BOFIT Discussion Papers
15 • 2018

Paul-Olivier Klein and Laurent Weill

Bank profitability and economic growth

BOFIT
THE BANK OF FINLAND
INSTITUTE FOR ECONOMIES
IN TRANSITION

BOFIT Discussion Papers
Editor-in-Chief Zuzana Fungáčová

BOFIT Discussion Papers 15/2018
2.7.2018

Paul-Olivier Klein and Laurent Weill: Bank profitability and economic growth

ISBN 978-952-323-236-5, online
ISSN 1456-5889, online

Suomen Pankki
Helsinki 2018

Contents

Paul-Olivier Klein and Laurent Weill

Bank profitability and economic growth

Abstract

This paper analyses the effect of bank profitability on economic growth. While policymakers have shown major concerns for low levels of bank profitability, there are no empirical studies on the growth effects of bank profitability. To fill this gap, we investigate the impact of bank profitability on economic growth using a sample of 133 countries during the period 1999–2013 with several empirical approaches. Our first major conclusion is that a high current level of bank profitability contributes positively to economic growth. Our second conclusion is that the past level of bank profitability exerts a negative influence on economic growth leading to the absence of significance for the overall bank profitability. Hence, the positive impact of bank profitability on economic growth is short-lived. These findings are robust to a battery of robustness checks, including those using alternative measures for profitability and growth.

JEL codes: G21, O16, O40.
Keywords: bank profitability, economic growth, finance-growth nexus.

Paul-Olivier Klein, orcid.org/0000-0003-2403-5980. University of Aberdeen Business School, Edward Wright Building, Dunbar Street, Aberdeen AB24 3QY, Scotland, UK. Email: paul-olivier.klein@abdn.ac.uk.

Laurent Weill, orcid.org/0000-0002-8630-1351. Corresponding author. Institut d'Etudes Politiques, Université de Strasbourg, 47 avenue de la Forêt Noire, 67082 Strasbourg Cedex, France. Email: laurent.weill@unistra.fr.

1 Introduction

The 2008 global financial crisis and steep decrease of interest rates took a toll on bank profitability. While the financial crisis had already eroded bank profitability in developed countries, persistent low interest rates have further diminished banks' profits by reducing bank interest receivables faster than interest expenditures.

This situation raised a new set of concerns for policymakers. When questioned on July 1, 2016 on how the ECB might use monetary policy to stimulate the Eurozone economy, ECB chief economist Peter Praet said: "*The profitability of the* [banking] *sector will be a key consideration.*" This declaration put the notion of bank profitability at the heart of central bank concerns,[1] implying somehow that bank profitability contributes to economic growth.

If this is indeed the case, researchers would typically look to two channels through which bank profitability might affect economic growth: financial stability and bank competition.

The first channel, *financial stability*, might enhance growth through higher bank profitability, because profitable banks can retain earnings, increase their core capital, offer higher returns to shareholders, and more easily raise capital on the markets (Flannery and Rangan, 2008). On the asset side, profitable banks might be more averse to risk as they have more to lose if downside risks materialize (Keeley, 1990). Profitable banks also have strong incentives to screen loans (Coval and Thakor, 2005) and monitor borrowers (Holmstrom and Tirole, 1997). Some empirical evidence suggests that greater profitability increases financial stability (e.g., Claeys and Schoors, 2007, for Russia; Arena, 2008, for Latin America). We also see that profitability is commonly used in predicting bank distress (e.g. CAMELS ratings), and that greater financial stability fosters economic growth.[2]

However the view that financial stability enhances growth has been criticized. Rancière, Tornell and Westermann (2008) find that countries with occasional financial crises enjoy higher growth than countries with stable financial systems. Thus, while financial liberalization can increase the frequency of crises, it also fosters financial development and contributes to growth. Thus, we cannot say for certain that bank profitability is positive for economic growth by fostering financial stability.

[1] The president of the Dutch central bank, Klaas Knot, observed: "The low interest rates (…) put pressure on banks' profitability" (October 4, 2016). ECB executive board member Yves Mersch noted that banks that cannot withstand temporary strains on their earnings may have bigger questions to answer about their future viability as businesses (October 3, 2016).
[2] See Kupiec and Ramirez (2013) and Atkinson, Luttrell and Rosenblum (2013) on the costs to economic growth associated with financial crises.

Looking at the second channel, *competition* in the banking sector, we see that low competition in the banking industry increases bank profits (e.g. Goddard, Molyneux and Wilson, 2004), but raises financing obstacles for firms (Beck, Demirgüç-Kunt and Maksimovic, 2004). High competition, on the other hand, alleviates credit constraints (Love and Pería, 2015; Ryan, O'Toole and McCann, 2014). If high bank profitability results from a lack of competition, it may reduce access to credit and depress growth (e.g. Cetorelli and Gambera, 2001; Claessens and Laeven, 2005).

Some researchers argue that low bank competition fosters access to credit. The information hypothesis of Petersen and Rajan (1994) asserts that banks are more likely to extend credit if they are better able to gather information on borrowers. In a concentrated credit market, Petersen and Rajan (1995) further show that creditors are more likely to fund credit-constrained firms as they can internalize the benefits of lending to firms. Boot and Thakor (2000) confirm that an increase in competition increases small-business lending. In line with this view, Fungacova, Shamshur and Weill (2017) provide empirical evidence that lower bank competition reduces the cost of credit for borrowing firms, thereby favouring access to credit.

In any case, the influence of bank profitability on economic growth remains an open question – a question somewhat surprisingly never empirically investigated in the literature. To fill this gap, we examine the causal effect of bank profitability on economic growth by performing a cross-country analysis on a sample of 133 countries over the period 1999 to 2013. We provide preliminary estimates with OLS, panel fixed-effects and instrumental-variables regressions. We then perform dynamic panel GMM estimations in line with Beck and Levine (2004) and Arcand, Berkes and Panizza (2015).

We enter this analysis aware that the dynamics of bank profitability might affect the results. In their analysis of 100 past banking crises, for example, Reinhart and Rogoff (2014) uncover a regular pattern of high-leverage in banks and rapid lending growth that create an asset bubble and eventual financial crisis. The situation, therefore, could arise where the influence of bank profitability on economic growth is positive in the short term, but turns negative as time goes by. Consequently, we assess the influence of the dynamics of bank profitability by performing estimations that jointly include past and current levels of profitability.

Two main results emerge. First, the current level of bank profitability positively affects economic growth. This effect is robust across estimations. Our baseline model provides an effect of 0.331, i.e. a 1% increase in bank return-on-assets generates an additional 0.331% of growth over three years. Second, the impact of the past level of profitability on economic growth turns to be negative when the dynamics of bank profitability are included. Overall, integrating both the current

and past level of bank profits leads to a similar global effect (around 0.3%) that falls short of being significant in most specifications.

This study therefore contributes substantially to the literature on bank profitability. It complements the extensive literature assessing the potential variables influencing bank profitability (Goddard, Molyneux and Wilson, 2004; García-Herrero, Gavilá and Santabárbara, 2009; Lee and Hsieh, 2013; Chronopoulos et al., 2015), as well as the strand of literature focusing on the dynamics of bank profitability over the business cycle (Albertazzi and Gambacorta, 2009; Bolt et al., 2012). Here, we investigate the consequences of banking profitability and provide evidence on its impact on economic growth, adding a new perspective to the literature on the finance-growth nexus. This vast literature summarized by Levine (2005), who has identified the beneficial (albeit non-monotonic) role of bank-supplied credit on growth (Arcand, Berkes and Panizza, 2015).

The normative implications of our work are especially relevant for monetary authorities and policymakers seeking to promote economic growth. A finding that bank profitability positively affects economic growth would confirm the major importance of fostering bank profitability, and conversely, finding a negative impact would imply that that increased bank profitability harms economic growth. If the latter is true, pro-growth authorities should not dwell on promoting bank profitability.

The remainder of the paper is as follows. Section 2 presents recent trends in bank profitability and economic growth. Section 3 details the methodology and the data. Section 4 reports the estimations. Section 5 provides concluding remarks.

2 Trends in bank profitability

In this section, we examine recent trends in bank profitability, providing a first glance at the relationship between bank profitability and economic growth. Our data on economic growth are taken from the World Bank's World Development Indicators Database. The data on bank profitability are from the World Bank Group's Global Financial Development Database (GFDD). We concentrate on the period from 1999 to 2013, the period during which bank profitability are available. In accordance with earlier studies, we ignore yearly data and use three-year averages to smooth business cycle fluctuations (e.g. Beck and Levine, 2004).

Panel A in Table 1 provides raw statistics on banks' return-on-assets (ROA) from 1999 to 2013. The mean ROA is 1.66% worldwide for the period overall. While relatively low in the late 1990s at around 1.54%, it rose in the early 2000s and reached 2.04% for the period 2005–2007. The

financial crisis dented bank profitability, which fell to 1.12% before recovering to 1.64% in 2010–2013. While this is below the pre-crisis level, it is substantially higher than in the late 1990s and close to the mean. A Kruskal-Wallis equality-of-population rank test confirms that differences are significant between the years. There is also a widespread distribution of bank returns across countries. While the standard deviation is relatively high (2.86%) for the full period, it is much lower before the financial crisis when banks in most countries enjoyed positive returns.

We draw two conclusions from these raw statistics. First, bank profits skyrocketed in the early 2000s, peaking just before the subprime crisis. Bank returns also recovered to average levels after the crisis, and were actually higher than in the late 1990s. This finding contradicts the popular mantra of recent times that bank profits have been consistently low. Second, profitability varies considerably across countries, with banks in emerging countries typically showing the highest returns.

We now put banks' profits and GDP growth side by side. Figure 1 displays the relation between banks' profits and economic growth per capita in our sample with the highest and lowest percentiles removed. We find a positive relation between banks' ROA and growth. On average, a 1% increase in banks' ROA is associated with a 0.27% increase in GDP growth.

We decompose this relationship in panel B of Table 1, sorting countries according to their banks' ROA and apportioning countries to quintiles. We provide the corresponding GDP growth per capita for each quintile to gauge how ROA and GDP growth are related, and employ a Kruskal-Wallis equality-of-population rank statistic to test differences across groups.

When considering figures for the full period, the key finding is the positive relation between bank profitability and growth. The median GDP growth goes from 1.21% in countries with the lowest level of bank profitability to 2.85% in countries where banks reap the highest profits. This non-linear relation shows a sharp increase in economic growth between the countries having the 20% least-performing banks and the next quintile. The second quintile exhibits a median growth at 2.51% and the relation is then flattened. Countries in the fourth quintile have the highest growth at 2.91%. Overall, differences across groups are substantial and significant.

