Is Bank Profitability that Good?

Evidence on the Link between Bank Profitability and Growth

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Abstract

The importance of bank profitability is regularly stressed in the public debate because of its influence on financial stability. However greater bank profits can hamper economic growth since they can be associated with lower competition reducing access to credit. The aim of this paper is to provide the first investigation of the impact of bank profitability on economic growth. We analyze this issue on a sample of 133 countries for the period 1999-2013 with OLS, fixed effects, and system GMM regressions. Our findings support the view that bank profitability fosters economic growth. Additional tests confirm the robustness of this conclusion. Thus measures that favor bank profitability are growth-enhancing.

JEL Codes: G21, O16, O40.
Keywords: bank profitability, financial development, economic growth, finance-growth nexus.

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1. Introduction

On July 1, 2016, when questioned about the economic stimulus that ECB could launch, the ECB's Chief Economist, Peter Praet, said that "the profitability of the [banking] sector will be a key consideration" in assessing how the ECB can help to stimulate the Eurozone economy.

This declaration illustrates the importance of bank profitability for decades for central banks and academics. The financial crisis and the exceptional decrease of interest rates have raised fresh concerns for bank profitability. While the financial crisis has eroded bank profitability in developed countries, low interest rates diminish bank profits by reducing bank interest receivables faster than interest expenditures. Bank profitability has therefore been put at the top of the agenda of decision-makers.[1]

A natural question then emerges to know why bank profitability matters. This concern appears to be motivated by the beneficial impact of bank profitability on financial stability. Bank profitability is considered to strengthen financial stability for several reasons. A more profitable bank can increase its capital base and foster its viability. Moreover managers of profitable banks have lower incentives to take excessive risk since they can lose more shareholders value if downside risks realize (Keeley, 1990). Measures of bank profitability have therefore been commonly used in early warning models to predict distress of banks, like the CAMELS-rating system. Empirical evidence has shown that greater profitability is associated with lower probability of bank failure (e.g., Claeys and Schoors, 2007, for Russia; Arena, 2008, for Latin America).

However the consensual view that bank profitability fosters financial stability does not mean that it is beneficial for economic growth. It appears as a fundamental issue since economic growth is an ultimate objective for decision-makers.

Bank profitability can be detrimental to economic growth since it is associated with low competition / high concentration. While competition and concentration are driving forces of profitability in all industries, in the field of banking they have been shown to

[1] The President of the Dutch central bank, Klas Knot, observed that "The low interest rates (…) put pressure on banks' profitability" (4 October 2016), while ECB Executive Board member Yves Mersch considered that banks that can't withstand temporary strains on their earnings may have bigger questions to answer about their future viability as businesses (3 October 2016).

influence access to credit. Namely, Beck, Demirgüc-Kunt, and Maksimovic (2004) have found that greater bank concentration enhances financing obstacles perceived by firms, while Love and Peria (2012) and Ryan, O'Toole, and McCann (2014) conclude that bank competition alleviates credit constraints for firms. Thus, low competition / high concentration in the banking industry can lead to constrained access to credit which hampers economic growth. Cetorelli and Gambera (2001) find evidence that bank concentration depresses growth while Claessens and Laeven (2005) show a positive impact of bank competition on growth. Therefore, greater profitability can hamper growth by being associated with greater financing obstacles.

In addition, the view that bank profitability favors financial stability and positively influences growth through this channel can be challenged through two angles. First, Boyd and De Nicolo (2005) criticize the positive relation between bank profitability and financial stability. They show that bank competition is beneficial for financial stability, based on the effect of competition on a borrower's behavior. By reducing loan rates, bank competition makes it easier for borrowers to repay loans, which reduces their incentives to engage in moral-hazard behavior such as shifting. As a consequence, lower profitability associated with fiercer competition should not necessarily foster financial stability.

Second, the commonly accepted view that financial stability enhances growth has been criticized. Rancière, Tornell and Westermann (2008) find that countries with occasional financial crises have greater growth than countries with stable financial systems. This conclusion is explained by the fact that financial liberalization can drive more frequent crises but can also fosters financial development and contributes to growth through this channel.

Therefore, the view that bank profitability would be positive for economic growth is far from certain. Surprisingly this question has never been investigated in the literature. To fill this loophole, the objective of this research is to examine the causal effect of bank profitability on economic growth. To this end, we perform a cross-country analysis on a sample of 133 countries over the period 1999 to 2013. We use different empirical approaches to investigate this relation. We perform standard OLS and panel fixed effects

estimations to provide a first glance. We then perform dynamic panel GMM estimations in line with Beck and Levine (2004) and Arcand, Berkes and Panizza (2015).

This study therefore provides a major contribution to the literature on bank profitability. An extensive literature has assessed which variables influence bank profitability (Goddard, Molyneux and Wilson, 2004; Garcia-Herrero, Gavila and Santabarbara, 2009; Lee and Hsieh, 2013; Chronopoulos et al., 2015) and studied the dynamics of bank profitability over the business cycle (Albertazzi and Gambacorta, 2009; Bolt et al., 2012). Our work provides the first evidence on the growth effects of bank profitability and therefore represents an important step towards understanding the relevance of favoring this dimension. In addition, our work adds a new angle to the literature on the finance-growth nexus. This huge literature summarized by Levine (2005) has identified the beneficial role of credit supplied by banks on growth, even if this positive influence can be reversed when banking development exceeds a certain threshold (Arcand, Berkes and Panizza, 2015). We contribute to the understanding of the macroeconomic effects of banking development by considering bank behavior rather than focusing on the outcome of banks.

The normative implications of our work are of particular relevance for the authorities. A positive effect of bank profitability on economic growth would confirm the major importance of fostering bank profitability. Reversely, to find a negative impact would mean that bank profitability can harm economic growth. Hence favoring bank profitability should not be promoted by pro-growth authorities.

