP" and "Private credit by deposit money banks to GDP."

To approximate this quality aspect of financial intermediation, we estimate bank-specific cost efficiency. The few empirical studies that deal with bank efficiency and economic growth use the spread between deposit and lending rates as a proxy for banking efficiency. However, this is a very crude measure. We instead estimate cost efficiency as the non-random deviation from optimal costs. The deviation may be due to excessive employment of scarce resources or reflect a suboptimal input mix at given factor prices.

At the regional level, a few studies attempt to test the importance of bank efficiency via a more sophisticated measure. In line with the approach used in this paper, Lucchetti et al. (2001) measure the efficiency of Italian banks with stochastic cost-frontier analysis. The study's systematic deviations from optimal cost due to a poor allocation of input factors measure the resources wasted during the intermediation process. The results suggest that both the volume of originated credit as well as bank-specific efficiency scores are significantly and positively related to regional economic growth, respectively. Recently, Koetter and Wedow (2006) and Hasan et al. (2009) provide some evidence along the same line for German agglomeration and European regions, respectively. These regional growth studies indicate that bank efficiency is likely to spur growth in an independent and economically significant way. However, generalizing these results requires testing the quality hypothesis in an international context. To our knowledge, only Berger et al. (2004) provide some evidence in this direction. However, their sample is restricted to small community banks, which account only for a limited fraction of all funds channelled to investors.

The rest of the paper is organized as follows. Section 1 describes the methodology, including the estimation of efficiency measures and the growth model. Section 2 presents the data, and Section 3 discusses the results. Section 4 concludes the study.

1. Methodology

To measure the performance of the financial sector we use the average cost efficiency of a country's banking sector as well as the variance of cost efficiency within the country. We estimate efficiency with stochastic frontier analysis (SFA). Business and economics research has widely applied SFA to benchmark the economic performance of agents.[2] An additional error-term component captures systematic deviations due to inefficiency.

Equation (1) depicts an optimum cost frontier.

$$TC_{i,t} = C(y_{i,t}, p_{i,t}; \beta)\exp(v_{i,t} + u_{i,t}) \qquad (1)$$

where TC denotes total costs. $C(y,p;\beta)$ is a cost function that depends on outputs (y), input prices (p), and estimated parameters (β). The term v is a common error term as in OLS that is normally distributed with mean zero and a fixed variance. The u term captures inefficiency. It is a positive distributed term for which several distributions may be assumed. We assume for u an exponential distribution. Thus, the higher u, the more costs bank i wastes at time t to produce a given output vector and the more inefficient it therefore is. On the other hand if u is zero, bank i incurs the optimal costs associated with its production choice, save for random error v, and is thus fully efficient.

The primary task of a bank is to act as intermediary between savers and borrowers. This fits our requirement that a bank should allocate resources at the lowest possible cost. To specify the cost function, we follow a model of bank production developed by Sealy and

[2] Meeusen and van den Broeck (1977) and Aigner et al. (1977) developed SFA. A comprehensive introduction is Kumbakhar and Lovel (2000).

Lindley (1977). According to that model, banks demand labor, fixed assets, and funds at given prices to produce financial products and services. The output vector is measured in monetary volumes and comprises interbank and commercial loans, securities, and other earning assets. When conducting their intermediation task, banks demand input factors such that total costs are minimized.

We estimate the efficient frontier in Equation (1) by choosing the translog functional form. We obtain bank-specific efficiency estimates u_{it} by employing the approach of Jondrow et al. (1982). Because we can estimate the efficiency score for each bank and because we know where each bank is geographically located, we can calculate both mean efficiency and variance for each country and year. These are our measures for the quality of the financial sector in a country. The specific form of the cost function appears in Equation (2).

$$\begin{aligned}\ln(TC) = {} & \beta_0 + \beta_1 \ln(CL_{i,t}) + \beta_2 \ln(SOEA_{i,t}) + \beta_3 \ln(PE_{i,t}) + \beta_4 \ln(IE_{i,t}) \\ & + \beta_5 \ln(CL_{i,t})^2 + \beta_6 \ln(SOEA_{i,t})^2 + \beta_7 \ln(PE_{i,t})^2 + \beta_8 \ln(IE_{i,t})^2 \\ & + \beta_9 \ln(CL_{i,t}) \ln(SOEA_{i,t}) + \beta_{10} \ln(CL_{i,t}) \ln(PE_{i,t}) + \beta_{11} \ln(CL_{i,t}) \ln(IE_{i,t}) \\ & + \beta_{12} \ln(SOEA_{i,t}) \ln(PE_{i,t}) + \beta_{13} \ln(SOEA_{i,t}) \ln(IE_{i,t}) + \beta_{14} \ln(PE_{i,t}) \ln(IE_{i,t}) \\ & + \beta_{15} t + \beta_{16} t^2 + \beta_{17} \ln(CL_{i,t}) t + \beta_{18} \ln(SOEA_{i,t}) t + \beta_{19} \ln(PE_{i,t}) t + \beta_{20} \ln(IE_{i,t}) t \\ & + \beta_{21} \ln(EP_{i,t}) + \beta_{22} SAVING + \beta_{23} COOP + \beta_{24} GOV + u_{i,t} + v_{i,t}\end{aligned} \tag{2}$$

TC in Equation (2) represents the total costs bank *i* faces at time *t*. The outputs in Equation (2) are *CL* and *SOEA*, which measure total customer loans and securities and other earning assets, respectively. *PE* denotes the input prices, personnel expenses over total assets, and *IE* equals interest expenses over total deposits plus total other funding.[3]

[3] Note that the correct measure for the price of personnel would be personnel expenses over total number of employees. Given the lack of employee data, we follow the bank-efficiency literature.

In line with the literature, we also control for the level of equity (*EP*), which reflects alternative risk preferences and funding structures. Furthermore, we control for the organizational form of the bank: *SAVING* and *COOP* are dummy variables that equals 1 if the bank is a savings bank or a cooperative bank, respectively. *GOV* adjusts for the governance level in the country in which the bank is located. This variable is created with principal-component analysis from the six governance indicators suggested in Kaufmann, et al. (2006).

Point estimates of efficiency are relative measures and can only be compared when obtained with a single estimation. Clearly, assuming one cost frontier for all the banks in the world is restrictive because banking systems around the world continue to differ systematically. Therefore, we controlled for the macroeconomic environment by including the Kaufmann indicators.[4]

Next, we regress financial-development proxies and further controls on economic growth. We use the dynamic panel GMM estimator to account for potential endogeneity issues concerning quantity proxies of financial development (Arellano and Bond; 1991).[5] We consider the critique voiced by Islam (1995) and specify a reduced-form growth model as a dynamic panel model (see also Beck et al., 2000; and Levine et al., 2000) in Equation (3):

$$\ln Y_{r,t} = \alpha \ln Y_{r,t-1} + \beta_1 \ln FV_{r,t} + \beta_2 \ln FQ_{r,t} + \gamma \ln POP_{r,t} + \mu_r + \varepsilon_{r,t} \qquad (3)$$

Here, *Y* is GDP per capita and *FV* is a vector of financial variables used in previous studies, such as total stock market value traded to GDP and private credit by deposit money banks to

[4] Furthermore, in unreported estimations we specified bank-specific fixed effects without qualitative changes in our main results but less convincing maximization procedures.