This relationship is not constant over time, but strongly affected by the global financial crisis. In the pre-crisis period, GDP growth for all countries is especially high and the positive relation with bank profits vanishes.[3] Countries with the least profitable banks generate an economic growth of 3.94% during 2005–2007, while countries with more profitable banks generate a growth

[3] While the mean GDP growth across countries is at 3.90% in the period 2005–2007, it is at 2.12% for the other periods. The difference is significant ($p<0.01$).

between 3.02% and 4%. Differences among groups are not significant. The 2005–2007 period seems pivotal as the positive relation between bank profits and GDP growth is strong and significant in the post-crisis period. Only countries with the worst performing banks display negative growth, and GDP growth progressively increases along with bank profits. Countries with the most profitable banks surpass all the other groups with an economic growth of 3.13%. This pattern is similar, even if less distinct, in the 2010–2013 period, when most countries recovered from the crisis.

Panel C more thoroughly considers the role of banking crisis on the correlation between GDP growth and bank profits. We use the banking crisis indicator provided by GFDD to separate years with banking crisis from those without banking crisis. For all periods, the correlation between banks' ROA and GDP growth per capita is 12.68% and highly significant. The correlation between bank profits and economic growth falls to 3.86% in the pre-crisis period and becomes non-significant. During a banking crisis, the correlation between bank profits and economic growth rises to 22.07%. It reaches 28.86% in the post-crisis period. Hence, the correlation between banks' ROA and GDP growth per capita is much higher during and after the banking crisis than before.

Two key results emerge when relating statistics on bank profits and economic growth. First, this general relationship is positive. Higher levels of bank profits correlate with higher levels of GDP growth over the full period. Second, this positive relationship is higher in the wake of the crisis and during the recovery period.

While these figures give weight to the view that banking profitability is beneficial to economic growth, especially during a recovery, one can hardly draw conclusions from these correlations. As they likely suffer from severe endogeneity issues, it is important to control for omitted determinants and tackle the issue of reverse causality – especially in light of the evidence of economic growth impacting bank profits (e.g. Demirgüç-Kunt and Huizinga, 1999). We now build a methodology that considers these elements and helps to identify this relationship.

3 Empirical strategy

In this section, we present our empirical strategy to estimate the impact of bank profitability on economic growth. We first present the data and variables used and then the methodology employed.

3.1 Data and variables

The main sources of data are the 2015 edition of the World Bank Group's GFDD and the World Bank's World Development Indicators Database. The explained variable is the 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 dollars.

To capture bank profits, we use banks' return-on-assets (*ROA*). Banks' return-on-assets is a standard indicator of bank profitability in the literature (Garcia-Herrero, Gavila and Santabarbara, 2009; Bolt et al., 2012). We employ the return-on-assets before tax to avoid the impact of cross-country differences in taxation. The indicator is computed with underlying bank-by-bank unconsolidated data from Bankscope. In the regressions, we winsorize the variable at the 1% level to avoid the influence of outliers. Banking data are only available from 1999, the starting year of our analysis.

We model economic growth as a function of five additional components that are standard in the finance and growth literature (e.g. Arcand, Berkes and Panizza, 2015). To control for initial conditions, we employ the initial level of GDP defined as the first value of GDP per capita at market prices in constant 2005 US dollars (*Initial GDP*). We account for human capital with the variable *Education* that measures the number of years of schooling for population aged 25 and over, obtaining the data from Barro and Lee database.[4] We control for inflation computed from the annual variation in the consumer price index (ΔCPI). 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, $Inflation = \ln(\Delta CPI + \sqrt{\Delta CPI^2 + 1})$. We consider country openness with trade in percentage of GDP (*Openness*). Last, we control for government size with *Government Expenditures* defined as the percentage in GDP of the general government final consumption expenditures. As in the studies of Beck and Levine (2004) and Arcand, Berkes and Panizza (2015), we use logs of all control variables.

We next assess the role of banking crisis and bank riskiness. Our dummy variable *Banking Crisis* from the GFDD takes a value of one for each year in which a banking crisis occurs. To control for bank risks, we use two aggregated indicators of risks provided by the GFDD database. We first use the Z-scores of banks, which compare the capital buffer available to banks (equity and return-on-assets) to the volatility of those returns. This indicator is widely used in the literature to capture

[4] http://www.barrolee.com/

the probability of default of banks (e.g. Laeven and Levine, 2009). We also use the ratio of banks' non-performing loans to gross loans (*NPL*) to capture credit risk.

Last, we examine the roles of monetary policy, banking development, economic development and institutional development. We detail the corresponding variables in each subsection. Appendix A provides a list of the variables along with their definition and source. Table 2 presents descriptive statistics for all the variables.

Taking the restrictions set by the different data sources, we end up with a panel of 132 countries over the period of 1999 to 2013. Appendix C gives a list of the countries included in the analysis.

3.2 Methodology

To assess the impact of bank profits on economic growth, we estimate the following growth model:

$$y_{i,t} = \alpha_0 + \alpha_1 . y_{i,t-1} + \beta_1 . ROA_{i,t} + \beta_2 . ROA_{i,t-1} + \sum_{k=1}^{K} \gamma_k . Controls_{k,i,t} + \varepsilon_{i,t}, \quad (1)$$

where *y* stands for GDP growth per capita and *ROA* for banks' return-on-assets. Countries are indexed with *i* and years with *t*. In accordance with former literature, we do not consider yearly data, but split the full period into three-year periods to smooth business-cycle fluctuations. Our dataset spans 1999 to 2013, which allows us to consider five successive three-year periods.

The baseline model includes the five control variables detailed in the previous subsection: *Initial GDP*, *Education*, *Inflation*, *Openness* and *Government Expenditures*. In the first set of estimations, we only consider $ROA_{i,t}$. We next add $ROA_{i,t-1}$ to account for the potential dynamics in bank profitability.

To be more explicit, when explaining, say, economic growth for the year 2017, $ROA_{i,t}$ indicates the impact of the *current* level of bank profitability, defined as the mean bank profitability for 2015, 2016 and 2017. In contrast, $ROA_{i,t-1}$ indicates on the impact of the *past* level of bank profitability, defined as the mean bank profitability for 2012, 2013 and 2014.

We estimate the equation (1) with four alternative approaches, which progressively account for potential econometric flaws.

Following Beck and Levine (2004) and Arcand, Berkes and Panizza (2015), we start our analysis with a cross-country OLS regression. OLS regressions are not only useful in describing the

data but also in providing a first (biased) estimate of the coefficients. Error terms of the OLS are most likely to be correlated with the regressors for three reasons: an omitted variable bias, a potential reverse causality and a dynamic regressor, y_{t-1}.

Our first step to tackle these issues is to perform a panel fixed-effects (FE) regression. Panel fixed-effects regression resolves the omitted variable bias, but not the problems of reverse causality or a dynamic regressor.

We move a step further with an instrumental variables (IV) estimation, using the Lerner index in the banking industry to instrument *ROA*. The Lerner index is a potentially valuable instrument as bank competition has a direct impact on bank profitability (e.g. Goddard, Molyneux and Wilson, 2004), but it is unlikely to be correlated with the other regressors or to affect GDP growth per capita directly. Appendix B provides first-stage regressions and the usual tests on the validity of this instrument. While an IV panel FE model resolves the problem of omitted variable bias and reverse causality, it does not tackle the issue created by a dynamic regressor.

Our final step, therefore, is to obtain valid estimates is to use a system GMM model with first-differencing, following Arellano and Bond (1991) and Blundell and Bond (1998). We briefly introduce GMM estimators below and refer to Roodman (2006) for a more extensive discussion. GMM estimators are designed for panel data analysis following a dynamic process, with fixed individual effects, endogenous, predicted and exogenous regressors, serial correlation and heteroscedasticity within individuals and uncorrelated disturbances across individuals. They are also robust to a panel with a small number of time periods and many individuals ("small T, large N"). GMM estimators use the lags of the variables as instruments. We use all the lags available starting with the second lags for endogenous variables and the first lags for predetermined variables. All current variables except *Education* are defined as endogenous. *Education* and the lagged variables are defined as predetermined. Yearly fixed-effects are defined as exogenous. We compute robust standard errors using Windmeijer (2005) finite sample correction.

4 Results

This section presents the results. We first concentrate on the main estimations, including both the current and the lagged level of bank profits. In the next subsection, we assess the roles of bank risk and banking crises. The third subsection breaks down into assessment of the roles of monetary policy and financial development, the roles of economic development and institutions, and finally some robustness tests.

4.1 Baseline results

Table 3 displays the estimations considering the current level of ROA as our key explaining variable. The different columns provide OLS, Panel FE, IV Panel FE and System GMM estimations. The key finding is the significantly positive coefficient of *ROA* in all estimations, supporting the view that bank profitability enhances economic growth.

The OLS model provides a lower bound of 0.151%, while Panel FE yields a coefficient of 0.375% and the IV regression gives an upper bound of 0.778%. System GMM provides reliable estimates in between OLS and Panel FE estimates, at 0.331%.[5] In other words, an increase of the ROA of 1 percent leads to an increase of 0.331% of economic growth over a period of three years. Models are correctly specified with significant F-statistics and Chi². For IV Panel FE and System GMM, there is no evidence of over-identification with non-significant Hansen statistic. As it should be for System GMM estimations, the first difference of errors is only auto-correlated at the first order. Regarding the other explanatory variables, we observe that past level of GDP growth positively contributes to the current level of growth and government expenditures exert a negative impact on growth.

We next consider the dynamics of bank profitability and redo the System GMM estimations by including the past level of banks' return-on-assets (ROA_{t-1}). Panel FE models do not correct for autocorrelation in the error-term, especially in panels with few periods and many individuals, and thus are ill-suited for dynamic models. Thus, we rely on the estimates provided by the System GMM, which do account for these issues. The results are displayed in the last column of Table 3.

We observe a significantly positive coefficient for *ROA* in all models, confirming the positive impact of the current level of bank profitability on economic growth. We also find a negative and significant coefficient for ROA_{t-1}, supporting the view that the past level of bank profitability is detrimental for economic growth.

In this specification, we observe a coefficient of *ROA* that is more than twice its size in comparison with the previous specification. An increase of 1 percent in the current level of bank profitability leads to an additional economic growth of 0.715%. However, this effect is tempered by the negative impact of the past level of bank profitability. An increase of 1 percent in the past level of bank profitability leads to a decrease of 0.351% in current economic growth. These results suggest that the impact of bank profitability on economic growth follows a dynamic pattern in line with the results of Reinhart and Rogoff (2014).

[5] More reliable System GMM estimates likely lie between biased OLS and Panel FE estimates (Roodman, 2009).