This study is divided into four sections. Section 2 presents data and methodology. Section 3 reports the estimations. Section 4 provides concluding remarks.

2. Data and methodology

2.1 Data

We use country-level data from several sources to perform our study. Data on financial variables including bank profitability are obtained from the 2015 edition of the Global Financial Development Database (GFDD) from the World Bank. These data are

only available from 1999 onwards, which is the starting year of our analysis. Macroeconomic indicators including GDP growth come from World Development Indicators database from the World Bank. In addition, we collect data on governance variables from the World Bank governance database and data on monetary policy indicators in the Eurozone from the ECB data warehouse. Taking the restrictions set by the different data sources, we end up with a panel of 133 countries over the period of 1999 to 2013.

The explained variable is the average real GDP per capita growth. It is defined as the annual variation of GDP per capita based on the measurement of GDP per capita in constant 2005 US$.

The key explaining variable is *ROA* which is a standard indicator of bank profitability (Garcia-Herrero, Gavila and Santabarbara, 2009; Bolt et al., 2012). It is defined as the return on assets before tax since we want to avoid the impact of cross-country differences in taxation. We winsorize *ROA* at the 1% level to avoid the influence of outliers.

The set of explaining variables includes five control variables which have been used by Arcand, Berkes and Panizza (2015) in their analysis of the impact of financial development on economic growth, and are standard in the finance-growth nexus literature. The initial level of GDP is defined as the first value of GDP per capita at market prices in constant 2005 US$ (*Initial GDP*). *Education* measures the number of years of schooling for population aged 25 and over. These data come from the Barro and Lee database. Since they are only available on a 5-year basis, gaps are linearly extrapolated. *Inflation* is measured with the annual variation in the consumer price index. We drop observations below -10% to skip outliers. In the regressions, we set negative observations to zero and then apply the inverse hyperbolic sine transformation $LINFL = \ln(INFL + \sqrt{INFL^2 + 1})$. *Openness* is taken into account through the trade in percentage of GDP. We finally consider government size with *Government Expenditures* defined as the percentage in GDP of the general government final consumption expenditures. As Beck and Levine (2004) and Arcand, Berkes and Panizza (2015), we use logs of all control variables.

In addition, we test the potential influence of country-level variables taking into account the environment. To this end, we consider monetary policy using money growth, namely *M2 growth* and *M3 growth*. Banking development is taken into account through two standard indicators first introduced by King and Levine (1993). *Private Credit*, defined as domestic credit to private sector scaled by GDP, is the main indicator of banking development in accordance with its widespread use in the literature. Alternatively, we consider *Bank Share* defined as banks' private credits scaled by the sum of banks' private credit and central bank assets.

Economic development is considered in two ways. We first measure the level of economic development with the mean GDP per capita. Then we employ dummy variables based on World Bank income classification (*High Income, Middle Income, Low Income*). Institutional framework is taken into account through two indicators: *Rule of Law* captures perceptions of the extent to which agents have confidence in and abide by the rules of society, while *Regulatory Quality* captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

Descriptive statistics of all variables are presented in Table 1 and the definitions of variables in the Appendix.

2.2 Methodology

Indexing countries with i and years with t, we carry out the econometric analysis using the following relation:

$$GDP\ per\ capita\ growth_{it} = \alpha_0 + \alpha_1 ROA_{it} + \beta\, Control\ Variables_{it} + \varepsilon_{it} \qquad (1)$$

We estimate the equation (1) with three alternative approaches in accordance with the finance-growth nexus literature. We start our analysis with a set of simple cross-country OLS regressions following Beck and Levine (2004) and Arcand, Berkes and Panizza (2015). Even if this approach has endogeneity flaws, it provides a useful way to analyze the data. To this end, we average all variables by country for the full period of the study. Additionally, we perform these estimations separately for two sub-periods, before and after the 2008 financial crisis. These separate estimations are motivated by the

fact that the impact of bank profitability on growth can have evolved with the financial crisis.

We then exploit the time variation of our sample by performing panel fixed effects estimations. Since we examine growth, we do not consider yearly data but split the full period into 3-year periods in accordance with former literature to disentangle credit cycle effects and to smooth business cycle fluctuations. Our dataset spans from 1999 to 2013, which allows considering five successive periods. In these estimations, we test the addition of a dummy variable for banking crisis years (*Crisis*) as well as the interaction of this variable with bank profitability so that we take into account the potential influence of banking crises on the relation between bank profitability and growth.

Finally, we address the endogeneity issues and the omitted variable bias by moving to dynamic panel estimation procedures. We perform the system GMM dynamic panel estimation technique following Blundell and Bond (1998), which has been first introduced in the finance and growth nexus literature by Levine, Loayza, and Beck (2000) and which has now been extensively used by the literature. We obtain robust standard errors using the Windmeijer (2005) finite sample correction. We consider again data averaged over 3-year periods in this approach.

2.3 Univariate analysis

In Table 1, we describe figures on the ROA. We provide them for the full sample and for groups of countries based on growth to have a first glance of the relation between bank profitability and growth. Countries are sorted according to the real GDP per capita growth so that five groups of countries by growth are created. All statistics on ROA are provided for the full period and for three-year periods. Differences across groups and years are tested performing a Kruskal-Wallis equality-of-population rank test.

When considering figures for the full period, the key finding is the fact that the median ROA increases with the growth performance of countries. Namely, the median ROA is respectively of 1.25%, 1.35%, 1.53%, 1.78%, and 1.85%, for the five groups of countries by increasing order of growth. This finding suggests a positive relation between bank profitability and economic growth.

We observe a median ROA of 1.55% for the full period. A time pattern for the full sample appears, with the period 2005-2007 being the pivotal point. While ROA mainly increases from 1999 to 2007, reaching an average of 2.04% for the whole sample, it then decreases in the aftermath of the financial crisis. Now considering the level of GDP growth in this time-series, it appears that this pattern is only valid for the slowest growing countries. For the other groups, bank profitability is stable over the period.