[5] We also used the system GMM estimator developed by Blundell and Bond (1998). Although the results concerning the quality effect of financial intermediation remain qualitatively the same, some specification tests indicated preferences for the difference estimator.

GDP. *FQ* is the financial quality variable. *POP* measures population growth. The *t* terms are time indicators, and *r* indexes countries. To eliminate μ_r, an unobserved region-specific effect, we use the single-equation GMM estimator (Arellano and Bond, 1991) and employ lagged levels and Kaufmann indicators as instruments.

2. Data

The data used to estimate bank efficiency are from Bankscope and Kaufmann et al. (2006). We have an unbalanced panel dataset containing 8,410 banks and 44,945 observations for the years 1996 up to and including 2005. The data are adjusted for inflation and cover 152 countries in which at least one bank is located. Bankscope lists at least five banks in 141 of these countries. Table 1 gives an overview of the descriptive statistics. Table 2 shows the correlation between those variables. The macro data is obtained from the World Development Indicators provided by the World Bank for the years 1996 up to and including 2005. Descriptive statistics and the correlation of this set are given in Tables 3 and 4, respectively.

3. Results

We first consider the results from the stochastic cost-frontier analysis. Next, we turn to the growth regression results.

3.1 Cost efficiency across countries

Table 5 shows the result of four stochastic cost-frontier estimations. Based on log-likelihood tests and other information criteria, we find support for a frontier specification when controlling for technological change, country-specific quality indicators of governance, and

other controls. The efficiency scores obtained per country are in Table 6. In subsequent growth-regressions we use efficiency scores obtained from the unconstrained model in column (1) of Table 5.[6] Coefficient estimates of banks' output and factor prices in Table 5 are all highly significant, thus corroborating our assumption that inefficiencies prevail in international banking. Parameters yield the expected sign (i.e., higher prices and outputs cause higher costs). The mean cost-efficiency estimates in Table 6 further indicate that the dispersion of banks' relative ability to intermediate financial funds is relatively large both within and across countries.

The mean cost efficiency across countries is between 28 and 91 percent. Although we generally find that industrialized countries with many banks are indeed more likely to be efficient (e.g., the U.S., Germany, or the Netherlands), we also find that banking systems in a number of less developed countries exhibit relatively high efficiency. Ethiopia or Honduras are examples. As such, merely being a nonindustrialized country does not mean having an inefficient banking system. This suggests that our measure of financial-development quality might contain additional information compared to traditional indicators of an economy's monetization.

3.2 Individual and joint finance-growth effects

By showing the results of the Arellano and Bond (1991) estimations, Table 7 illustrates the relation between conventional measures of financial development and the relative ability of banking systems to intermediate financial funds. The first two columns show the outcomes of models in which the "standard" financial sector variables are included. We find evidence that

[6] Note, however, that neither estimated coefficients nor the efficiency scores for alternative specifications differ substantially and yield rather comparable results, which are available upon request. Furthermore panel fixed effect efficiency scores are used and the results are qualitatively the same

neither the quantity of the financial market nor the volume of deposits financial institutions held foster economic growth individually. Though it contradicts much of the earlier literature on the relation between finance and growth, this result is in line with Rousseau and Wachtel (2010). They offer fairly univocal evidence that the finance-growth nexus established in earlier periods vanishes when considering (i) more recent periods and (ii) separating developed and less developed countries (see also Rioja and Valev 2004).

Put differently, a mere deepening of credit and capital markets does not necessarily imply an expansion of real output. Instead, transforming savings into investments might yield an independent effect. Columns three to five of Table 7 show according specifications that include our efficiency measure (CE) of each country's banking sector relative to the world frontier. This measure is significant at the one percent level for every specification. It ranges between 0.1 and 0.3. Because the dependent variable is logged and CE runs from 0 to 1, a 0.1 increase of efficiency will increase GDP per capita by approximately one percent. Thus, we find evidence of an independent quality effect in recent years.

A common concern regarding studies of the finance-growth nexus is reverse causality, i.e. the notion that economic growth spurs financial development. We share this concern especially for measures of financial depth since credit demand should increase e.g. in an expanding economy. Note, however, that cost efficiency measures the *relative* ability of banks to demand factors optimally given their factor prices. Therefore, this measure is less prone to reverse causality because independent of the real cycle (boom with e.g. rising wages, bust with e.g. decreasing interest rates), banks consider face (exogenous) factor prices when choosing their production plans with varying degrees of insight/ability/skill, which is exactly their efficiency.

The estimated relation between this quality measure and growth is economically significant. Though many developed economies would consider an increase in cost efficiency of their banking system hard to accomplish, Table 6 highlights that policies to enhance banking-market efficiency should yield real benefits, too (especially for a number of economies in transition). Importantly, the joint specification of both quantity and the efficiency measure in column five highlight that a deeper capital market paired with better banks are most beneficial for an economy. Intuitively, banks' relative ability to conduct their selection and monitoring tasks might be exactly what is necessary to realize economic growth via easy access to financial markets and institutions.

Because these results suggest that quantity and quality of finance interact, Table 7 specifies additional results in columns six to nine. First, we show specifications where CE interacts with the financial-markets quantity measure. The results are in line with the effect of columns three to five and are significantly positive at the one percent level. Likewise, the interaction effect of efficiency and the size of the stock market is always positive and significant at the five percent level. This indicates that a deeper financial sector has a positive impact on economic growth. Note that our results support the central role played by the quality aspect of financial intermediation. Similarly, the effect of credit markets on economic growth is calculated (column 8 and 9). The results show that the size of the credit market has no significant impact on economic growth in our sample.

3.3 Conditional marginal effects of financial-depth measures

Our results indicate that although improving quality exerts an individual effect, the quantity effect often documented in previous literature appears to interact with the quality effect in recent years. We want to further explore the economic significance of this interaction. Therefore, we

also calculated the stock market's marginal effect on economic growth conditional on an interval of the quality measure (*CE*). The results are in Figure 1. Relative stock market capitalization has a significant effect on economic growth of at least five percent if the banks' cost efficiency is higher than about 80 percent.[7] Because the majority of countries exhibit CEs above this threshold, we conclude that better banks and deeper capital markets benefit most economies. In turn, Figure 2 clearly illustrates that private credit never has a positive effect on economic growth.[8] To some extent these results corroborate studies that find a complementary role for both financial markets and institutions.