A crucial concern is the overall impact of bank profitability on economic growth. We compute and test the cumulated effect of current and past levels of bank profits. Results are reported at the bottom of Table 4. Two results emerge from the System GMM estimates. First, the size of the cumulated effect of both *ROA* and ROA_{t-1} has the same order of magnitude as the coefficient reported in column (4) with a value of 0.364. Hence, the overall effect of bank profitability when including the past and the current levels of bank profitability is close to our previous estimation with only the current level of bank profitability. Second, the sum of the two coefficients is not significant. Therefore, the overall effect of bank profitability on economic growth is not significant when the model accounts for both current and past levels of bank profitability. This finding suggests bank profitability may contribute to both the upward and downward parts of the business cycle. Its effect on medium-term growth, i.e. a period of six years, turns to be non-significant.[6]

Thus, our estimations lead to two main conclusions. First, bank profitability helps foster economic growth. We find evidence that the current level of bank profitability is positively associated with greater economic growth. Second, when considering the dynamics of bank profitability by considering jointly the impact of the past and current levels of bank profitability, we observe no significant impact of bank profitability on economic growth. The significantly positive impact of the current level is offset by the significantly negative impact of the past level.

4.2 Interactions with country-level variables

Our main estimations indicate that bank profitability exerts a positive impact on economic growth, but one that is non-significant over the long term.

We can investigate whether this relation is influenced by the economic and institutional framework of the country. To this end, we consider four factors of this framework: monetary policy, financial development, economic development and institutional quality.

Monetary policy can influence the impact of bank profitability on growth by favouring higher or lower profits, since monetary policy has been shown to be a key driver of bank profitability (Demirgüc-Kunt and Huizinga, 1999; Borio, Gambacorta and Hofmann, 2017). In that case, the monetary policy stance might be a valuable tool to affect the relationship between bank profitability and economic growth. We address these two questions by incorporating the role of monetary policy

[6] We test for a longer-term dynamic adding the second lag of *ROA* but find no support for a significant effect of ROA_{t-2}, while the main results hold for *ROA* and ROA_{t-1}.

in the growth equation. We use the M2 and M3 growth as our indicators of the monetary environment. We interact both these variables with the banks' return-on-assets to estimate if the monetary environment impacts the effects of bank profits on GDP growth. Table 5 reports the results.

In the first step, we control for M2 growth. The coefficients of *ROA* and ROA_{t-1} remain positive and negative, respectively. However, when monetary policy is accounted for, the role of the current level of bank profits is reduced by half and becomes non-significant, i.e. monetary policy is a big driver of bank profits. Conversely, the coefficient of *M2 Growth* is positive and significant, in line with the view that accommodative monetary policy fosters growth. Hence, the monetary policy stance seems to reduce the role of bank profits in the short run. In the second step, we add the interaction of bank profitability with M2 growth (*ROA × M2 Growth*). The coefficient of the interaction is negatively significant. A loose monetary stance reduces the positive impact of bank profitability on GDP growth. This result is in line with the evidence that an environment with accommodative monetary policy and low interest rate levels is detrimental to bank profits (Borio, Gambacorta and Hofmann, 2017). We now show that is also detrimental to the positive role of bank profits on economic growth. In the meantime, the coefficient of *ROA* is again positive and the sum of *ROA* and ROA_{t-1} is positive and significant. Hence, reducing M2 growth, arguably through an increase in interest rates, greatly contributes to the positive impact of bank profits on economic growth.

We redo similar estimations using the growth of M3 as our indicator of monetary policy. Compared to M2, the coefficients of *M3 Growth* and *ROA × M3 growth* are halved, indicating that changing the larger aggregate of money has less impact on growth and bank profits. The sum of *ROA* and ROA_{t-1} is also non-significant. Hence, monetary policy can foster the relationship between bank profits and economic growth only in the short run. It creates a negative impact in the next period and generates no significant long-term impact.

We now consider the roles of *financial and economic development*, asking whether they influence the relation between bank profitability and economic growth. Recent studies in the finance-growth nexus have shown that the impact of financial development indicators on economic growth can be conditional to the level of development of the country (Rioja and Valev, 2004; Arcand, Berkes and Panizza, 2015). In line with this conclusion, the relationship between bank profitability and economic growth may be conditional to the level of financial development.

Financial and economic development are also often associated with lower information asymmetries (Godlewski and Weill, 2011; Fungacova, Shamshur and Weill, 2017). The quality of

risk analysis increases with the knowledge and skill of bank employees, which are positively associated with economic and financial development. In line with that argument, we expect bank profitability to be less beneficial to economic growth in countries with greater financial and economic development as these countries are less affected by information asymmetries. As a consequence, the argument that high profitability associated with low competition would be beneficial for access to credit because profitable banks would be more able to gather information on the borrower would be less relevant.

We use two indicators to measure financial development: the ratio of domestic credit to the private sector scaled by GDP (*Private Credit*), banks' private credits scaled by the sum of banks' private credit and central bank assets (*Bank Share*). Table 6 reports the results. Controlling for the financial environment does not alter the relationship between bank profitability and economic growth. *Private Credit* exerts a negative impact on economic growth. This is rather at odds with the literature on the finance-growth nexus, but can be explained by the introduction of bank profits into the equation, the use of a larger sample and more recent data.[7] When we add the interaction between *ROA* and any of both financial development indicators, we find no significant coefficient for the interaction term, suggesting that the impact of bank profitability on economic growth is not influenced by the level of financial development.

We consider economic development using the World Bank classification of income. We create the dummy variable *Income Group*. The World Bank classifies countries into four income groups: low-income (*Income Group* = 1), middle income, upper middle income and high income (*Income Group* = 4). In Table 8, we first add *Income Group* to the model that does not modify the impact of bank profitability on economic growth. Next, we consider whether the relationship between bank profitability and economic growth is different between income groups. To do so, we use a dummy variable for each income group (respectively *Low Income, Middle Income, Upper-Middle Income, High Income*, by increasing order of income) and interact it with *ROA*. We only observe a significant coefficient for the interaction term between ROA and Upper Middle Income, which is positive. Therefore, only these countries seem to benefit more from the positive link between banks' return-on-assets and GDP growth.[8] Hence, low-income countries are not the largest

[7] See the "vanishing effect" found by Rousseau and Wachtel (2011) and the recent evidence provided by Arcand, Berkes and Panizza (2015) of a negative effect in the case of excessive financial development.
[8] This category in our sample has 32 countries. It includes Argentina, Brazil, China, Malaysia, Russia, Turkey and South Africa.

beneficiaries of greater bank profitability for their growth. The winners are developed economies moving up the ladder, but not near the top yet.

Finally, we consider the impact of *institutional quality*. Institutions can influence the relation between bank profitability and economic growth in multiple ways. As noted, bank profitability influences economic growth by fostering financial stability. However, financial stability may be beneficial or detrimental to economic growth. The detrimental impact of financial stability results from the fact that financial liberalization associated with financial instability can be growth-enhancing. This positive effect of financial instability for growth may be conditioned on high institutional quality that guarantees financial crises are not persistently driven by poor institutions.

In a related vein, the positive impact of bank profitability through the competition channel on growth results from high profitability associated with low competition to collect information on borrowers. This may be conditioned on high institutional quality such that high profitability is not the outcome of obstacles implemented by the authorities to preserve monopoly rents for incumbent banks. Thus, it is worthwhile to ask whether the impact of bank profitability on economic growth is influenced by institutional quality

We measure institutional quality using 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. In the regressions, we use the first difference of these variables and multiply them by 100 to rescale them. Table 9 reports the results.

Controlling for the institutions alone does not change the results. The coefficient of *Rule of Law* turns out to be positive and non-significant, while the coefficient of *Regulatory Quality* is positive and significant. This confirms that an increase in the quality of the institutions is followed by higher growth.

We now turn to the role institutions play in the relationship between bank profits and economic growth. We capture this element using the interaction of *Rule of Law* and *ROA* and *Regulatory Quality* with *ROA*. Both estimates are positive and significant. Countries offering a better institutional environment benefit more from the positive relation between banks' return-on-assets and GDP growth. In each case, the overall impact of bank profitability is also positive and significant, giving more weight to the view that institutions exert a positive impact. These results explain why countries in the upper middle income category benefit more from strong bank profits. Good quality institutions are essential to growth in this respect.

4.3 Robustness checks

Additional regressions are run to test the robustness of the relation between bank profitability and economic growth. Unless otherwise indicated, we perform only System GMM panel regressions in these tests as they are the most relevant estimations in addressing endogeneity issues.

First, we investigate whether banking crises influence our results. Our period of study contains several banking crises, including the global financial crisis. It is therefore of interest to study whether the relationship between bank profitability and economic growth is different in normal times and in crisis times.

To this end, we include the dummy variable *Banking Crisis* in the estimations. Using data extracted from the GFDD, this variable is equal to one for years with a banking crisis, and to zero otherwise. Table 8 presents the results.

We first investigate whether accounting for banking crises alters the results. The addition of *Banking Crisis* is shown in column (1). We then investigate whether the impact of bank profitability on economic growth differs with the period by including interaction terms between bank profitability variables and crisis dummy variables. We test several specifications: *ROA × Banking Crisis* in column (2), *ROA, ROA_{t-1} × Banking Crisis* in column (3), *ROA × $Banking\ Crisis_{t-1}$* in column (4), *ROA × $Banking\ Crisis_{2008-2010}$* in column (5). $Banking\ Crisis_{2008-2010}$ is a dummy variable equal to one if the period includes the global financial crisis period of 2008–2010, and zero otherwise. With all these specifications, we are then able to provide a broad view of the influence of banking crises on our results.

We conclude that our main findings remain unaffected. In all estimations, *ROA* is significantly positive and ROA_{t-1} is significantly negative, and the overall effect of bank profitability is not significant. Hence, controlling for banking crises does not affect our main findings. Moreover, we find no significant interaction term. Therefore, we do not obtain any evidence that the relation between bank profitability and economic growth would be influenced by banking crises. Thus, the relation between bank profitability and economic growth is not influenced by the fact that our observation period includes a major crisis.

Second, we check the robustness of our profitability measure. We redo the main specification using the banks' return-on-equity. ROA, as noted, is a broad measure of bank profitability. It accounts for risks supported by both shareholders and creditors. Return-on-equity, in contrast, provides information only on the return for the capital invested by shareholders. This measure has been

used in works on bank profitability (e.g. Goddard, Molyneux and Wilson, 2004). Here, we use return-on-equity before taxes, unconsolidated across countries and winsorized at the 1% level. The estimations are reported in Table 9. Our main results again hold. We observe a positive impact of the current level of bank profitability on growth with a significantly positive coefficient of *ROE* in the three specifications. We also find a negative and significant effect of the lagged value of the return-on-equity and the common effect of *ROE* and ROE_{t-1} is positive and non-significant. The interaction between *ROE* and *Banking Crisis* remains non-significant, confirming that bank profits do not contribute to economic recovery.