The analysis by sub-periods tends to show that the period can have influenced this relation. The first period 1999-2001 does not accord with the pattern of greater ROA for fast-growing countries. The following periods are more in accordance with this positive relation, even if only the last sub-period 2011-2013 fully accords with greater ROA for each country group based on growth.

3. Results

This section presents the results of the estimations. We first comment on the main estimations. We continue with results including various interactions with country-level variables to examine how environment can affect the impact of bank profitability on growth. We conclude with robustness tests.

3.1 Main estimations

We report the results on the impact of bank profitability on growth using three approaches.

Table 3 displays the estimations obtained with simple cross-country OLS regressions. These first regressions show no significant coefficient for *ROA* for the full period of study. However when we consider separate sub-periods, we observe that *ROA* is not significant for the period 1999-2007 but significantly positive for the period 2008-2013. Hence, there is some evidence with OLS regressions that bank profitability exerts a positive impact on economic growth. But this effect is only observed for the period started with the financial crisis. However these regressions only give a first glance of the results and help to analyze the data. The endogeneity flaws of this approach and the

absence of consideration of information over time do not allow concluding from these results.

We then exploit the time variation of the sample by estimating panel regressions with fixed effects for banks. Table 4 reports these estimations. The key finding is the significantly positive coefficient of *ROA*. This result is observed in all three specifications. Therefore, the main conclusion of panel fixed effects regressions is the positive relation between bank profitability and economic growth. It supports the conclusion that bank profitability is beneficial for economic growth.

We observe that the *Crisis* variable is significant and negative in line with the intuitive view that banking crisis years are accompanied by lower economic growth. We also find out that the interaction term between *Crisis* and *ROA* is not significant, which suggests that the relation between bank profitability and economic growth is not modified during banking crisis years.

We then turn to system GMM dynamic panel estimations. Even if previous estimations have provided useful analysis for the relation between bank profitability and economic growth, these estimations are the most relevant ones in the sense that they address endogeneity issues and omitted variable bias. Given these properties, system GMM estimations are our preferred ones.

We obtain the same results with system GMM regressions than with panel fixed effects regressions. The main result is the significant and positive coefficient for *ROA* in all three specifications. It supports the view that bank profitability exerts a positive impact on economic growth. In addition, we observe that the interaction term between *ROA* and *Crisis* is not significant, in accordance with the view that banking crisis years do not change the effect of bank profitability on economic growth. This finding suggests that bank profitability is not more pro-growth during banking crisis times. We could have expected bank profitability to be of greater influence for growth during such troubled times, since it can foster financial stability and can then help preventing the detrimental effects of banking crises. However such result is not observed with no significant difference in the impact of bank profitability on growth between non-crisis and crisis years.

We find out that *Crisis* is negative in both tested specifications with this variable, even if it is only significant when the interaction term between *ROA* and *Crisis* is included. It confirms the intuition that banking crisis years are associated with weaker economic growth. We proceed with an analysis of the control variables in system GMM regressions. Initial level of income per capita is significantly positive, which is at odds with the prediction of convergence in levels of income per capita. In accordance with the expected detrimental impact of inflation on growth, *Inflation* is significantly negative in all specifications. The three other control variables, taking into account education, openness, and government expenditures, are not significant.

In a nutshell, our findings support the view that bank profitability is growth-enhancing. We explain this conclusion by the positive effect of bank profitability on financial stability which fosters economic growth. In broad terms, these findings contribute to the literature on the finance-growth nexus by providing evidence on the impact of bank behavior on economic growth. The vast majority of this literature is concentrated on quantitative measures of financial development. We rather focus on one key dimension of bank behavior, profitability, and show that it also affects economic growth.

3.2 Interactions with country-level variables

Our main finding is the positive impact of bank profitability on economic growth. We can nonetheless question the presence of heterogeneity in the relation between bank profitability and economic growth. Finance-growth literature has shown that the effect of banking development on growth is conditional to the country framework. We therefore check whether our results are driven by monetary policy, banking development, or institutional framework.

For empirical testing of variations in the impact of bank profitability on economic growth depending on country-level environment, we include interaction terms between bank profitability and monetary policy, banking, economic and institutional development indicators in the system GMM estimations. The estimations results are reported in Tables 6 to 9.

For monetary policy (Table 6), we find limited evidence that it influences the relation between bank profitability and growth. While the interaction term with *M2 growth* is not significant, we observe that the interaction term with *M3 growth* is positive and significant. This finding then provides some support to the view that expansionary monetary policy fosters the positive impact of bank profitability on growth. It can be interpreted by the fact that expansionary monetary policy can lower financial stability. The reason is the positive effect of expansionary monetary policy on credit growth, which increases the occurrence of banking crises. As such, an expansionary monetary policy would make bank profitability more favorable to growth by having a greater beneficial influence on the economic activity through the preservation of bank stability in troubled times.

We obtain evidence that banking development exerts an impact on the link between bank profitability and growth (Table 7). The interaction term between *ROA* and *Private Credit*, the main indicator for banking development, is significantly negative. This result associated with the significantly positive coefficient for *ROA* indicates that greater banking development reduces the pro-growth effect of bank profitability. Nevertheless we do not observe any significant coefficient for the interaction term between *ROA* and the other indicator for banking development, *Bank Share*. How should we interpret these results? A potential explanation can be the fact that greater banking development is associated with greater experience and/or greater size of banks, which reduces the financial stability benefits for banks to have greater profitability. Reversely, a low degree of banking development means lower financial strength of banks which would make them more sensitive to the pro-stability impact of bank profitability.