3.4 Robustness: efficiency dispersion and productivity instead of output

In Table 6 we showed that the cost efficiency of banks varied not only across but also within countries. This might cast concerns regarding possible aggregation bias when specifying only the first moment of the CE distribution in second-stage growth regressions. In addition, a relatively large dispersion could indicate that agents face larger uncertainty about obtaining banking services from an efficient intermediary. Alternatively, a broad range of efficiency levels could indicate that the banking industry is willing to "experiment" and incur poor results at times. Though being as such more risky, an industry with a larger appetite for innovative but potentially inefficient projects might also be rewarded with larger returns (i.e., higher output per capita). Given this ambiguity, we also specify a coefficient of variation (COV) calculated as the standard deviation over the mean of CE per country. Table 8 shows the results of the main growth models analyzed in Table 7, including the COV measure of efficiency. All main results remain intact. Higher mean cost efficiency continues to exert an economically and statistically significant positive output effect yet, the interaction effect disappears. The measure of

[7] The standard errors of the coefficients for the marginal effects are calculated with the use of the delta method (Oehlert, 1992).
[8] Model 6 and model 7 of Table 7 are used to create Figure 1. Models 8 and 9 of Table 7 are used to create Figure 2.

uncertainty, COV, is in most specifications also significantly positive. Hence, a dispersed banking system in itself appears not to be a reason for concern to policy makers.

Finally, as a robustness check we present in Table 9 growth regressions specifying GDP per worker as a simple measure of productivity. Because better financial intermediation should spur economic growth by reducing the allocative inefficiency when selecting investment projects, this effect should be particularly apparent when testing a simple productivity measure more directly. All results remain qualitatively identical and therefore confirm the individual quality effect of better banks for both output and productivity.

3.5 Income differences

So far all countries in the sample are treated equally. But arguably, efficiency may be more important if a country is well developed while any increase in quantity could be relevant in less developed countries (Rioja and Valev 2004, Rousseau and Wachtel 2010). To test if there is a difference between the development of the country and the quantity and quality effects on economic growth we separate according subsamples and redo the analysis of Table 7. The results are shown in Table 10. The left panel features results for low and lower middle income countries (columns [1] to [3]) as defined by the World Bank. The right panel shows results for the subsample of higher middle and high income countries (columns [4] to [6]). Because data on stock market total value traded is unavailable for many less developed countries, we focus on the quantity and quality of the banking sector.

The specification of quantity effects only (columns 1 and 4) shows that merely increasing the size of the banking system does not affect economic growth for low and lower middle income countries. The direct effect of increasing private credit in developed economies is even

significantly negative, indicating that more credit is not necessarily allocated in such a way that it spurs growth.

The quality effect, in turn, is important for both developing and developed countries alike as shown in columns [2] and [5]. The cost efficiency variable (CE) is highly significant for both samples and the larger magnitude for the latter subsample corroborates the notion that especially in more mature economies it is better rather than more credit that facilitates growth.

The quality and the quantity of financial services provided are likely to interact with another. Two results in the according specifications in columns [3] and [6] of Table 10 are noteworthy. First, the direct positive effect of a better average intermediation quality remains significantly positive only for the developed country subsample. This result corroborates that the naïve quantity-oriented finance-growth nexus weakens considerably for economies with fairly well developed financial systems (Rousseau and Wachtel 2010). Second, point estimates of both the interaction term as well as the quantity indicator are insignificant in both subsamples.

This does neither imply, however, that the effect of increasing the depth of the financial system nor improving it's efficiency have no growth effects. Due to the specification of an interaction term, we need to focus on total marginal effects rather than parameter estimates as before. The marginal effects of cost efficiency as well as private credit by deposit money banks evaluated at the mean are significantly positive significant for the developing countries subsample. This result implies that both expanding the financial system as well as enhancing bank efficiency spur economic growth. This result is confirmed, and even stronger, in the high-income sample. In contrast, the impact of the quantity measure on economic growth is never significant.

All in all these findings indicate that for low income countries quantity and quality are important for economic growth, where high income countries only can benefit from an increase in quality.

4. Conclusion

This paper introduces a direct measure of financial intermediation quality to analyze the finance-growth nexus. This measure of banks' efficiency, rooted in microeconomic banking theory, provides a relative measure of financial intermediaries' abilities to convert scarce resources relatively efficiently into financial services and products. Two decisive advantages compared to previously employed quantity-oriented measures (e.g., aggregate credit to economic output) are as follows.

First, bank efficiency is conceptually much more closely related to the theoretical notion that better rather than more financial intermediaries foster growth. Second, because it measures relative ability within a peer group of banks, the measure is less prone to valid concerns of reverse causality. Independent of an expanding or a contracting economy, bankers should always be able to demand scarce resources in optimal proportions and choose production plans that invest in the most profitable projects at given risk.

This paper sheds new light on the quality-based finance-growth nexus for a comprehensive sample of more than 100 countries between 1996 and 2005. We report that the relation between volume-based measures of financial development and economic growth is weak. We also observe that countries' mean cost efficiencies are, both individually and jointly with volume measures, significantly and positively related to output growth. The effect is also economically significant as a 0.1 increase in efficiency increases GDP per worker by approximately one percent.

Our evidence further underpins the importance of considering the benefits from the interaction of an efficient banking system with deep financial markets. At the same time, the analysis of conditional marginal effects highlights that, only beyond a certain minimum level

of approximately 70 percent cost efficiency, financial-market deepening has a significant effect on growth. In turn, we find little evidence supporting a positive relation between the relative volume of credit and growth that received overwhelming attention in the literature in recent years.

The positive growth effect of improved intermediation quality is particularly pronounced for developed economies, which corroborates the notion that merely expaning credit in fairly developed financial systems is not a panacea to spur further growth. For developing countries, in turn, both quality but also financial quantity expansion is beneficial for economic growth.

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Table 1: Descriptive statistics banking data

Variable	Obs	Mean	Std. Dev.	Min	Max
ln(*CL*)	44945	6.125	1.960	1.131	12.670
ln(*SOEA*)	44945	5.975	2.004	1.281	12.582
ln(*PE*)	44945	-4.342	0.590	-7.050	-2.618
ln(*IE*)	44945	1.087	0.920	-2.493	3.959
ln(TC)	44945	3.262	1.868	-1.609	11.234
EZ	44945	0.002	0.042	0.000	1.000
ln(*EP*)	44945	4.148	1.851	0.000	12.177
ln(*EN*)	44945	0.009	0.213	0.000	9.042
GOV	44945	2.796	1.719	-4.197	4.861
SAVING	44945	0.218	0.413	0.000	1.000
COOP	44945	0.348	0.476	0.000	1.000

CL stands for consumer loans; *SOEA* stands for securities and other operating assets; *PE* stands for personnel expenses over total assets; *IE* stands for interest expenses over total assets. *EZ*, *EP*, and *EN* stand for small equity (xxx <equity < xxx) position, large equity position (> xxx), and a negative equity position (< xxx) respectively. *GOV* is a score component of the Kaufmann (2006) institutions data; *SAVING* and *COOP* are dummy variables that indicate a savings or cooperative bank.