Third, we use an alternative indicator for economic growth. In the main estimations, we employ real GDP per capita growth in accordance with the vast majority of studies on the finance-growth nexus (e.g. Beck and Levine, 2004; Arcand, Berkes and Panizza, 2015). To test the robustness of this measure, we consider real GDP growth and redo the estimations in Table 10. This modification does not change the results. We still observe that the coefficient of *ROA* is positive and significant in all estimations. Conversely, ROA_{t-1} is negative and significant. Using real GDP growth, the cumulated effect of *ROA* and ROA_{t-1} is positive and significant at the 10% level in two estimations. This result already had shown up in several tables and confirms mixed evidence on this matter. The interaction term between *ROA* and *Crisis* remains non-significant, confirming that higher profits during a crisis do not contribute to economic recovery.

Fourth, we consider possible nonlinearity in the relation between bank profitability and economic growth. This is notably due to the non-linear pattern between the bank profit quintiles and GDP growth appearing in the raw data. We perform three estimations in Table 11. In column (1), we include the squared *ROA* to capture a quadratic effect. We then follow the quintile subdivision of *ROA* performed in Table 1 by creating five dummy variables for each ROA quintile ($Q_{ROA}1$ to $Q_{ROA}5$) to generate an interaction with *ROA*. In column two, we only consider the first quintile, since the non-linearity in raw data starts at the second quintile. In the third column, we add the other quintiles and remove the first. In all three specifications, we observe no significant coefficient for the variables added to test nonlinearity. The quadratic term of *ROA* is non-significant. The Lind and Mehlum (2010) U-shaped test confirms that there is no quadratic relation (with extrema outside data range). Moreover, the nonlinear pattern across quintiles we observe in the data does not hold in the model. This comports with our main specification and provides evidence of a linear relation between bank profits and economic growth.

Fifth, we challenge the way we have averaged our data. This could be important as the main objective of averaging is to smooth the business cycle. In the meantime, one of our main

findings is the role of profit dynamics on GDP. Our main estimations consider three-year periods. Here, we first try a shorter horizon with two-year periods. We perform estimations with system GMM regressions. We next try a five-year horizon. For these regressions, we perform panel fixed effects with robust standard errors as the number of periods by country is insufficient to allow estimating system GMM regressions. We also cannot include any lag of the variables. Table 12 reports the results. Our main findings are again supported. *ROA* has a positive effect on economic growth, the effect of ROA_{t-1} is negative and the cumulated effect non-significant. The interaction between *ROA* and *Banking Crisis* is also non-significant.

Finally, we control for risk in the estimations. As noted, bank profitability can affect economic growth by influencing financial stability and it can play a role in bank competition. As a consequence, this channel of transmission implies bank profitability can influence bank risk. We therefore consider the validity of our results once risk is accounted for in our estimations. We measure bank risk with two indicators. We use the z-score (*Z-score*), which is inversely related to the probability of default of a bank. A higher z-score is associated with lower bank risk. We also utilize the ratio of non-performing loans to total loans (*NPL*) as an indicator of the quality of the loan portfolio. We use data provided by the GFDD for these measures. We perform two estimations in Table 13, adding alternatively the Z-score and NPL in the estimations. We observe that the main results remain unaffected with a significantly positive coefficient for ROA and a significantly negative coefficient for ROA_{t-1}. In other words, our main conclusions are not affected when bank risk is taken into consideration.

5 Conclusions

This paper addresses the evidence of bank profitability effects on economic growth. With policymakers concerned about low bank profitability, it is natural to ask whether higher bank profitability actually enhances growth.

We obtain two major conclusions. First, we find that the current high bank profitability favours economic growth. Second, the past level of bank profitability negatively influences economic growth. Hence, bank profitability is only growth-enhancing in the short run. These findings are robust to a battery of robustness checks, including the use of alternative measures of profitability and growth.

In addition, we observe that the impact of bank profitability on economic growth is influenced by two country-specific characteristics. It is diminished by an expansive monetary policy and amplified by higher institutional quality.

A possible interpretation of these conclusions deals with the positive influence of bank profitability on financial stability. Greater profitability allows banks to increase their core capital and gives greater incentives to screen loans and monitor borrowers. Through this channel, bank profitability has a different influence on economic growth in the short and medium term based on the relation between financial stability and economic growth. While this relation is positive in the short run, it becomes non-significant in the medium run. This is due to the detrimental effects of financial stability on economic growth noted by Rancière, Tornell and Westermann (2008).

From a policy perspective, these findings support the view that bank profitability should only be promoted by authorities for growth concerns with a short horizon. In the medium run, greater bank profitability does not contribute to enhanced growth. Hence, while authorities generally document their concerns on bank profitability by its impact on the soundness of the financial industry, we complement this argument by showing the growth effects of bank profitability. Thus, when authorities take the position that low profitability of banks is a major concern, it does not appear to be relevant in the broader perspective of economic growth except in the short run.

References

Albertazzi, Ugo, and Leonardo Gambacorta (2009). "Bank Profitability and the Business Cycle," *Journal of Financial Stability* 5, 393–409.

Arcand, Jean Louis, Enrico Berkes and Ugo Panizza (2015). "Too Much Finance?" *Journal of Economic Growth* 20, 105–148.

Arellano, Manuel, and Stephen Bond (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies* 58, 277–297.

Arena, Marco (2008). "Bank failures and bank fundamentals: A comparative analysis of Latin America and East Asia during the nineties using bank-level data," *Journal of Banking & Finance* 32, 299–310.

Atkinson, Tyler, David Luttrell and Harvey Rosenblum (2013). "How bad was it? The costs and consequences of the 2007–09 financial crisis," Federal Reserve Bank of Dallas Staff Paper.

Beck, Thorsten, Asli Demirgüç-Kunt and Ross Levine (2006). "Bank Concentration, Competition, and Crises: First Results," *Journal of Banking & Finance* 30, 1581–1603.

Beck, Thorsten, Asli Demirgüç-Kunt and Vojislav Maksimovic (2004). "Bank Competition and Access to Finance: International Evidence," *Journal of Money, Credit and Banking* 36, 627–648.

Beck, Thorsten, and Ross Levine (2004). "Stock Markets, Banks, and Growth: Panel Evidence," *Journal of Banking & Finance* 28, 423–442.

Beltratti, Andrea and René M. Stulz (2012). "The credit crisis around the globe: Why did some banks perform better?" *Journal of Financial Economics* 105, 1–17.

Blundell, Richard, and Stephen Bond (1998). "Initial conditions and moment restrictions in dynamic panel data models, *Journal of Econometrics* 87, 115–143.

Bolt, Wilko, Leo de Haan, Marco Hoeberichts, Maarten R. C. van Oordt and Job Swank (2012). "Bank profitability during recessions," *Journal of Banking & Finance* 36, 2552–2564.

Boot, Arnoud W. A., and Anjan V. Thakor (2000). "Can Relationship Banking Survive Competition?" *Journal of Finance* 55, 679–713.

Borio, Claudio, Leonardo Gambacorta, and Boris Hofmann (2017). "The Influence of Monetary Policy on Bank Profitability, *International Finance* 20, 48–63.

Cetorelli, Nicola, and Michele Gambera (2001). "Banking Market Structure, Financial Dependence and Growth: International Evidence from Industry Data," *Journal of Finance* 56, 617–648.

Chronopoulos, Dimitris K., Hong Liu, Fiona J. McMillan and John O. S. Wilson (2015). "The Dynamics of US Bank Profitability," *European Journal of Finance* 21, 426–443.

Claessens, Stijn, and Luc Laeven (2005). "Financial Dependence, Banking Sector Competition, and Economic Growth," *Journal of the European Economic Association* 3, 179–207.

Claeys, Sophie, and Koen Schoors (2007). "Bank supervision Russian style: Evidence of conflicts between micro- and macro-prudential concerns," *Journal of Comparative Economics* 35, 630–657.

Cooke, J. B., and Christoffer Koch (2014). "Weakly capitalized banks slowed lending recovery after recession," *Economic Letters* 9, 1–4.

Coval, Joshua D., and Anjan V. Thakor (2005). "Financial intermediation as a beliefs-bridge between optimists and pessimists," *Journal of Financial Economics* 75, 535–569.

Demirgüç-Kunt, Asli, and Harry Huizinga (1999). "Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence," *World Bank Economic Review* 13, 379–408.

Flannery, Mark J., and Kasturi P. Rangan (2008). "What Caused the Bank Capital Build-up of the 1990s?" *Review of Finance* 12, 391–429.

Fungacova, Zuzana, Anastasiya Shamshur and Laurent Weill (2017). "Does bank competition reduce cost of credit? Cross-country evidence from Europe," *Journal of Banking & Finance* 83, 104–120.

Gambacorta, Leonardo, and Hyun Song Shin (2016). "Why bank capital matters for monetary policy," *Journal of Financial Intermediation*.

García-Herrero, Alicia, Sergio Gavilá and Daniel Santabárbara (2009). "What explains the low profitability of Chinese banks?" *Journal of Banking & Finance* 33 (Financial Globalisation, Risk Analysis and Risk Management), 2080–2092.

Goddard, John, Phil Molyneux and John O. S. Wilson (2004). "Dynamics of Growth and Profitability in Banking," *Journal of Money, Credit and Banking* 36, 1069–1090.

Haggard, Stephan, and Lydia Tiede (2011). "The Rule of Law and Economic Growth: Where are We?" *World Development* 39, 673–685.

Holmstrom, Bengt, and Jean Tirole (1997). "Financial Intermediation, Loanable Funds, and The Real Sector," *Quarterly Journal of Economics* 112, 663–691.

Keeley, Michael C. (1990). "Deposit Insurance, Risk, and Market Power in Banking," *American Economic Review* 80, 1183–1200.

King, Robert G., and Ross Levine (1993). "Finance and Growth: Schumpeter Might be Right," *Quarterly Journal of Economics* 108, 717–737.

Kupiec, Paul H., and Carlos D. Ramirez (2013). "Bank Failures and the Cost of Systemic Risk: Evidence from 1900 to 1930," *Journal of Financial Intermediation* 22, 285–307.

Laeven, Luc, and Ross Levine (2009). "Bank Governance, Regulation and Risk Taking," *Journal of Financial Economics* 93, 259–275.

Lee, Chien-Chiang, and Meng-Fen Hsieh (2013). "The Impact of Bank Capital on Profitability and Risk in Asian Banking," *Journal of International Money and Finance* 32, 251–281.

Levine, Ross (2005). "Finance and Growth: Theory and Evidence," Chapter 12 in Philippe Aghion and Steven N. Durlauf (eds.), *Handbook of Economic Growth* (Elsevier).

Levine, Ross, Norman Loayza and Thorsten Beck (2000). "Financial intermediation and growth: Causality and causes," *Journal of Monetary Economics* 46, 31–77.

Lind, Jo Thori, and Halvor Mehlum (2010). "With or Without U? The Appropriate Test for a U-Shaped Relationship," *Oxford Bulletin of Economics and Statistics* 72, 109–118.

Love, Inessa, and María Soledad Martínez Pería (2015). "How Bank Competition Affects Firms' Access to Finance," *World Bank Economic Review* 29, 413–448.