We find limited support for the impact of economic development on the relation between bank profitability and growth (Table 8). We first test the impact of the interaction term between *ROA* and *GDP per capita* in column (1). We then find no significant coefficient for this interaction term, which suggests the absence of any influence of economic development on the relation between bank profitability and economic growth. However the investigation of interaction terms between *ROA* and dummy variables for groups of countries based on income shows some leads of a link. In columns (2) and (3), we respectively add the interaction term *ROA*×*High Income* and

ROA×*Low Income* only. We observe a significantly negative coefficient for *ROA*×*High Income* but no significance for *ROA*×*Low Income*. In other words, it provides some support to the view that the positive impact of bank profitability on economic growth would be lower in high-income countries. In column (4), we test the simultaneous inclusion of all three interaction terms between *ROA* and *High Income, Middle Income, and Low Income*. We find that *ROA*×*Low Income* and *ROA*×*Middle Income* are positive and significant with a greater coefficient for *ROA*×*Low Income*, while *ROA*×*High Income* is not significant. Hence these results provide some evidence that the growth-enhancing effect of bank profitability would be more pronounced in countries with lower economic development. These results could be explained by the fact that greater economic development fosters experience of banks, which lowers the benefits associated with higher financial stability to have greater bank profitability.

For institutional development (Table 9), we observe no influence on the link between bank profitability and economic growth. Both interaction terms of *ROA* with *Rule of Law* and *Regulatory* are not significant. These results consequently suggest that the institutional framework does not seem to affect the impact of bank profitability on economic growth, which differs from what has been observed for the relation between banking development and economic growth.

3.3. Robustness analysis

Additional regressions are run to test the robustness of the relation between bank profitability and economic growth. They are all performed with system GMM regressions unless otherwise indicated.

First, we use an alternative measure for bank profitability with *ROE*, computed as the ratio of net income before tax to equity. While the return on assets takes into account the risks derived from leverage and can therefore be considered as a broader measure, the return on equity provides information on the return for the capital invested by shareholders and has been used in some works on bank profitability (e.g., Goddard, Molyneux and Wilson, 2004). In a similar way than for *ROA*, we winsorize *ROE* at the 1% level. The estimations are reported in Table 10.

We again observe a positive impact of bank profitability on growth with a significantly positive coefficient of *ROE* in all three tested specifications. In addition, we find again no significant coefficient for the interaction term between bank profitability measured by *ROE* and *Crisis*. Hence the results obtained with *ROE* corroborate those obtained with *ROA*. Consequently they indicate that the findings are not conditional to the choice of the profitability measure.

Second, we test an alternative indicator for economic growth. In the main estimations we utilize real GDP per capita growth in accordance with the vast majority of studies on finance-growth nexus (e.g., Beck and Levine, 2004; Arcand, Berkes and Panizza, 2015). To test the robustness of the specification of growth measure, we consider real GDP growth and redo the estimations in Table 11.

Despite this change in the growth measure, we still observe that the coefficient of *ROA* is positive and significant in all estimations. The interaction term between *ROA* and *Crisis* remains not significant. We therefore obtain the same results when explaining real GDP growth than with real GDP growth per capita.

Third, we consider possible nonlinearity in the relation between bank profitability and economic growth. To this end, we perform three estimations in Table 12. In column (1), we include the squared *ROA* to capture a quadratic effect. In column (2), we consider the interaction term between ROA and the dummy variable *Median ROA* which is equal to one if the observation is above the median ROA of the sample and to zero else. In column (3), we include the interaction term between ROA and the dummy variable *Upper Quartile ROA* which is equal to one if the observation is above the third quartile of ROA of the sample and to zero else. These alternative specifications provide different ways to test nonlinearity. In all three specifications, we observe no significant coefficient for the variable added to test nonlinearity. This indicates that the relation between bank profitability and economic growth is not nonlinear.

Last, we consider a potential non-linear relation between *ROA* and *GDP growth*. First, we use the square of *ROA* to capture a quadratic effect. Then, we use dummy variables to split the sample between the observations above the median ROA (*Median ROA*) and above the upper quartile (*Upper Quartile ROA*). We then use the interaction of these variables with *ROA*.

Fourth, we try shorter and longer time horizons to average variables in Table 13. In the main estimations, we have considered 3-year periods. We first try a shorter time horizon with 2-year periods. We perform estimations with system GMM regressions. We then try a longer time horizon with 5-year periods. For these regressions, we perform panel fixed effects with robust standard errors since the number of periods by country is not sufficient to allow estimating system GMM regressions. We find that ROA remains significantly positive in all these specifications as well.

Our main findings have thus been confirmed by robustness tests, which strengthen the conclusion that bank profitability favors economic growth.

4. Conclusion

This paper provides the first evidence on the effect of bank profitability on economic growth. To this end, we perform estimations with standard OLS, panel fixed effects and system GMM regressions on a sample of 133 countries over the period 1999-2013. We find that bank profitability favors economic growth. This finding is robust to a battery of robustness checks. We interpret this finding to mean that a higher level of bank profitability fosters financial stability by enhancing the capital base of banks and by reducing incentives to bank managers for moral hazard behavior, and thereby enhances economic growth.

The positive impact of bank profitability is influenced by three additional characteristics. It is amplified by expansive monetary policy and diminished by greater banking development and to a lesser degree by greater economic development. It does not seem overall to have evolved over time with the crisis or to be influenced by institutional framework.

Overall, these findings support the view that bank profitability should be promoted by authorities. While authorities generally document their concerns on bank profitability by its impact on the soundness of the financial industry, we complement their argumentation by showing the growth-enhancing effect of bank profitability. Thus the

position of authorities which considers low profitability of banks as a major concern is fully relevant in the broader perspective of economic growth.