Table 2: Correlation banking data

	ln(*CL*)	ln(*SOEA*)	ln(*PE*)	ln(*IE*)	lTOC	*EZ*	ln(*EP*)	ln(*EN*)	*GOV*	*SAVING*	*COOP*
ln(*CL*)	1										
ln(*SOEA*)	0.840	1									
ln(*PE*)	-0.199	-0.224	1								
ln(*IE*)	-0.088	-0.078	0.164	1							
lTOC	0.921	0.876	0.032	0.007	1						
EZ	-0.067	-0.071	-0.013	-0.004	-0.069	1					
ln(*EP*)	0.890	0.877	-0.132	-0.004	0.922	-0.093	1				
ln(*EN*)	0.013	-0.005	0.024	-0.007	0.048	-0.002	-0.092	1			
GOV	0.033	-0.008	-0.228	-0.230	-0.123	-0.022	-0.107	-0.043	1		
SAVING	0.098	0.027	-0.102	0.037	0.006	0.003	-0.002	-0.022	0.292	1	
COOP	-0.223	-0.208	0.067	-0.292	-0.288	-0.010	-0.326	-0.002	0.183	-0.385	1

CL stands for consumer loans; *SOEA* stands for securities and other operating assets; *PE* stands for personnel expenses over total assets; *IE* stands for interest expenses over total assets. *EZ*, *EP*, and *EN* stand for small equity (xxx <equity < xxx) position, large equity position (> xxx), and a negative equity position (< xxx) respectively. *GOV* is a score component of the Kaufmann (2006) institutions data; *SAVING* and *COOP* are dummy variables that indicate a savings or cooperative bank.

Table 3: Descriptive statistics growth data

Variable	Obs	Mean	Std. Dev.	Min	Max
Ln GDPPC	1794	7.567	1.585	4.085	10.863
Population growth	1787	1.462	0.300	0.115	2.581
Stock market total value traded to GDP	1011	-3.287	2.502	-13.816	1.270
Private credit by deposit money banks to GDP	1466	-1.400	1.048	-5.201	0.779
Control of corruption	1343	0.053	1.023	-1.776	2.516
Rule of law	1356	0.026	0.965	-1.908	2.265
Regulatory quality	1361	0.102	0.883	-3.875	3.344
Government effectiveness	1361	0.087	0.981	-2.175	2.569
Political stability	1331	-0.070	0.932	-2.974	1.694
Voice and accountability	1367	-0.007	0.935	-2.133	1.712
CE	1171	0.7405	0.135	0.212	0.967

GDPPC stands for gross domestic product per capita. CE means cost efficiency and is scaled from 0 (lowest) to 1 (full).

Table 4: Correlation growth data

		1	2	3	4	5	6	7	8	9	10	11
Ln GDPPC	1	1										
Population growth	2	-0.2056	1									
Stock market total value traded to GDP	3	0.6107	-0.0418	1								
Private credit by deposit money banks to GDP	4	0.7157	0.0719	0.6057	1							
Control of corruption	5	0.8621	-0.1495	0.6246	0.7111	1						
Rule of law	6	0.8635	-0.1688	0.6417	0.7363	0.9723	1					
Regulatory quality	7	0.7918	-0.1762	0.5339	0.6935	0.8654	0.8658	1				
Government effectiveness	8	0.8599	-0.1867	0.6552	0.7477	0.9623	0.9613	0.8873	1			
Political stability	9	0.7132	-0.3353	0.3743	0.5559	0.7941	0.8292	0.7599	0.7874	1		
Voice and accountability	10	0.6797	-0.3699	0.4073	0.5365	0.7429	0.749	0.7438	0.7603	0.7275	1	
CE	11	0.2303	0.1285	0.1876	0.1704	0.2156	0.2192	0.1062	0.2023	0.1317	0.0568	1

GDPPC stands for gross domestic product per capita. CE means cost efficiency and is scaled from 0 (lowest) to 1 (full).

Table 5: Cost frontier estimation results

	[1]	[2]	[3]	[4]
Obs	44945	44945	44945	44945
Years	1996-2005	1996-2006	1996-2007	1996-2008
Countries	152	152	152	152
ln(*TC*)				
Constant	1.71***	1.54***	1.587***	1.682***
	[0.044]	[0.044]	[0.038]	[0.038]
ln(*CL*)	0.506***	0.502***	0.492***	0.491***
	[0.005]	[0.006]	[0.005]	[0.005]
ln(*SOEA*)	0.376***	0.384***	0.373***	0.366***
	[0.006]	[0.006]	[0.006]	[0.006]
ln(*PE*)	1.194***	1.186***	1.186***	1.187***
	[0.015]	[0.016]	[0.015]	[0.015]
ln(*IE*)	0.026***	0.067***	0.104***	0.1***
	[0.01]	[0.01]	[0.009]	[0.009]
$\ln(CL)^2$	0.075***	0.073***	0.073***	0.072***
	[0]	[0]	[0]	[0]
$\ln(SOEA)^2$	0.068***	0.066***	0.066***	0.066***
	[0]	[0]	[0]	[0]
$\ln(PE)^2$	0.041***	0.043***	0.043***	0.043***
	[0.002]	[0.002]	[0.002]	[0.002]
$\ln(IE)^2$	0.004***	0.013***	0.009***	0.008***
	[0.001]	[0.001]	[0.001]	[0.001]
ln(*CL*)*ln(*SOEA*)	-0.136***	-0.13***	-0.13***	-0.13***
	[0]	[0]	[0]	[0]
ln(*CL*)*ln(*PE*)	-0.002***	0	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]
ln(*CL*)*ln(*IE*)	0	-0.002***	-0.001	-0.002***
	[0.001]	[0.001]	[0.001]	[0.001]
ln(*SOEA*)*ln(*PE*)	0.004***	0.006***	0.006***	0.006***
	[0.001]	[0.001]	[0.001]	[0.001]
ln(*SOEA*)*ln(*IE*)	-0.007***	-0.008***	-0.005***	-0.003***
	[0.001]	[0.001]	[0.001]	[0.001]
ln(*PE*)*ln(*IE*)	0.001	0.008***	0.011***	0.013***
	[0.002]	[0.002]	[0.002]	[0.002]
T	0.02***	0.023***	0.027***	
	[0.004]	[0.004]	[0.002]	
T^2	-0.001***	0***	-0.002***	
	[0]	[0]	[0]	
ln(*CL*)**T*	-0.002***	-0.003***		
	[0]	[0]		
ln(*SOEA*)**T*	-0.001***	-0.001***		
	[0]	[0]		
ln(*PE*)**T*	-0.001	0		
	[0.001]	[0.001]		
ln(*IE*)**T*	0.006***	0.009***		
	[0.001]	[0.001]		
ln(*EP*)	0.041***	0.052***	0.052***	0.058***
	[0.002]	[0.002]	[0.002]	[0.002]
SAVING	-0.121***	-0.146***	-0.149***	-0.148***
	[0.004]	[0.003]	[0.003]	[0.003]
COOP	-0.135***	-0.147***	-0.149***	-0.149***
	[0.004]	[0.004]	[0.003]	[0.003]
GOV	-0.035***			
	[0.001]			
θ	4.366***	4.133***	4.108***	4.088***
	[0.034]	[0.031]	[0.031]	[0.031]
σ_v	0.172***	0.167***	0.167***	0.167***
	[0.001]	[0.001]	[0.001]	[0.001]

Standard errors in brackets, * significant at 10%, ** significant at 5%, *** significant at 1%. *CL* stands for consumer loans; *SOEA* stands for securities and other operating assets; *PE* stands for personnel expenses over total assets; *IE* stands for interest expenses over total assets. *EP* is the equity position of the bank. *GOV* is a score component of the Kaufmann (2006) institutions data; *SAVING* and *COOP* are dummy variables that indicate a savings or cooperative bank.