Mehran, Hamid, and Anjan Thakor (2011). "Bank Capital and Value in the Cross-Section," *Review of Financial Studies* 24, 1019–1067.

North, Douglass C. (1989). "Institutions and economic growth: An historical introduction," *World Development* 17, 1319–1332.

Patiño, Maria Laura (2001). "Lessons from the financial crisis in Ecuador in 1999," *Journal of International Banking Regulations* 3, 37–70.

Petersen, Mitchell A., and Raghuram G. Rajan (1994). "The Benefits of Lending Relationships: Evidence from Small Business Data," *Journal of Finance* 49, 3–37.

Petersen, Mitchell A., and Raghuram G. Rajan (1995). "The Effect of Credit Market Competition on Lending Relationships," *Quarterly Journal of Economics* 110, 407–443.

Qian, Jun, and Philip E. Strahan (2007). "How Laws and Institutions Shape Financial Contracts: The Case of Bank Loans," *Journal of Finance* 62, 2803–2834.

Rancière, Romain, Aaron Tornell and Frank Westermann (2008). "Systemic Crises and Growth," *Quarterly Journal of Economics* 123, 359–406.

Reinhart, Carmen M., and Kenneth S. Rogoff (2014). "Recovery from Financial Crises: Evidence from 100 Episodes," *American Economic Review* 104, 50–55.

Roodman, David (2006). "How to Do xtabond2: An Introduction to Difference and System GMM in Stata," *Stata Journal* 9, 86–136.

Rousseau, Peter L., and Paul Wachtel (2011). "What Is Happening to the Impact of Financial Deepening on Economic Growth?" Economic Inquiry 49, 276–288.

Ryan, Robert M., Conor M. O'Toole and Fergal McCann (2014). "Does Bank Market Power Affect SME Financing Constraints?" Journal of Banking & Finance 49, 495–505.

Thakor, Anjan V. (2014). "Bank Capital and Financial Stability: An Economic Trade-Off or a Faustian Bargain?" Annual Review of Financial Economics 6, 185–223.

Windmeijer, Frank (2005). "A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM estimators," *Journal of Econometrics* 126, 25–51.

Tables and figures

Table 1 Trends in ROA

	1999-2013	1999-2001	2002-2004	2005-2007	2008-2010	2011-2013	KW test, by year
Panel A: RoA							
N	642	126	129	132	130	125	
Mean	1.66	1.54	1.96	2.04	1.12	1.64	
Median	1.55	1.18	1.64	1.89	1.50	1.53	19.6***
Standard Dev.	2.86	3.21	2.33	1.54	4.32	1.92	
Minimum	-43.12	-18.07	-6.39	-5.50	-43.12	-11.47	
Maximum	14.31	14.31	11.83	7.69	7.38	8.55	
Panel B: ROA levels and growth							
20% Lowest ROA							
N	129	26	26	27	26	25	
Median GDP growth	1.21	1.83	1.30	3.94	-0.87	0.62	31.98***
Second quintile							
N	128	25	26	26	26	25	
Median GDP growth	2.51	2.42	2.80	3.18	1.05	2.40	18.63
Third quintile							
N	129	25	26	27	26	25	
Median GDP growth	2.44	1.78	2.83	4.00	0.79	2.00	8.09
Fourth quintile							
N	128	25	26	26	26	25	
Median GDP growth	2.91	2.22	2.94	3.42	1.64	2.90	29.23
20% Highest ROA							
N	128	25	25	26	26	25	
Median GDP growth	2.85	2.33	3.82	3.02	3.13	2.94	2.89
KW test - *by ROA*	38.05***	1.30	8.74	1.03	30.21***	17.89**	117.13***

Panel C: Correlation between ROA and growth	Full Sample	Period preceding a banking crisis	During a banking crisis	Period following a banking crisis
Correlation	0.127***	0.039	0.221*	0.289**

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. Panel A presents statistics for ROA in all the countries (%). In Panel B, we sort countries on their ROA in each period and create quintiles. For each quintile, we provide the real GDP growth per capita (%). We test the differences across groups (levels of ROA and time-period) using the 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 levels of ROA. The overall difference between levels and time-periods is given at the bottom right of the table. Panel C reports the correlation using the World Bank *Banking Crisis* indicator. ***, ** and * report the 1%, 5% and 10% thresholds of significance.

Table 2 Descriptive statistics

	N	Mean	Median	Std. dev.	Minimum	Maximum
ROA (%)	642	1.66	1.55	2.86	-43.12	14.31
GDP per capita growth (%)	642	2.50	2.37	3.04	-11.28	14.36
GDP per capita *(constant 2005US$)*	642	970,037	43,774	3,610,205	137	31,100,000
Education (years)	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
Banking Crisis	642	0.11	0.00	0.32	0.00	1.00
Z-Score	642	15.81	14.57	10.70	-18.81	57.34
NPL (%)	454	6.97	4.09	7.51	0.23	74.10
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	18.36	15.59	18.01	-82.27	198.16
GDP growth (%)	642	3.96	3.89	3.21	-10.57	17.22
Lerner	536	0.26	0.25	0.14	-0.73	0.86

This table provides descriptive statistics for the variables used in the study. Appendix A gives the definitions of the variables.

Table 3 Main estimations

	OLS	Panel FE	IV Panel FE	System GMM	System GMM
ROA	0.151*	0.375***	0.788***	0.331*	0.715**
	(1.92)	(3.39)	(3.36)	(1.77)	(2.24)
ROA_{t-1}					-0.351**
					(-2.42)
GDP Per Capita $Growth_{t-1}$	0.429***	0.107*	-0.006	0.456***	0.475***
	(8.33)	(1.72)	(-0.09)	(5.98)	(6.14)
Initial GDP (log)	0.014	-6.771***	-5.824***	-0.451	-0.498
	(0.27)	(-3.11)	(-3.29)	(-1.27)	(-1.46)
Education (log)	0.206	2.142	3.944*	0.111	0.507
	(0.82)	(1.11)	(1.82)	(0.14)	(0.57)
Inflation (log)	-0.098	-1.225**	-0.456	-0.720	-0.591
	(-0.33)	(-2.59)	(-1.56)	(-1.38)	(-1.06)
Openness (log)	0.331	1.303	0.756	-0.191	-0.232
	(1.30)	(1.33)	(0.68)	(-0.20)	(-0.25)
Government Exp. (log)	-1.446***	-2.586	-1.916	-2.621*	-2.539*
	(-3.61)	(-1.65)	(-0.95)	(-1.84)	(-1.81)
Constant	3.670	76.257***	1.097**	15.367**	14.604**
	(1.60)	(3.06)	(2.16)	(2.16)	(1.98)
N	508	508	422	508	508
No. of groups	132	132	113	132	132
Adjusted R^2	0.31	0.34			
F	23.06	13.38***	13.77***		
Chi^2				197.16***	199***
Hansen p-value			0.15	0.11	0.18
AR 1				-3.89***	-3.94***
AR 2				-1.00	-1.16
H_0: $ROA + ROA_{t-1} = 0$					*0.364*
					(2.14)

The table below presents OLS, Panel fixed-effects (FE), Instrumental Variables (IV) Panel FE and System GMM 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. 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. Appendix A gives the definitions of the variables. Appendix B details the first-stage of the IV Panel FE.

Table 4 Monetary policy

	(1)	(2)	(3)	(4)
ROA	0.295	0.835**	0.388*	0.403*
	(1.31)	(2.26)	(1.89)	(1.90)
ROA_{t-1}	-0.291**	-0.223	-0.312**	-0.247**
	(-2.28)	(-1.54)	(-2.44)	(-2.21)
M2 growth	0.219***	0.329***		
	(4.38)	(5.57)		
ROA × M2 growth		-0.042**		
		(-2.56)		
M3 growth			0.126***	0.182***
			(4.31)	(4.86)
ROA × M3 growth				-0.020**
				(-2.19)
GDP Per Capita $Growth_{t-1}$	0.367***	0.347***	0.379***	0.328***
	(4.51)	(4.43)	(4.47)	(3.65)
Initial GDP (log)	0.085	0.061	-0.123	0.047
	(0.48)	(0.27)	(-0.53)	(0.27)
Education (log)	0.732	0.487	0.658	0.467
	(0.98)	(0.65)	(1.21)	(0.95)
Inflation (log)	-1.224***	-1.055**	-0.626	-0.243
	(-2.67)	(-2.04)	(-0.98)	(-0.39)
Openness (log)	-0.121	0.028	-0.136	0.120
	(-0.16)	(0.04)	(-0.17)	(0.14)
Government Exp. (log)	-1.287	0.291	-3.139***	-2.575**
	(-1.00)	(0.20)	(-2.87)	(-2.02)
Constant	3.571	-2.226	10.930*	5.811
	(0.64)	(-0.35)	(1.75)	(1.04)
N	490	490	488	488
No. of groups	132	132	132	132
Chi^2	242.91***	258.20***	219.09***	307.86***
Hansen p-value	0.40	0.41	0.32	0.35
AR 1	-3.58***	-3.42***	-4.03***	-4.35***
AR 2	-0.56	-0.31	-0.56	-0.41
H_0: $ROA + ROA_{t-1} = 0$	0.004	0.613*	0.076	0.155
	(0.00)	(3.39)	(0.18)	(0.62)

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. 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. Appendix A gives the definitions of the variables.

Table 5 Financial development

	(1)	(2)	(3)	(4)
ROA	0.380** (2.23)	0.395 (1.50)	0.766*** (2.78)	-0.370 (-0.35)
ROA_{t-1}	-0.200* (-1.94)	-0.165** (-2.04)	-0.330** (-2.52)	-0.296** (-2.28)
Private Credit	-0.018*** (-2.76)	-0.019*** (-3.26)		
ROA × Private Credit		-0.001 (-0.42)		
Bank Share			0.310 (0.12)	-4.157 (-1.44)
ROA × Bank Share				1.499 (1.22)
GDP Per Capita $Growth_{t-1}$	0.426*** (5.19)	0.409*** (5.20)	0.530*** (4.91)	0.486*** (4.79)
Initial GDP (log)	-0.125 (-0.53)	-0.027 (-0.16)	-0.216 (-0.62)	0.152 (0.53)
Education (log)	0.826 (1.17)	1.033 (1.61)	0.389 (0.48)	0.900 (1.09)
Inflation (log)	-0.380 (-0.79)	-0.374 (-0.82)	-0.128 (-0.21)	0.058 (0.10)
Openness (log)	0.543 (0.62)	0.689 (0.99)	-0.136 (-0.11)	-0.741 (-0.77)
Government Exp. (log)	-1.217 (-1.07)	-1.193 (-1.17)	-1.512 (-0.97)	-0.779 (-0.73)
Constant	4.142 (0.64)	2.031 (0.38)	7.039 (0.88)	5.982 (0.87)
N	494	494	452	452
No. of groups	132	132	126	126
Chi^2	250.60***	326.92***	165.97***	199.94***
Hansen p-value	0.10	0.19	0.21	0.20
AR 1	-3.84***	-3.85***	-3.75***	-3.87***
AR 2	-0.42	-0.27	-0.12	-0.42
H_0: $ROA + ROA_{t-1} = 0$	0.179 (1.16)	0.230 (0.72)	0.436 (2.48)	-0.667 (0.41)

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. 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. Appendix A gives the definitions of the variables.