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Table 1
Statistics on ROA

This table presents statistics for the ROA at the country level for 133 countries. ROA is presented for the full period and for three-year periods. Countries are sorted according to the real GDP per capita growth so that five groups of countries by growth are created. For each group of countries, we provide the ROA for the full period and for the sub periods. We test the differences across groups (pace of growth and time-period) using Kruskal-Wallis equality-of-population rank test (*KW test*). Chi² of the test is reported in the last column for differences across time and in the last row for differences across groups of growth. The overall difference between groups and time-periods is given at the bottom right of the table. ***, **, and * report the 1%, 5%, and 10% thresholds of significance.

	1999-2013	1999-2001	2002-2004	2005-2007	2008-2010	2011-2013	KW test - *by year*
Full sample							
N	642	126	129	132	130	125	
Mean	1.73	1.18	1.64	1.89	1.50	1.53	19.6***
Median	1.55	1.57	1.92	2.04	1.43	1.68	
Slowest growth							
N	129	26	17	11	52	23	18.26***
Median	1.25	1.28	1.65	2.76	0.83	0.73	
Second 20^{ile}							
N	128	25	33	14	25	31	5.53
Median	1.35	1.13	1.11	1.81	1.76	1.17	
Third 20^{ile}							
N	129	35	20	29	21	24	1.22
Median	1.53	1.17	1.62	1.49	2.01	1.64	
Fourth 20^{ile}							
N	128	27	27	32	17	25	7.31
Median	1.78	1.02	1.76	2.01	2.25	1.80	
Fastest growth							
N	128	13	32	46	15	22	2.04
Median	1.85	1.30	1.98	1.92	1.81	1.89	
KW test - *by growth*	29.01***	1.22	6.81	10.22*	22.24***	11.95**	69.79***

Table 2
Descriptive statistics

This table provides descriptive statistics for the variables used over the study. Definitions of variables are provided in the Appendix.

	N	Mean	Median	Std. dev.	Minimum	Maximum
ROA	642	1.73	1.55	2.00	-6.35	9.13
GDP per capita growth	642	2.50	2.37	3.04	-11.28	14.36
GDP per capita	642	970,037	43,774	3,610,205	137	31,100,000
Crisis	642	0.11	0.00	0.32	0.00	1.00
Education	642	7.81	8.00	3.12	0.91	14.62
Inflation	642	7.21	3.94	30.17	0.00	699.40
Openness	642	89.87	77.05	56.31	19.77	450.78
Government exp.	642	15.65	15.45	5.10	4.42	38.10
M2 growth	617	3.63	3.17	7.34	-35.18	50.08
M3 growth	613	3.54	2.69	7.54	-18.39	94.23
Bank Share	575	0.84	0.92	0.19	0.04	1.00
Private Credit	626	57.77	39.93	51.86	1.27	300.72
Rule of Law	641	0.07	-0.13	1.01	-1.92	1.98
Regulatory Quality	642	0.21	0.10	0.93	-2.13	2.10
ROE	641	17.99	15.59	14.69	-21.26	78.31
GDP growth	642	3.96	3.89	3.21	-10.57	17.22

Table 3
OLS estimations

OLS regressions. The dependent variable is real GDP per capita growth. All variables are averaged over three different time periods at the top of the column. The t-statistic based on robust variances is reported in parentheses. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	1999-2013	1999-2007	2008-2013
ROA	-0.086	-0.025	0.309**
	(-0.68)	(-0.19)	(2.21)
Initial GDP (log)	0.068	-0.001	0.088
	(0.98)	(-0.01)	(1.05)
Education (log)	0.673**	1.165**	-0.019
	(2.01)	(2.54)	(-0.04)
Inflation (log)	0.621**	-0.086	1.007***
	(2.51)	(-0.20)	(3.36)
Openness (log)	0.649**	0.751**	0.326
	(1.99)	(2.45)	(0.84)
Government Exp. (log)	-1.717***	-1.506**	-1.801***
	(-3.35)	(-2.43)	(-2.95)
Constant	1.078	1.840	1.629
	(0.47)	(0.74)	(0.56)
N	133	132	130
Adjusted R^2	0.13	0.08	0.24
F	4.31***	3.76***	7.87***

Table 4
Panel fixed effects estimations

Panel regressions with country fixed effects. The dependent variable is real GDP per capita growth. Variables are averaged over a 3-year time period. Dummy variables for the years are included but not reported. The t-statistic based on robust variances is reported in parentheses. *, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)
ROA	0.312***	0.219***	0.191***
	(4.14)	(3.26)	(2.64)
Crisis		-1.986***	-1.992***
		(-4.38)	(-4.40)
ROA × Crisis			0.051
			(1.23)
Initial GDP (log)	-3.241**	-3.594**	-3.647**
	(-2.16)	(-2.54)	(-2.56)
Education (log)	4.213**	2.890	2.917
	(2.23)	(1.58)	(1.60)
Inflation (log)	-0.677	-0.604	-0.577
	(-1.52)	(-1.42)	(-1.35)
Openness (log)	1.916**	2.289**	2.313**
	(2.03)	(2.43)	(2.43)
Government Exp. (log)	-2.653**	-2.299*	-2.292*
	(-2.00)	(-1.76)	(-1.75)
Constant	28.530*	32.810**	33.218**
	(1.74)	(2.12)	(2.13)
N	642	642	642
Nb of groups	133	133	133
Adjusted R^2	0.25	0.29	0.29
F	12.57***	14.99***	13.77***