Table 6: Efficiency scores per country[9]

Nr	Country	Mean	SD	T	N	Nr	Country	Mean	SD	T	N	Nr	Country	Mean	SD	T	N
1	Albania	67.3%	6.5%	6	40	53	Gambia, The	76.7%	6.4%	8	14	105	New Zealand	83.9%	2.9%	10	51
2	Algeria	57.0%	16.0%	8	20	54	Georgia	68.1%	7.9%	7	17	106	Niger	65.7%	11.2%	8	13
3	Angola	38.3%	11.1%	9	28	55	Germany	83.3%	1.6%	9	13595	107	Nigeria	67.8%	4.4%	8	38
4	Antigua and Barbados	58.9%	12.2%	2	2	56	Ghana	59.9%	10.6%	9	75	108	Norway	80.0%	2.6%	9	352
5	Argentina	77.5%	10.6%	10	379	57	Greece	85.4%	1.5%	9	130	109	Oman	82.5%	9.5%	9	50
6	Armenia	65.2%	11.3%	9	37	58	Guatemala	76.6%	3.4%	5	8	110	Pakistan	81.8%	4.1%	9	159
7	Australia	83.5%	2.3%	10	117	59	Guinea	49.4%	8.6%	4	6	111	Panama	77.2%	7.7%	9	47
8	Austria	74.1%	2.2%	9	1100	60	Guyana	79.7%	4.6%	8	24	112	Papua New Guinea	84.9%	4.0%	7	20
9	Azerbaijan	68.9%	22.7%	4	9	61	Haiti	70.3%	4.8%	2	2	113	Paraguay	56.2%	17.5%	9	103
10	Bahamas, The	81.2%	6.3%	6	14	62	Honduras	90.6%	2.7%	9	74	114	Peru	62.6%	7.7%	9	123
11	Bahrain	89.8%	2.9%	9	32	63	Hong Kong, China	81.4%	4.6%	9	70	115	Philippines	65.3%	13.7%	9	42
12	Bangladesh	85.5%	1.8%	8	200	64	Hungary	72.3%	11.1%	8	17	116	Poland	81.4%	4.1%	9	80
13	Belarus	70.2%	12.9%	8	25	65	Iceland	77.0%	7.2%	9	49	117	Portugal	72.8%	2.0%	9	145
14	Belgium	83.3%	2.7%	9	367	66	India	81.4%	3.2%	9	503	118	Romania	67.9%	21.1%	9	27
15	Belize	84.6%	6.7%	2	2	67	Indonesia	75.2%	13.6%	9	327	119	Russian Federation	64.0%	13.0%	9	376
16	Benin	68.2%	5.1%	8	32	68	Iran, Islamic Rep.	86.0%	9.5%	6	6	120	Rwanda	57.6%	8.3%	8	23
17	Bhutan	86.6%	4.9%	8	9	69	Ireland	70.7%	14.3%	8	13	121	Samoa	73.1%	10.5%	3	3
18	Bolivia	62.3%	13.5%	9	68	70	Israel	88.0%	3.3%	9	70	122	Saudi Arabia	88.3%	2.8%	9	35
19	Botswana	80.1%	6.4%	10	39	71	Italy	80.1%	13.8%	10	5077	123	Senegal	66.3%	6.0%	9	47
20	Brazil	77.8%	1.9%	9	587	72	Jamaica	80.0%	6.5%	7	21	124	Serbia and Montenegro	54.8%	21.1%	4	40
21	Brunei Darussalam	49.3%	12.8%	6	6	73	Japan	79.4%	3.0%	9	3517	125	Seychelles	84.5%	10.1%	4	5
22	Bulgaria	64.9%	14.6%	4	41	74	Jordan	81.5%	3.3%	9	33	126	Sierra Leone	73.4%	5.9%	9	29
23	Burkina Faso	68.0%	4.1%	8	41	75	Kazakhstan	71.5%	16.6%	9	40	127	Singapore	69.5%	9.4%	9	74
24	Burundi	73.9%	11.5%	8	20	76	Kenya	80.1%	4.7%	9	133	128	Slovak Republic	57.8%	11.7%	9	70
25	Cambodia	69.9%	10.6%	4	13	77	Korea, Rep.	71.0%	8.2%	9	134	129	Slovenia	83.5%	3.3%	9	43
26	Cameroon	68.9%	10.2%	8	32	78	Kuwait	86.3%	3.6%	8	32	130	South Africa	77.9%	12.7%	10	108
27	Canada	78.1%	5.7%	9	89	79	Kyrgyz Republic	50.2%	0.0%	1	2	131	Spain	84.4%	0.8%	9	1006
28	Cape Verde	66.9%	8.0%	5	13	80	Latvia	65.8%	13.2%	9	136	132	Sri Lanka	74.7%	11.1%	6	8
29	Central African Republic	84.7%	0.5%	2	2	81	Lebanon	76.8%	5.4%	9	215	133	Sudan	62.9%	18.6%	9	39
30	Chad	81.3%	7.2%	5	8	82	Lesotho	59.3%	7.0%	8	18	134	Suriname	72.3%	5.1%	8	8
31	Chile	69.8%	2.5%	9	197	83	Libya	69.0%	15.6%	5	7	135	Swaziland	89.5%	1.8%	8	24
32	China	55.7%	10.8%	8	24	84	Lithuania	77.7%	4.7%	9	73	136	Sweden	76.6%	3.5%	9	395
33	Colombia	69.4%	6.4%	9	222	85	Luxembourg	78.1%	1.8%	9	692	137	Switzerland	80.7%	1.6%	9	2047
34	Congo, Dem. Rep.	28.5%	5.9%	3	0	86	Macao, China	79.2%	6.1%	4	22	138	Tanzania	80.4%	5.3%	2	2
35	Congo, Rep.	28.5%	5.9%	3	5	87	Macedonia, FYR	64.2%	11.1%	9	57	139	Thailand	73.3%	15.7%	8	34
36	Costa Rica	88.0%	1.7%	9	134	88	Madagascar	50.8%	9.4%	8	24	140	Togo	63.3%	18.4%	9	17
37	Croatia	80.8%	3.9%	8	165	89	Malawi	81.5%	7.3%	8	24	141	Trinidad and Tobago	80.6%	4.9%	10	42
38	Cote d'Ivoire	74.4%	5.1%	8	38	90	Malaysia	71.6%	16.5%	10	240	142	Tunisia	88.1%	6.0%	9	96
39	Cyprus	74.4%	8.1%	9	69	91	Maldives	65.7%	9.6%	5	5	143	Turkey	78.4%	10.8%	8	34
40	Czech Republic	56.9%	14.7%	9	142	92	Mali	72.0%	11.2%	9	33	144	Ukraine	63.4%	17.1%	9	131
41	Denmark	78.2%	1.6%	9	664	93	Malta	85.4%	4.5%	10	49	145	United Arab Emirates	88.3%	1.8%	8	79
42	Djibouti	89.4%	1.2%	3	4	94	Mauritania	54.8%	19.4%	8	14	146	United Kingdom	76.1%	6.4%	10	314
43	Dominican Republic	68.5%	7.1%	9	103	95	Mauritius	84.9%	4.7%	9	46	147	United States	83.6%	2.5%	9	4518
44	Ecuador	62.6%	10.9%	8	97	96	Mexico	80.2%	3.7%	5	56	148	Uruguay	77.5%	14.7%	8	68
45	El Salvador	72.5%	13.3%	9	61	97	Micronesia, Fed. Sts.	91.1%	0.0%	1	1	149	Uzbekistan	71.5%	11.7%	8	27
46	Eritrea	33.7%	5.9%	2	2	98	Moldova	78.0%	5.4%	9	57	150	Venezuela, RB	73.8%	5.5%	9	250
47	Estonia	71.6%	13.2%	9	50	99	Mongolia	56.7%	17.3%	6	19	151	Vietnam	77.1%	4.7%	9	99
48	Ethiopia	90.6%	6.0%	10	39	100	Morocco	72.8%	3.2%	9	58	152	Zambia	79.6%	8.0%	7	27
49	Fiji	80.0%	3.8%	2	2	101	Mozambique	62.7%	10.0%	9	39						
50	Finland	71.2%	4.0%	9	52	102	Namibia	87.8%	1.9%	9	29		Total	74%	13.6%	1169	44829
51	France	79.0%	2.6%	9	1944	103	Nepal	79.5%	4.2%	9	74						
52	Gabon	89.5%	4.9%	4	4	104	Netherlands	85.1%	3.9%	9	94						