Table 6 Economic development

	(1)	(2)	(3)	(4)	(5)
ROA	0.753***	0.853***	0.394	0.702***	0.812***
	(2.81)	(2.93)	(1.33)	(2.97)	(3.90)
ROA_{t-1}	-0.428***	-0.310**	-0.391***	-0.411***	-0.354***
	(-3.65)	(-2.55)	(-3.52)	(-3.76)	(-3.65)
Income Group	-1.798***	-1.142*	-2.607***	-1.460**	-2.165***
	(-2.68)	(-1.83)	(-3.11)	(-2.33)	(-4.06)
ROA × High Income		-0.572			
		(-1.43)			
ROA × Up-Middle Income			1.097***		
			(3.00)		
ROA × Middle Income				-0.110	
				(-0.33)	
ROA × Low Income					-0.525
					(-1.42)
GDP Per Capita $Growth_{t-1}$	0.383***	0.360***	0.307***	0.401***	0.352***
	(4.42)	(4.90)	(3.66)	(4.54)	(4.42)
Initial GDP (log)	-0.240	-0.015	0.099	-0.224	-0.092
	(-0.68)	(-0.07)	(0.27)	(-0.89)	(-0.30)
Education (log)	3.319***	2.756**	4.216**	2.582**	3.493**
	(2.64)	(2.08)	(2.35)	(2.37)	(2.49)
Inflation (log)	-0.874	-0.883	-1.427**	-0.744	-1.134**
	(-1.55)	(-1.50)	(-2.17)	(-1.53)	(-2.16)
Openness (log)	0.090	0.979	0.554	0.453	-0.070
	(0.10)	(1.24)	(0.66)	(0.67)	(-0.10)
Government Exp. (log)	-2.579*	-2.043	-1.990	-2.157*	-2.919*
	(-1.78)	(-1.37)	(-1.52)	(-1.77)	(-1.93)
Constant	10.570	1.854	4.752	8.046	11.859*
	(1.33)	(0.35)	(0.87)	(1.29)	(1.81)
N	508	508	508	508	508
No. of groups	132	132	132	132	132
Chi^2	234.59***	227.58***	171.70***	235.30***	225.82***
Hansen p-value	0.17	0.17	0.30	0.22	0.25
AR 1	-3.85***	-3.66***	-3.58***	-3.76***	-3.81***
AR 2	-0.96	-0.72	-0.20	-0.97	-0.81
H_0: $ROA + ROA_{t-1} = 0$	0.325	0.543**	0.003	0.291	0.458**
	(1.83)	(4.53)	(0.01)	(1.70)	(5.23)

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. 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. Appendix A gives the definitions of the variables.

Table 7 Institutional development

	(1)	(2)	(3)	(4)
ROA	0.700** (2.10)	1.007*** (3.50)	0.645*** (2.76)	0.811*** (3.43)
ROA_{t-1}	-0.367*** (-2.59)	-0.444*** (-2.69)	-0.396*** (-3.15)	-0.409*** (-3.74)
Δ.Rule of Law	0.024 (1.56)	-0.029 (-0.81)		
ROA × Δ.Rule of Law		0.028** (2.53)		
Δ.Regulatory Quality			0.058*** (2.61)	0.041* (1.84)
ROA × Δ.Regulatory Quality				0.012** (2.29)
GDP Per Capita $Growth_{t-1}$	0.471*** (6.23)	0.452*** (6.22)	0.378*** (4.95)	0.387*** (5.12)
Initial GDP (log)	-0.480 (-1.31)	-0.434 (-1.35)	-0.367 (-1.42)	-0.649** (-2.30)
Education (log)	0.479 (0.53)	0.873 (1.08)	0.770 (1.02)	0.703 (1.08)
Inflation (log)	-0.509 (-0.88)	-0.091 (-0.20)	-0.665 (-1.12)	-0.271 (-0.54)
Openness (log)	-0.196 (-0.21)	0.510 (0.53)	-0.151 (-0.20)	0.584 (0.98)
Government Exp. (log)	-2.410* (-1.74)	-1.738 (-0.96)	-4.070*** (-2.78)	-3.827*** (-2.63)
Constant	13.840* (1.85)	6.407 (0.71)	17.010*** (2.68)	15.265** (2.35)
N	507	507	508	508
No. of groups	132	132	132	132
Chi^2	175.54	163.47	250.20	192.29
Hansen p-value	0.14	0.16	0.15	0.21
AR 1	-4.04	-4.43	-4.39	-4.50
AR 2	-1.07	-1.31	-0.05	-0.14
H_0: $ROA + ROA_{t-1} = 0$	0.334 (1.70)	0.563*** (6.92)	0.250 (1.69)	0.402** (4.43)

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. 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. Appendix A gives the definitions of the variables.

Table 8 Robustness check: Banking crisis

	(1)	(2)	(3)	(4)	(5)
ROA	0.594*	0.462*	0.559***	0.893**	0.399*
	(1.83)	(1.78)	(3.04)	(2.55)	(1.84)
ROA_{t-1}	-0.304**	-0.295***	-0.286**	-0.358**	-0.235**
	(-2.52)	(-2.89)	(-2.32)	(-2.33)	(-2.23)
Banking Crisis	-1.023	-1.277*	-0.774	-2.400**	-0.481
	(-1.14)	(-1.91)	(-1.13)	(-2.26)	(-0.53)
ROA × Banking Crisis		0.021			
		(0.07)			
ROA_{t-1} × Banking Crisis			-0.207		
			(-0.77)		
ROA × $\text{Banking Crisis}_{t-1}$				-0.822	
				(-1.26)	
$\text{Banking Crisis}_{t-1}$				2.518**	
				(2.35)	
ROA × $\text{Banking Crisis}_{2008\text{-}2010}$					1.189
					(0.45)
$\text{Banking Crisis}_{2008\text{-}2010}$					-2.954*
					(-1.69)
GDP Per Capita Growth_{t-1}	0.459***	0.409***	0.459***	0.432***	0.458***
	(5.81)	(5.62)	(6.50)	(5.36)	(5.83)
Initial GDP (log)	-0.302	-0.250	-0.293	-0.362	-0.306
	(-1.07)	(-1.27)	(-1.38)	(-1.58)	(-1.11)
Education (log)	0.552	0.883	0.581	0.592	0.523
	(0.75)	(1.24)	(0.81)	(0.87)	(0.83)
Inflation (log)	-0.564	-0.603	-0.556	-0.245	-0.559
	(-0.86)	(-0.98)	(-0.98)	(-0.62)	(-0.86)
Openness (log)	-0.321	-0.342	-0.118	0.685	-0.277
	(-0.43)	(-0.57)	(-0.15)	(0.82)	(-0.41)
Government Exp. (log)	-1.801	-2.937***	-2.286*	-1.244	-1.727
	(-1.30)	(-2.65)	(-1.88)	(-0.82)	(-1.28)
Constant	11.024	13.298**	11.341**	4.619	10.841*
	(1.60)	(2.33)	(2.42)	(0.75)	(1.75)
N	508	508	508	508	508
No. of groups	132	132	132	132	132
Chi^2	278.77***	297.02***	269.35***	226.89***	264.21***
Hansen p-value	0.19	0.23	0.24	0.16	0.17
AR 1	-3.81***	-3.70***	-3.89***	-4.17***	-3.78***
AR 2	-1.05	-0.88	-1.04	-1.21	-1.08
H_0: $\sum_t ROA_t + \sum_t ROA_t \times \text{Banking Crisis}_t = 0$	0.290	0.188	0.067	-0.287	1.353
	(1.17)	(0.47)	(0.05)	(0.23)	(0.26)

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. 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. Appendix A gives the definitions of the variables.

Table 9 Robustness check: Alternative measure of profitability

	(1)	(2)	(3)
ROE	0.105*** (2.86)	0.088** (2.38)	0.080** (2.09)
ROE_{t-1}	-0.069*** (-3.17)	-0.067*** (-3.33)	-0.064*** (-2.88)
Banking Crisis		-1.477** (-2.12)	-1.561* (-1.68)
ROE × Banking Crisis			-0.008 (-0.13)
GDP Per Capita $Growth_{t-1}$	0.456*** (5.16)	0.418*** (4.88)	0.418*** (4.99)
Initial GDP (log)	-0.309 (-1.02)	-0.327 (-1.06)	-0.347 (-1.17)
Education (log)	0.821 (0.97)	0.867 (1.20)	0.853 (1.23)
Inflation (log)	-0.566 (-0.83)	-0.490 (-0.74)	-0.476 (-0.75)
Openness (log)	-0.554 (-0.61)	-0.139 (-0.15)	-0.062 (-0.06)
Government Exp. (log)	-3.120* (-1.81)	-2.803* (-1.79)	-2.840* (-1.90)
Constant	15.016* (1.68)	12.902 (1.52)	12.991 (1.57)
N	507	507	507
No. of groups	132	132	132
Chi^2	145***	348.62***	362.15***
Hansen p-value	0.20	0.18	0.19
AR 1	-4.07***	-3.92***	-3.91***
AR 2	-0.78	-0.65	-0.64
H_0: $ROA + ROA_{t-1} = 0$	0.036 (1.85)	0.020 (0.50)	0.016 (0.34)

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. 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. Appendix A gives the definitions of the variables.

Table 10 Robustness check: Alternative measure of growth

	(1)	(2)	(3)
ROA	0.934**	0.887**	0.896***
	(2.25)	(2.23)	(2.66)
ROA_{t-1}	-0.358**	-0.337**	-0.306**
	(-2.08)	(-2.23)	(-2.05)
Banking Crisis		-1.189	-1.356
		(-1.51)	(-1.60)
ROA × Banking Crisis			-0.639
			(-0.90)
GDP $Growth_{t-1}$	0.406***	0.367***	0.354***
	(4.35)	(4.06)	(4.05)
Initial GDP (log)	-0.318	-0.144	-0.167
	(-0.86)	(-0.70)	(-0.70)
Education (log)	-0.325	-0.211	-0.225
	(-0.35)	(-0.24)	(-0.25)
Inflation (log)	-0.733	-0.824	-0.972*
	(-1.23)	(-1.42)	(-1.71)
Openness (log)	-0.107	-0.149	-0.070
	(-0.10)	(-0.17)	(-0.08)
Government Exp. (log)	-3.316**	-2.817*	-2.923**
	(-2.43)	(-1.89)	(-2.24)
Constant	16.675**	13.911**	14.430**
	(2.48)	(2.04)	(2.49)
N	508	508	508
No. of groups	132	132	132
Chi^2	206.99***	280.65***	362.83***
Hansen p-value	0.15	0.20	0.31
AR 1	-3.55***	-3.49***	-3.64***
AR 2	-1.57	-1.54	-1.49
H_0: $ROA + ROA_{t-1} = 0$	0.576*	0.551*	0.590**
	(3.30)	(3.34)	(4.45)

System GMM panel regressions. The dependent variable is real GDP 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 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. Appendix A gives the definitions of the variables.