Table 5
System GMM estimations

System GMM panel regressions. The dependent variable is real GDP per capita growth. Variables are averaged over a 3-year time period. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)
ROA	1.667***	1.140**	1.433***
	(2.93)	(2.03)	(2.78)
ROA_{t-1}	-0.413	-0.059	-0.238
	(-1.33)	(-0.18)	(-0.79)
Crisis		-4.298	-3.264
		(-1.58)	(-1.54)
ROA × Crisis			-0.103
			(-0.25)
Initial GDP (log)	29.726**	32.110***	31.896***
	(2.36)	(2.79)	(3.21)
Education (log)	-58.191	-44.498*	-31.460*
	(-1.47)	(-1.80)	(-1.75)
Inflation (log)	-2.970	-2.712	-1.937*
	(-1.59)	(-1.56)	(-1.94)
Openness (log)	5.430	7.964	7.723
	(0.82)	(1.18)	(1.47)
Government Exp. (log)	-1.155	4.092	0.743
	(-0.14)	(0.56)	(0.13)
Constant	21.285	6.717	-1.087
	(0.98)	(0.39)	(-0.09)
N	508	508	508
Nb of groups	132	132	132
Chi^2	101.38***	121.41***	133.6***
AR 1	-3.11***	-3.32***	-3.14***
AR 2	-0.31	-0.05	-0.29

Table 6
Impact of monetary policy

System GMM panel regressions. The dependent variable is real GDP per capita growth. Variables are averaged over a 3-year time period. All explained variables are one-year lagged. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)	(4)
ROA	1.323**	1.010*	1.245***	0.783*
	(2.37)	(1.68)	(2.90)	(1.93)
ROA_{t-1}	-0.100	0.052	-0.049	-0.248
	(-0.30)	(0.16)	(-0.20)	(-0.73)
M2 growth	0.124	0.266		
	(1.40)	(1.57)		
ROA × M2 growth		-0.060		
		(-1.07)		
M3 growth			-0.045	-0.204
			(-0.49)	(-1.54)
ROA × M3 growth				0.097**
				(2.24)
Initial GDP (log)	39.830***	41.828***	42.205***	40.314***
	(3.43)	(3.64)	(3.85)	(4.00)
Education (log)	-37.010	-26.775	-21.541	-23.940
	(-1.17)	(-0.98)	(-0.98)	(-1.02)
Inflation (log)	-1.057	-0.883	0.358	0.317
	(-0.76)	(-0.66)	(0.30)	(0.26)
Openness (log)	1.514	-1.402	6.571	6.911
	(0.22)	(-0.20)	(1.33)	(1.33)
Government Exp. (log)	-4.517	-2.384	-1.757	-1.846
	(-0.53)	(-0.36)	(-0.29)	(-0.35)
Constant	5.521	9.041	-1.714	1.190
	(0.30)	(0.52)	(-0.11)	(0.08)
N	483	483	478	478
Nb of groups	132	132	131	131
Chi^2	128.78***	173.38***	129.58***	166.34***
AR 1	-3.39***	-3.37***	-3.36***	-3.07***
AR 2	1.19	0.90	1.68*	0.60

Table 7
Impact of banking development

System GMM panel regressions. The dependent variable is real GDP per capita growth. Variables are averaged over a 3-year time period. All explained variables are one-year lagged. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)	(4)
ROA	0.935**	1.870***	1.440***	-1.303
	(2.17)	(3.04)	(3.38)	(-0.52)
ROA_{t-1}	0.935**	1.870***	1.440***	-1.303
	(2.17)	(3.04)	(3.38)	(-0.52)
Private Credit	-0.023	0.052		
	(-0.69)	(0.95)		
ROA × Private Credit		-0.018***		
		(-2.77)		
Bank Share			10.937	2.285
			(1.15)	(0.19)
ROA × Bank Share				2.938
				(0.99)
Initial GDP (log)	39.257***	46.722***	36.851***	41.581***
	(3.48)	(3.97)	(3.13)	(3.81)
Education (log)	-29.016	-35.990	-14.186	-10.918
	(-1.14)	(-1.13)	(-0.72)	(-0.64)
Inflation (log)	-0.964	-0.818	0.547	0.545
	(-0.86)	(-0.79)	(0.51)	(0.51)
Openness (log)	4.154	6.698	3.541	0.031
	(0.90)	(1.23)	(0.64)	(0.01)
Government Exp. (log)	-3.538	-5.670	-7.295	-2.215
	(-0.60)	(-0.98)	(-1.33)	(-0.43)
Constant	3.815	11.105	3.811	9.232
	(0.21)	(0.56)	(0.26)	(0.61)
N	492	492	442	442
Nb of groups	132	132	125	125
Chi^2	166.24***	106.66***	168.26***	180.58***
AR 1	-3.75***	-3.13***	-3.33***	-3.86***
AR 2	1.72*	2.08**	0.60	0.32

Table 8
Impact of economic development

System GMM panel regressions. The dependent variable is real GDP per capita growth. Variables are averaged over a 3-year time period. All explained variables are one-year lagged. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)	(4)
ROA	1.206	1.994***	1.164**	
	(0.68)	(2.80)	(2.48)	
ROA_{t-1}	-2.543**	-0.330	-0.023	
	(-2.50)	(-0.95)	(-0.07)	
ROA × GDP per capita	0.024			
	(0.16)			
ROA × High Income		-1.467*		0.548
		(-1.93)		(1.33)
ROA × Low Income			1.372	2.404***
			(1.30)	(2.68)
ROA × Middle Income				1.261**
				(2.06)
High Income		0.602		0.960
		(0.18)		(0.31)
Low Income			-6.532	-5.479
			(-1.18)	(-0.97)
Initial GDP (log)	25.672***	35.989***	26.870**	31.888***
	(3.02)	(2.91)	(2.12)	(2.82)
Education (log)	-39.300	-53.638	-45.185**	-44.439**
	(-1.40)	(-1.52)	(-2.39)	(-2.44)
Inflation (log)	-1.963	-3.001	-2.245	-2.244
	(-1.40)	(-1.64)	(-1.40)	(-1.41)
Openness (log)	1.605	7.901	10.301	11.177*
	(0.30)	(1.36)	(1.57)	(1.89)
Government Exp. (log)	0.495	-2.856	-0.926	-1.284
	(0.09)	(-0.37)	(-0.11)	(-0.15)
Constant	6.929	18.704	19.360	19.743
	(0.41)	(0.88)	(1.16)	(1.05)
N	508	508	508	508
Nb of groups	132	132	132	132
Chi^2	149.98***	112.74***	137.70***	177.90***
AR 1	-3.57***	-2.53***	-3.22***	-3.08***
AR 2	0.11	0.27	0.01	0.32