Note: T is the number of time periods available and N is the total number of bank observations for the country

[9] These efficiency scores are obtained with a slightly different dataset than the one that is used for Table 5. The dataset used for Table 5 excludes outliers.

Table 7: Baseline growth regressions with financial depth, cost efficiency, and interaction terms

	[1]	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*	*[7]*	*[8]*	*[9]*
	Markets	*Banks*	*Both MKT*	*Both FI*	*All*	*mkt int*	*mkt int all*	*FI int*	*FI int all*
Lagged Log GDP per capita	0.838***	0.659***	0.796***	0.682***	0.744***	0.806***	0.745***	0.807***	0.700***
	[0.051]	[0.120]	[0.039]	[0.104]	[0.068]	[0.043]	[0.084]	[0.084]	[0.082]
CE			0.122***	0.131***	0.180***	0.262***	0.327***	0.094*	0.269***
			[0.035]	[0.048]	[0.040]	[0.062]	[0.090]	[0.051]	[0.074]
Stock market total value	0.007		0.005		0.009*	-0.014**	-0.021		0.009
traded to GDP	[0.006]		[0.005]		[0.006]	[0.007]	[0.016]		[0.007]
Private credit by deposit		0.039		0.027	0.024		0.024	0.018	-0.012
money banks to GDP		[0.027]		[0.020]	[0.018]		[0.019]	[0.028]	[0.029]
Population growth	-0.033**	-0.02	-0.031	-0.021	-0.037**	-0.034**	-0.034***	-0.022	-0.035***
	[0.015]	[0.017]	[0.019]	[0.019]	[0.014]	[0.014]	[0.012]	[0.019]	[0.012]
*CE pooled * Stock market*						0.029**	0.040**		
						[0.011]	[0.019]		
*CE pooled * Private credit*								-0.023	0.055
								[0.027]	[0.043]
	1.420***	2.709***	1.665***	2.445***	2.098***	1.487***	1.978***	1.476**	2.403***
Constant	[0.418]	[0.941]	[0.328]	[0.824]	[0.575]	[0.368]	[0.695]	[0.662]	[0.672]
Time dummies	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Sargan Test	69.75	77.92	94.59	99.35	79.39	80.59	75.03	115.5	80.33
Sargan Prob	0.182	0.0599	0.271	0.172	0.435	0.398	0.349	0.443	0.21
AR1	-3.577	-2.469	-3.397	-3.061	-2.961	-2.8	-2.399	-3.975	-2.745
AR2	-1.468	-1.188	-1.512	-0.933	-1.486	-1.299	-1.289	-0.96	-1.547
Observations	674	898	638	805	576	638	576	805	576
Countries	104	139	102	135	95	102	95	135	95
Number of instruments	71	71	99	99	91	91	85	127	85

Notes: All variables in logs. GDP measured in 2000 USD. Population growth includes three percent annual depreciation. One-step estimates covering period 1996 to 2005. Sargan test from two-step estimates. Robust standard errors in brackets, * significant at 10%. ** significant at 5%; *** significant at 1%. The lag length for the instruments is chosen such that the number of instruments is about the same as the number of countries. All six Kaufmann variables included as additional instruments. The Sargan test is based on the Arellano Bond two-step estimator.

Table 8: Growth regressions using the uncertainty of cost efficiency

	[1] *Both MKT*	*[2]* *Both FI*	*[3]* *All*	*[4]* *mkt int*	*[5]* *mkt int all*	*[6]* *FI int*	*[7]* *FI int all*
Lagged Log GDP per capita	0.812***	0.697***	0.729***	0.779***	0.722***	0.718***	0.722***
	[0.040]	[0.120]	[0.066]	[0.040]	[0.072]	[0.133]	[0.067]
CE	0.209***	0.233***	0.230***	0.227***	0.322***	0.232***	0.209***
	[0.040]	[0.052]	[0.051]	[0.075]	[0.080]	[0.073]	[0.070]
Stock market total value	0.005		0.007	-0.003	-0.015		0.006
traded to GDP	[0.005]		[0.006]	[0.013]	[0.014]		[0.006]
Private credit by deposit		0.024	0.022		0.028	0.014	0.011
money banks to GDP		[0.024]	[0.017]		[0.018]	[0.033]	[0.029]
Population growth	-0.024	-0.003	-0.023	-0.023	-0.021	-0.008	-0.023
	[0.018]	[0.023]	[0.015]	[0.016]	[0.015]	[0.021]	[0.016]
*CE pooled * Stock market*				0.01	0.028*		
				[0.015]	[0.016]		
*CE pooled * Private credit*						-0.001	0.017
						[0.024]	[0.040]
COV CE	0.059	0.083*	0.066	0.026	0.056	0.073	0.039
	[0.041]	[0.050]	[0.050]	[0.048]	[0.046]	[0.048]	[0.047]
Constant	1.454***	2.228**	2.158***	1.721***	2.156***	2.060**	2.237***
	[0.342]	[0.956]	[0.574]	[0.340]	[0.604]	[1.044]	[0.577]
Time dummies	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Sargan test	85.5	97.43	82.51	78.22	79.94	100.9	84.59
Sargan prob	0.263	0.356	0.165	0.261	0.575	0.319	0.431
AR1	-4.815	-3.312	-4.281	-5.05	-4.284	-3.428	-4.415
AR2	-2.413	-1.495	-2.582	-2.346	-2.478	-1.464	-2.59
Observations	605	717	545	605	545	717	545
Countries	99	121	92	99	92	121	92
Number of instruments	91	106	85	85	98	109	98

Notes: All variables in logs. GDP measured in 2000 USD. Population growth includes three percent annual depreciation. One-step estimates covering period 1996 to 2005. Sargan test from two-step estimates. Robust standard errors in brackets, * significant at 10%. ** significant at 5%; *** significant at 1%. The lag length for the instruments is chosen such that the number of instruments is about the same as the number of countries. All six Kaufmann variables included as additional instruments. The Sargan test is based on the Arellano Bond two-step estimator. *COV* is the coefficient of variation.