Table 11 Robustness check: Test of a nonlinear relationship

	(1)	(2)	(3)
ROA	0.775*** (2.63)	0.584** (2.02)	0.479 (1.39)
ROA_{t-1}	-0.266* (-1.88)	-0.292** (-2.13)	-0.335*** (-2.85)
ROA^2	-0.041 (-1.09)		
ROA × $Q_{ROA}1$		-0.057 (-0.14)	
ROA × $Q_{ROA}2$			0.950 (1.06)
ROA × $Q_{ROA}3$			-0.199 (-0.22)
ROA × $Q_{ROA}4$			0.703 (1.22)
ROA × $Q_{ROA}5$			0.125 (0.27)
GDP Per Capita $Growth_{t-1}$	0.467*** (6.29)	0.480*** (6.78)	0.456*** (7.24)
Initial GDP (log)	-0.432 (-1.64)	-0.516 (-1.57)	-0.217 (-1.07)
Education (log)	0.111 (0.14)	0.161 (0.17)	0.666 (0.92)
Inflation (log)	-0.373 (-0.67)	-0.405 (-0.74)	-0.453 (-0.82)
Openness (log)	0.170 (0.19)	-0.005 (-0.00)	-0.071 (-0.10)
Government Exp. (log)	-1.814 (-1.33)	-2.603* (-1.93)	-2.581** (-2.39)
Constant	10.533* (1.85)	14.474** (2.09)	10.277** (2.01)
N	508	508	508
No. of groups	132	132	132
Chi^2	195.43***	210.42***	284.22***
Hansen p-value	0.13	0.18	0.26
AR 1	-4.13***	-3.95***	-3.98***
AR 2	-1.08	-1.10	-1.32
H_0: $ROA + ROA_{t-1} = 0$	0.509** (4.30)	0.292 (1.25)	0.144 (0.22)

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. 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. Appendix A gives the definitions of the variables.

Table 12 Robustness check: Alternative averaging

	2 Years – System GMM			5 Years – Panel Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
ROA	0.820**	0.666**	0.436*	0.320***	0.238**	0.222**
	(2.53)	(2.27)	(1.68)	(2.86)	(2.19)	(2.14)
ROA_{t-1}	-0.435**	-0.486***	-0.407**			
	(-2.28)	(-2.65)	(-2.20)			
Banking Crisis		-1.530**	-1.748***		-1.474***	-1.493***
		(-2.16)	(-2.65)		(-4.01)	(-3.95)
ROA × Banking Crisis			0.234			0.040
			(0.83)			(0.27)
GDP Per Capita $Growth_{t-1}$	0.240*	0.229*	0.227*			
	(1.75)	(1.77)	(1.77)			
Initial GDP (log)	0.028	0.034	0.046	-5.706***	-5.594***	-5.654***
	(0.11)	(0.18)	(0.28)	(-3.37)	(-3.50)	(-3.48)
Education (log)	1.435**	1.283*	1.294**	5.475**	4.585**	4.613**
	(2.10)	(1.96)	(2.19)	(2.46)	(2.11)	(2.13)
Inflation (log)	0.514	0.576	0.473	-0.109	-0.036	-0.021
	(0.76)	(1.01)	(0.81)	(-0.22)	(-0.07)	(-0.04)
Openness (log)	0.846	1.139	0.830	-0.272	-0.113	-0.152
	(0.86)	(1.40)	(1.23)	(-0.19)	(-0.08)	(-0.10)
Government Exp. (log)	-1.795	-1.611	-1.772	-0.020	0.302	0.280
	(-1.60)	(-1.54)	(-1.64)	(-0.01)	(0.16)	(0.14)
Constant	-1.039	-2.151	0.100	54.572***	53.804***	54.636***
	(-0.16)	(-0.41)	(0.02)	(2.85)	(2.93)	(2.91)
N	635	635	635	394	394	394
No. of groups	133	133	133	136	136	136
Chi^2	278.43***	312.58***	307.69***			
Hansen p-value	0.14	0.32	0.51			
AR 1	-2.08	-2.05	-2.10			
AR 2	0.80	0.83	0.92			
Adjusted R^2				0.27	0.30	0.30
F				12.57***	13.17***	11.95***
H_0: $ROA + ROA_{t-1} = 0$	0.386*	0.180	0.029			
	(2.87)	(0.72)	(0.02)			

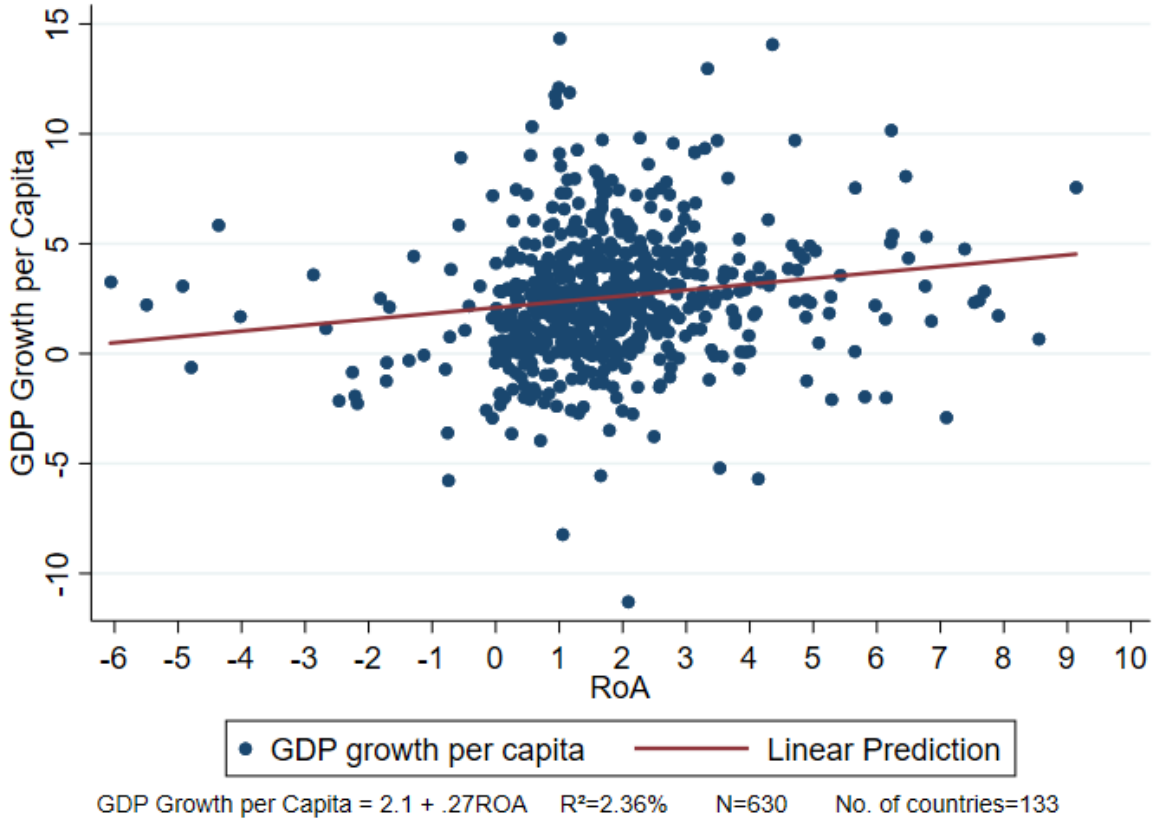
The table presents alternative periods to average variables. We use 2-year periods and perform system GMM regressions. We use 5-year periods and perform panel fixed effects estimations with robust standard errors (the number of periods by country is not sufficient to estimate system GMM panel regressions). The dependent variable is real GDP per capita growth. Dummy variables for the years 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. Appendix A gives the definitions of the variables.

Table 13 The role of risk

	(1)	(2)
ROA	0.670*** (2.64)	0.446** (2.57)
ROA_{t-1}	-0.304** (-2.25)	-0.200** (-2.15)
Z-Score	-0.056* (-1.68)	
Z-Score × ROA		
NPL		-0.013 (-0.37)
NPL × ROA		
GDP Per Capita $Growth_{t-1}$	0.456*** (6.22)	0.375*** (4.84)
Initial GDP (log)	-0.484* (-1.83)	-0.188 (-1.24)
Education (log)	0.477 (0.74)	-0.379 (-0.59)
Inflation (log)	-0.859 (-1.43)	0.152 (0.42)
Openness (log)	0.015 (0.02)	-0.084 (-0.13)
Government Exp. (log)	-3.232** (-2.06)	-1.394 (-1.34)
Constant	16.878** (2.46)	8.221* (1.80)
N	508	368
No. of groups	132	101
Chi^2	195.54***	286.94
Hansen p-value	0.19	0.16
AR 1	-3.81***	-2.93***
AR 2	-1.09	-1.59
H_0: $ROA + ROA_{t-1} = 0$	0.366* (3.00)	0.246 (2.01)

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. 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. Appendix A gives the definitions of the variables.

Figure 1 ROA and GDP growth



The graph below relates banks' return-on-assets on the abscissa and GDP growth per capita on the ordinate. The solid line fits the result of a linear prediction of GDP growth per capita on banks' return-on-assets. Each dot represents a three-year period in a country, with 630 observations and 133 countries. The first and last percentiles have been removed.