Table 9
Impact of institutions

System GMM panel regressions. The dependent variable is real GDP per capita growth. Variables are averaged over a 3-year time period. All explained variables are one-year lagged. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)	(4)
ROA	1.577***	1.363***	1.522***	1.430***
	(2.95)	(2.78)	(2.71)	(2.60)
ROA_{t-1}	-0.314	-0.201	-0.550*	-0.542**
	(-0.94)	(-0.55)	(-1.81)	(-2.07)
Rule of Law	-4.487	-8.603		
	(-0.66)	(-1.39)		
ROA × Rule of Law		-0.564		
		(-1.58)		
Regulatory Quality			1.403	4.983
			(0.23)	(0.95)
ROA ×Regulatory Quality				-0.568
				(-1.06)
Initial GDP (log)	33.816**	40.900***	26.974**	28.379**
	(2.53)	(3.24)	(2.39)	(2.46)
Education (log)	-45.370	-28.958	-44.132	-42.311*
	(-1.55)	(-1.18)	(-1.48)	(-1.83)
Inflation (log)	-2.286	-0.341	-2.701	-1.881
	(-1.25)	(-0.25)	(-1.59)	(-1.51)
Openness (log)	6.845	8.649	2.285	2.794
	(1.07)	(1.26)	(0.35)	(0.45)
Government Exp. (log)	1.816	3.123	-3.789	-7.924
	(0.22)	(0.42)	(-0.56)	(-1.13)
Constant	18.330	17.616	21.842	28.311
	(0.75)	(0.73)	(1.04)	(1.50)
N	507	507	508	508
Nb of groups	132	132	132	132
Chi^2	132.54***	154.26***	140.22***	200.82***
AR 1	-3.33***	-2.89***	-3.75***	-3.56***
AR 2	-0.29	0.21	-0.01	1.17

Table 10
Robustness check: Alternative measure of profitability

System GMM panel regressions. The dependent variable is real GDP per capita growth. Variables are averaged over a 3-year time period. All explained variables are one-year lagged. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)
ROE	0.216***	0.164**	0.151**
	(3.38)	(2.32)	(2.50)
ROE_{t-1}	-0.094**	-0.040	-0.054
	(-2.40)	(-0.81)	(-1.39)
Crisis		-3.789	-4.401
		(-1.50)	(-1.60)
ROE × Crisis			0.167
			(0.51)
Initial GDP (log)	27.195**	32.789***	31.619***
	(2.14)	(2.80)	(3.02)
Education (log)	-51.561	-33.513	-19.756
	(-1.36)	(-1.47)	(-1.32)
Inflation (log)	-1.503	-1.960	-0.849
	(-0.89)	(-1.11)	(-0.82)
Openness (log)	5.460	8.593	7.942*
	(0.95)	(1.42)	(1.67)
Government Exp. (log)	-0.182	5.075	0.841
	(-0.02)	(0.70)	(0.14)
Constant	25.180	8.043	5.595
	(1.25)	(0.49)	(0.42)
N	507	507	507
Nb of groups	132	132	132
Chi^2	110.38***	114.93***	250.20***
AR 1	-3.42***	-4.05***	-3.64***
AR 2	0.09	0.18	-0.02

Table 11
Robustness check: Alternative measure of growth

System GMM panel regressions. The dependent variable is real GDP growth. Variables are averaged over a 3-year time period. All explained variables are one-year lagged. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)
ROA	1.739***	1.193**	1.887***
	(2.97)	(2.00)	(3.18)
ROA_{t-1}	-0.558	-0.104	-0.355
	(-1.52)	(-0.26)	(-1.00)
Crisis		-4.409	-2.969
		(-1.60)	(-1.22)
ROA × Crisis			-0.591
			(-1.05)
Initial GDP (log)	23.601	27.097*	28.932**
	(1.59)	(1.84)	(2.10)
Education (log)	-38.670	-29.062	-22.009
	(-1.28)	(-1.33)	(-0.99)
Inflation (log)	-2.943	-2.838	-1.967
	(-1.54)	(-1.58)	(-1.50)
Openness (log)	1.480	5.083	6.006
	(0.21)	(0.72)	(1.10)
Government Exp. (log)	-1.058	4.321	2.743
	(-0.12)	(0.52)	(0.35)
Constant	25.057	11.746	8.537
	(1.14)	(0.63)	(0.52)
N	508	508	508
Nb of groups	132	132	132
Chi^2	131.47***	156.78***	151.08***
AR 1	-3.30***	-3.42***	-3.02***
AR 2	-1.15	-1.15	-1.13

Table 12
Robustness check: Test on nonlinear relationship

System GMM panel regressions. The dependent variable is real GDP per capita growth. Variables are averaged over a 3-year time period. All explained variables are one-year lagged. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	(1)	(2)	(3)
ROA	1.411***	0.941	1.262*
	(2.85)	(1.52)	(1.94)
ROA_{t-1}	-0.080	-0.133	-0.635
	(-0.31)	(-0.40)	(-1.23)
ROA^2	0.065		
	(0.79)		
ROA_{t-1}^2	-0.068		
	(-1.51)		
ROA × Median ROA		2.995	
		(1.40)	
ROA × Upper Quartile ROA			0.246
			(0.47)
Initial GDP (log)	24.797**	38.731***	35.800***
	(2.22)	(2.74)	(2.66)
Education (log)	-40.110	-51.280	-58.931
	(-1.42)	(-1.43)	(-1.48)
Inflation (log)	-2.482*	-1.392	-1.893
	(-1.76)	(-0.91)	(-1.63)
Openness (log)	6.828	8.409	5.468
	(1.41)	(1.17)	(0.92)
Government Exp. (log)	-3.848	8.038	0.813
	(-0.60)	(0.97)	(0.13)
Constant	12.789	11.680	12.088
	(0.97)	(0.62)	(0.63)
N	508	508	508
Nb of groups	132	132	132
Chi^2	152.99***	104.53***	142.52***
AR 1	-2.97***	-3.18***	-3.10***
AR 2	-0.39	0.20	-0.27