Table 9: Growth regressions using GDP per worker

	[1] *Markets*	*[2]* *Banks*	*[3]* *Both MKT*	*[4]* *Both FI*	*[5]* *All*	*[6]* *mkt int*	*[7]* *mkt int all*	*[8]* *FI int*	*[9]* *FI int all*
Lagged log GDP per worker	0.870***	0.698***	0.788***	0.690***	0.712***	0.814***	0.734***	0.756***	0.683***
	[0.053]	[0.137]	[0.043]	[0.108]	[0.078]	[0.045]	[0.089]	[0.103]	[0.084]
CE			0.119***	0.170***	0.228***	0.223***	0.364***	0.114*	0.311***
			[0.034]	[0.054]	[0.053]	[0.063]	[0.100]	[0.069]	[0.090]
Stock market total value	0.004		0.003		0.007	-0.012	-0.026*		0.006
traded to GDP	[0.005]		[0.005]		[0.007]	[0.008]	[0.015]		[0.006]
Private credit by deposit		0.043		0.034	0.034		0.037*	0.032	-0.004
money banks to GDP		[0.033]		[0.024]	[0.022]		[0.022]	[0.034]	[0.034]
Population growth	-0.025	-0.031*	-0.026	-0.03	-0.034**	-0.021	-0.032**	-0.026	-0.031**
	[0.020]	[0.018]	[0.021]	[0.020]	[0.016]	[0.022]	[0.015]	[0.019]	[0.014]
*CE pooled * Stock market*						0.023*	0.043**		
						[0.012]	[0.019]		
*CE pooled * Private credit*								-0.022	0.065
								[0.032]	[0.051]
Constant	1.243***	2.685**	1.883***	2.634***	2.565***	1.572***	2.258***	2.076**	2.764***
	[0.480]	[1.193]	[0.389]	[0.952]	[0.730]	[0.417]	[0.818]	[0.903]	[0.753]
Time dummies	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Sargan test	72.3	83.95	97.13	98.23	69.97	95.46	80.51	104	79.68
Sargan prob	0.133	0.0223	0.215	0.193	0.155	0.41	0.206	0.205	0.225
AR1	-3.61	-2.554	-3.162	-3.05	-2.516	-2.809	-2.194	-3.386	-2.457
AR2	-1.515	-1.724	-1.091	-0.943	-1.352	-1.035	-1.139	-0.984	-1.432
Observations	674	894	638	802	576	638	576	802	576
Countries	104	138	102	134	95	102	95	134	95
Number of instruments	71	71	99	99	72	106	85	106	85

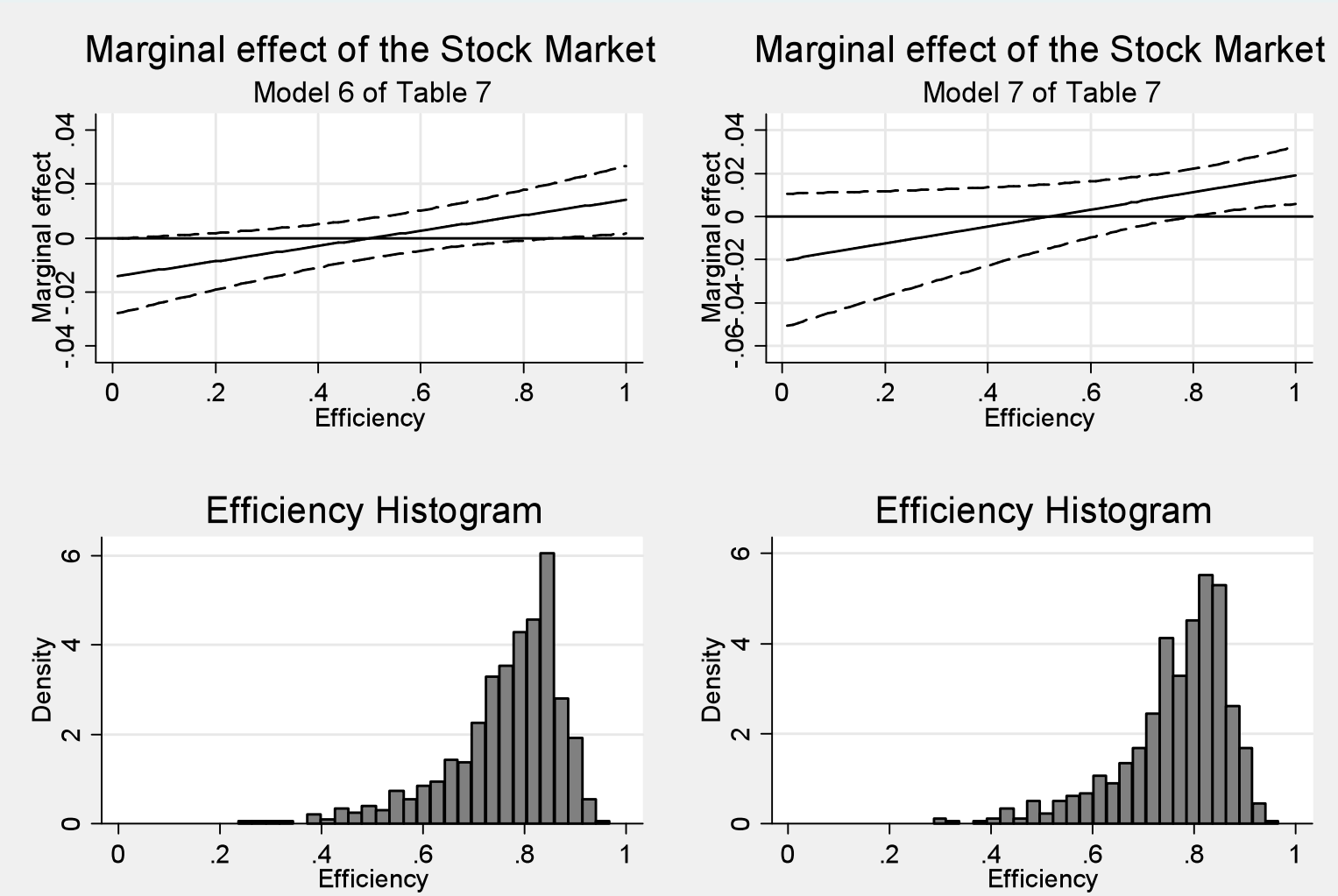
Notes: All variables in logs. GDP measured in 2000 USD. Population growth includes three percent annual depreciation. One-step estimates covering period 1996 to 2005. Sargan test from two-step estimates. Robust standard errors in brackets, * significant at 10%. ** significant at 5%; *** significant at 1%. The lag length for the instruments is chosen such that the number of instruments is about the same as the number of countries. All six Kaufmann variables included as additional instruments. The Sargan test is based on the Arellano Bond two-step estimator.