Table 13
Robustness check: Alternative periods

The table presents alternative periods to average variables. We use 2-year periods and perform system GMM regressions. We use 5-year periods and perform panel fixed effects estimations with robust standard errors (the number of periods by country is not sufficient to allow estimating system GMM panel regressions). The dependent variable is real GDP per capita growth. All explained variables are one-year lagged. Dummy variables for the years are included but not reported. One-year lagged of control variables are included but not reported. The t-statistic based on Windmeijer (2005) correction of variance is reported in parentheses.*, **, and *** denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Definitions of variables are provided in the Appendix.

	2 Years – System GMM			5 Years – Panel Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
ROA	1.204***	0.925***	0.631**	0.320***	0.238**	0.222**
	(3.21)	(2.82)	(2.16)	(2.86)	(2.19)	(2.14)
ROA_{t-1}	-1.004***	-0.757***	-0.540**			
	(-3.53)	(-2.76)	(-1.99)			
Crisis		-4.822***	-4.924***		-1.474***	-1.493***
		(-2.70)	(-2.93)		(-4.01)	(-3.95)
ROA × Crisis			0.232			0.040
			(0.79)			(0.27)
Initial GDP (log)	57.159***	50.653***	52.694***	-5.706***	-5.594***	-5.654***
	(7.04)	(5.81)	(6.55)	(-3.37)	(-3.50)	(-3.48)
Education (log)	-11.198	-20.925	-24.154	5.475**	4.585**	4.613**
	(-0.69)	(-1.26)	(-1.48)	(2.46)	(2.11)	(2.13)
Inflation (log)	2.318**	2.455***	2.059***	-0.109	-0.036	-0.021
	(2.57)	(2.78)	(2.71)	(-0.22)	(-0.07)	(-0.04)
Openness (log)	6.809*	6.247	5.874	-0.272	-0.113	-0.152
	(1.85)	(1.60)	(1.59)	(-0.19)	(-0.08)	(-0.10)
Government Exp. (log)	-3.164	-2.237	-1.518	-0.020	0.302	0.280
	(-0.92)	(-0.65)	(-0.45)	(-0.01)	(0.16)	(0.14)
Constant				54.572***	53.804***	54.636***
				(2.85)	(2.93)	(2.91)
N	635	635	635	394	394	394
Nb of groups	133	133	133	136	136	136
Chi^2	372.17***	319.13***	415.92***			
AR 1	-4.18***	-4.33***	-4.98***			
AR 2	0.57	0.56	0.29			
Adjusted R^2				0.27	0.30	0.30
F				12.57***	13.17***	11.95***

Appendix
Description of the Variables

The table presents definitions and sources of the variables used throughout the paper.

Variable	Description	Source
ROA	Bank return on assets (%, before tax).	Global Financial Development Database (GFDD)
GDP growth per capita	GDP per capita growth (annual %). Calculation is based on the GDP per capita (constant 2005 US$).	World Development Indicators (WDI)
Crisis	Banking crisis dummy (1=banking crisis, 0=none).	GFDD
GDP per capita	Value of GDP per capita at market prices (constant 2005 US$). Regressions use the initial value of this variable (*Initial GDP*).	WDI
Education	Years of schooling for population aged 25 and over. Data is available on a 5-year basis, gaps are linearly extrapolated.	Barro & Lee Database (2016 edition)
Inflation	Annual variation of the consumer price index in %. Observations below -10% are dropped. In regressions, negative observations are set to zero and then apply the inverse hyperbolic sine transformation $LINFL = \ln(INFL + \sqrt{INFL^2 + 1})$	WDI
Openness	Trade (% of GDP).	WDI
Government Exp.	General government final consumption expenditure (% of GDP).	WDI
M2 growth	Growth of money and quasi money as a percentage of GDP (annual %).	WDI, ECB Database for Eurozone countries.
M3 growth	Growth of broad money as a percentage of GDP (annual %).	GFDD
Bank Share	Banks' private credit scaled by the sum of banks' private credit and central bank assets.	GFDD
Private Credit	Domestic credit to private sector as a percentage of GDP.	GFDD
Rule of Law	Captures perceptions of the extent to which agents have confidence in and abide by the rules of society. Gaps for the years 1999 and 2001 are linearly extrapolated.	Worldwide Governance Indicators, World Bank
Regulatory Quality	Captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Gaps for the years 1999 and 2001 are linearly extrapolated.	Worldwide Governance Indicators, World Bank
High Income	Dummy variable equals to one if the country is classified as *High Income* (OECD or not OECD) by the World Bank; zero otherwise.	WDI
Middle Income	Dummy variable equals to one if the country is classified as *Middle Income* or *Up Middle Income* by the World Bank; zero otherwise.	WDI
Low Income	Dummy variable equals to one if the country is classified as *Low Income* by the World Bank; zero otherwise.	WDI
Median ROA	Dummy variable equals to one if the observation is above the median RoA of the sample; zero otherwise.	GFDD
Upper Quartile ROA	Dummy variable equals to one if the observation is above the third quartile of RoA; zero otherwise.	GFDD
ROE	Bank return on equity (%, before tax).	GFDD
GDP growth	GDP growth (annual %). Calculation is based on the GDP at market prices (constant 2005 US$).	WDI