Table 10: Estimates for sample split

	Low and Lower middle Income			High and higher middle income		
	[1]	[2]	[3]	[4]	[5]	[6]
	Quant	Qual	Both	Quant	Qual	Both
Lagged Log GDP per Capita	0.692***	0.446**	0.508***	0.913***	0.820***	0.854***
	[0.144]	[0.194]	[0.139]	[0.063]	[0.079]	[0.078]
CE		0.241***	0.165		0.298***	0.221**
		[0.074]	[0.154]		[0.066]	[0.100]
Private Credit by Deposit	0.043	0.073*	0.066	-0.037**	-0.019	0.01
Money Banks to GDP	[0.032]	[0.038]	[0.053]	[0.018]	[0.027]	[0.051]
Population growth	0.012	0.009	0.019	-0.041**	-0.038*	-0.036*
	[0.033]	[0.045]	[0.043]	[0.020]	[0.022]	[0.021]
*CE * Private credit*			-0.016			-0.039
			[0.069]			[0.059]
Constant	2.057**	3.524***	3.127***	0.839	1.478**	1.221*
	[0.954]	[1.271]	[0.920]	[0.593]	[0.722]	[0.708]
Time dummies	yes	yes	yes	yes	yes	yes
marginal effects						
CE (marg)			0.197***			0.25***
			[0.0639]			[0.0731]
Credit (marg)			0.0551**			-0.0204
			[0.0248]			[0.0239]
Sargan Test	37.94	35.07	43.16	43.98	41.81	44.79
Sargan Prob	0.337	0.24	0.192	0.142	0.0743	0.149
AR1-test	-2.709	-1.413	-2.138	-2.838	-2.456	-2.478
AR2-test	-0.636	-0.356	-0.399	-1.147	-1.004	-0.975
Observations	486	416	416	412	389	389
Countries	75	72	72	64	63	63
Number of instruments	46	42	49	46	42	49

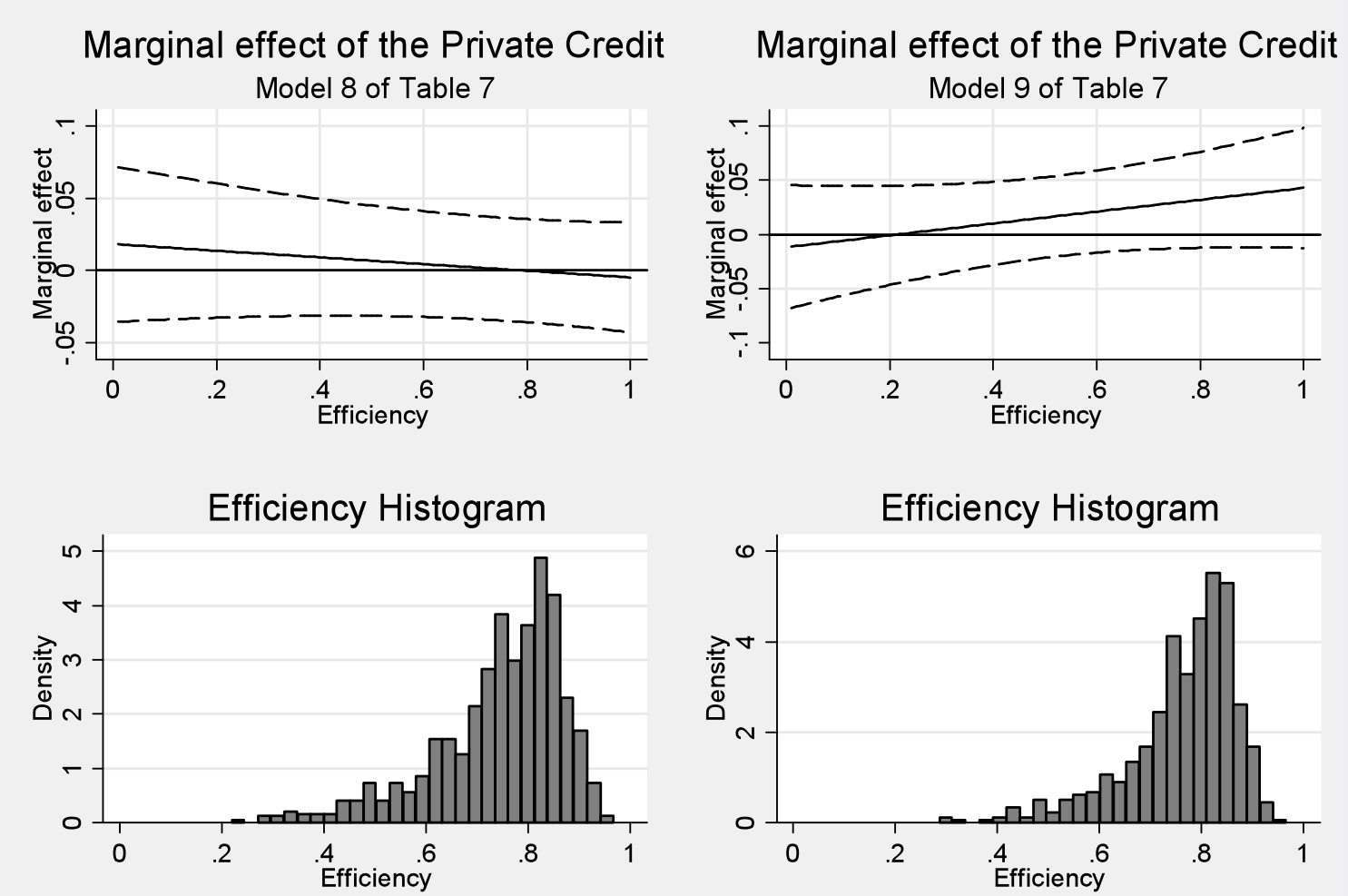
Notes: All variables in logs. GDP measured in 2000 USD. Population growth includes three percent annual depreciation. One-step estimates covering period 1996 to 2005. Sargan test from two-step estimates. Robust standard errors in brackets, * significant at 10%. ** significant at 5%; *** significant at 1%. The lag length for the instruments is chosen such that the number of instruments does not exceed the number of countries. All six Kaufmann variables included as additional instruments. CE (marg) and Credit (marg) denote the marginal effects of Cost efficiency and Private Credit by Deposit Money Banks to GDP evaluated at the mean respectively. The Sargan test is based on the Arellano Bond two-step estimator.

Figure 1: Marginal effect of the stock market on economic growth, conditional on efficiency



The scattered lines denote the 95% confidence interval.

Figure 2: Marginal effect of private credit on economic growth, conditional on efficiency



The scattered lines denote the 95% confidence interval.