Appendix A Variable definitions and sources

Variable	Description	Source
ROA	Aggregated banks' return-on-assets (%, before tax) at the country-level. Unconsolidated across countries.	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$).	World Development Indicators (WDI)
GDP per capita	Value of GDP per capita at market prices (constant 2005 US$). Regressions use the initial value of this variable (*Initial GDP*).	WDI
Education	Years of schooling for population aged 25 and over. Data available on a 5-year basis; gaps are linearly extrapolated.	Barro & Lee Database (2016 edition)
Inflation	Annual variation of the consumer price index (ΔCPI) in %. Observations below -10% are dropped. In regressions, negative observations are set to zero and then apply the inverse hyperbolic sine transformation $Inflation = \ln(\Delta CPI + \sqrt{\Delta CPI^2 + 1})$	WDI
Openness	Trade (% of GDP).	WDI
Government Exp.	General government final consumption expenditure (% of GDP).	WDI
Banking Crisis	Banking crisis dummy (1=banking crisis, 0=none).	GFDD
Z-Score	$\left(ROA + \left(\frac{Equity}{Assets}\right)\right) / \sigma_{ROA}$; σ_{ROA} is the standard deviation of ROA.	GFDD
NPL	Ratio of defaulting loans (payments of interest and principal past due by 90 days or more) to total gross loans.	GFDD
M2 growth	Growth of money and quasi money (annual %).	WDI, ECB Database
M3 growth	Growth of broad money (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
Income Group	Income classification of countries by the World Bank (1=Low Income, 2=Middle Income, 3=Upper Middle Income, 4=High Income). We create the corresponding dummy variables.	WDI
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
ROE	Aggregated banks' return-on-equity (%, before tax) at the country-level. Unconsolidated across countries.	GFDD
GDP growth	GDP growth (annual %). Calculation is based on the GDP at market prices (constant 2005 US$).	WDI
Q_{ROA}	Dummy variable for each ROA quintile ($Q_{ROA}1$ to $Q_{ROA}5$)	
Lerner	Measure of market power in the banking market. It compares output pricing and marginal costs.	GFDD

Appendix B First-stage IV Panel FE

	Table 3 ROA	Table 4 ROA
Lerner	5.433*** (2.76)	5.345*** (2.73)
$Lerner_{t-1}$	1.533 (1.07)	1.296 (0.82)
ROA_{t-1}		0.044 (0.52)
GDP Per Capita $Growth_{t-1}$	0.082** (1.99)	0.077* (1.75)
Initial GDP (log)	0.772 (0.95)	0.769 (0.97)
Education (log)	0.075 (0.06)	0.057 (0.04)
Inflation (log)	0.173 (0.95)	0.168 (0.92)
Openness (log)	0.063 (0.08)	0.133 (0.16)
Government Exp. (log)	1.725* (1.82)	1.721* (1.86)
Constant	-14.578 (-1.32)	-14.755 (-1.34)
N	422	422
No. of groups	113	113
Adjusted R^2	0.21	0.21
F	11.91***	11.21***
H_0 = No over-identification	2.06	2.02
p-value	0.15	0.15
H_0 = Under-identification	18.29***	15.68***
p-value	0.00	0.00
H_0 = Weak-Instrument	8.30**	8.14**
p-value	0.02	0.02

The table below presents the first-stage of the Instrumental Variables (IV) Panel Fixed-Effects (FE) regressions. The results columns are based on the models in Table 3 and Table 4, respectively. The variable Lerner instruments the variable ROA. Variables are averaged over a 3-year time period. Dummy variables for the years are included but not reported. We test over-identification using Hansen J-statistic, under-identification using Kleibergen-Paap test and weak instrument using Anderson-Rubin χ^2 test. 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. Appendix A gives the definitions of the variables.

Appendix C List of countries used in analysis

Country	Growth	ROA	Country	Growth	ROA
Afghanistan	6.37	0.90	Latvia	5.41	0.34
Albania	5.91	2.28	Lesotho	3.04	4.10
Algeria	2.04	1.01	Liberia	3.10	1.43
Argentina	2.14	0.57	Libya	2.57	0.97
Armenia	7.45	2.75	Lithuania	5.42	-0.31
Australia	1.70	1.19	Luxembourg	1.70	0.60
Austria	1.33	0.64	Macao SAR, China	8.80	1.16
Bahrain	-0.36	1.77	Malawi	1.17	6.17
Bangladesh	4.12	3.01	Malaysia	3.21	2.08
Barbados	0.70	1.66	Mali	1.09	1.50
Belgium	1.07	0.78	Malta	1.45	0.10
Belize	1.13	4.32	Mauritania	2.00	1.81
Benin	1.18	1.40	Mauritius	3.42	2.04
Bolivia	2.12	1.12	Mexico	0.91	0.97
Botswana	3.12	2.00	Mongolia	5.93	1.43
Brazil	2.15	1.82	Morocco	3.10	1.50
Brunei Darussalam	0.23	0.98	Mozambique	4.51	1.03
Bulgaria	4.06	1.24	Namibia	3.50	2.54
Burundi	-0.25	3.99	Nepal	2.79	2.10
Cambodia	6.09	0.95	Netherlands	1.05	0.17
Cameroon	1.08	2.23	New Zealand	1.67	1.25
Canada	1.39	1.51	Nicaragua	2.33	0.67
Central African Republic	-0.56	2.24	Niger	0.34	1.78
Chile	2.67	2.20	Norway	0.77	0.80
China	9.10	1.00	Pakistan	1.88	0.62
Colombia	2.49	1.41	Panama	4.61	1.48
Congo, Rep.	2.50	2.64	Papua New Guinea	-2.80	5.51
Costa Rica	2.93	1.85	Paraguay	1.63	2.43
Cote d'Ivoire	-0.39	1.43	Peru	3.89	2.04
Croatia	2.03	0.89	Philippines	2.99	1.38
Cyprus	0.59	1.72	Poland	3.79	1.42
Czech Republic	2.43	1.01	Portugal	0.35	0.19
Denmark	0.55	0.84	Qatar	1.47	2.53
Dominican Republic	3.31	2.36	Romania	4.27	1.47
Ecuador	1.99	-5.37	Russian Federation	5.19	3.89
Egypt, Arab Rep.	2.45	0.89	Rwanda	4.56	3.86
El Salvador	1.63	1.99	Saudi Arabia	2.16	2.20
Estonia	4.34	3.26	Senegal	1.19	2.29
Fiji	-1.72	0.90	Sierra Leone	2.47	7.97

Country	Growth	ROA	Country	Growth	ROA
Finland	1.49	-0.09	Singapore	3.68	1.34
France	0.88	0.81	Slovak Republic	3.72	0.47
Gabon	-0.71	2.48	Slovenia	1.98	1.11
Gambia, The	0.51	6.63	South Africa	1.65	1.45
Germany	1.24	0.45	Spain	0.71	0.85
Ghana	3.81	5.99	Sri Lanka	4.35	1.28
Greece	0.10	-2.14	Sudan	3.98	1.69
Guatemala	1.12	1.33	Swaziland	0.99	3.32
Guyana	2.62	2.23	Sweden	1.74	1.62
Haiti	-0.90	1.48	Switzerland	1.07	0.98
Honduras	1.89	1.85	Syrian Arab Republic	0.75	0.57
Hong Kong SAR, China	3.42	1.75	Tajikistan	5.46	3.18
Hungary	2.26	1.57	Tanzania	3.36	3.58
Iceland	1.78	-6.26	Thailand	3.74	0.81
India	5.48	1.39	Togo	-0.10	2.52
Indonesia	3.67	0.80	Tonga	0.94	4.27
Iraq	3.56	2.76	Trinidad and Tobago	4.63	1.90
Ireland	2.25	0.47	Tunisia	2.82	-0.11
Israel	1.97	0.67	Turkey	2.52	2.92
Italy	-0.07	0.78	Uganda	3.37	4.87
Jamaica	0.26	1.50	Ukraine	4.46	1.27
Japan	0.81	0.20	United Kingdom	1.27	1.00
Jordan	2.85	1.52	United States	1.17	1.46
Kazakhstan	6.76	1.76	Uruguay	2.51	-0.03
Kenya	1.51	1.83	Venezuela, RB	1.19	2.98
Korea, Rep.	4.28	0.44	Vietnam	5.08	1.53
Kuwait	-0.21	2.10	Yemen, Rep.	1.27	2.10
Kyrgyz Republic	3.40	3.53	Zambia	5.93	3.68
Lao PDR	5.81	1.38	Zimbabwe	-0.50	6.13

This table displays the list of the countries included in our analysis. We provide the GDP growth per capita and the return on assets in percentage. Figures are averaged over 1999–2013.

BOFIT Discussion Papers

A series devoted to academic studies by BOFIT economists and guest researchers. The focus is on works relevant for economic policy and economic developments in transition / emerging economies.

2017
- No 1 Koen Schoors, Maria Semenova and Andrey Zubanov: Depositor discipline in Russian regions: Flight to familiarity or trust in local authorities?
- No 2 Edward J. Balistreri, Zoryana Olekseyuk and David G. Tarr: Privatization and the unusual case of Belarusian accession to the WTO
- No 3 Hongyi Chen, Michael Funke, Ivan Lozev and Andrew Tsang: To guide or not to guide? Quantitative monetary policy tools and macroeconomic dynamics in China
- No 4 Soyoung Kim and Aaron Mehrotra: Effects of monetary and macroprudential policies – evidence from inflation targeting economies in the Asia-Pacific region and potential implications for China
- No 5 Denis Davydov, Zuzana Fungáčová and Laurent Weill: Cyclicality of bank liquidity creation
- No 6 Ravi Kanbur, Yue Wang and Xiaobo Zhang: The great Chinese inequality turnaround
- No 7 Yin-Wong Cheung, Cho-Hoi Hui and Andrew Tsang: The Renminbi central parity: An empirical investigation
- No 8 Chunyang Wang: Crony banking and local growth in China
- No 9 Zuzana Fungáčová and Laurent Weill: Trusting banks in China
- No 10 Daniela Marconi: Currency co-movements in Asia-Pacific: The regional role of the Renminbi
- No 11 Felix Noth and Matias Ossandon Busch: Banking globalization, local lending, and labor market effects: Micro-level evidence from Brazil
- No 12 Roman Horvath, Eva Horvatova and Maria Siranova: Financial development, rule of law and wealth inequality: Bayesian model averaging evidence
- No 13 Meng Miao, Guanjie Niu and Thomas Noe: Lending without creditor rights, collateral, or reputation – The "trusted-assistant" loan in 19th century China
- No 14 Qing He, Iikka Korhonen and Zongxin Qian: Monetary policy transmission with two exchange rates and a single currency: The Chinese experience
- No 15 Michael Funke, Julius Loermann and Andrew Tsang: The information content in the offshore Renminbi foreign-exchange option market: Analytics and implied USD/CNH densities
- No 16 Mikko Mäkinen and Laura Solanko: Determinants of bank closures: Do changes of CAMEL variables matter?
- No 17 Koen Schoors and Laurent Weill: Russia's 1999-2000 election cycle and the politics-banking interface
- No 18 Ilya B. Voskoboynikov: Structural change, expanding informality and labour productivity growth in Russia
- No 19 Heiner Mikosch and Laura Solanko: Should one follow movements in the oil price or in money supply? Forecasting quarterly GDP growth in Russia with higher-frequency indicators
- No 20 Mika Nieminen, Kari Heimonen and Timo Tohmo: Current accounts and coordination of wage bargaining
- No 21 Michael Funke, Danilo Leiva-Leon and Andrew Tsang: Mapping China's time-varying house price landscape
- No 22 Jianpo Xue and Chong K. Yip: One-child policy in China: A unified growth analysis

2018
- No 1 Zheng (Michael) Song and Wei Xiong: Risks in China's financial system
- No 2 Jennifer N. Carpenter, Fangzhou Lu and Robert F. Whitelaw: The real value of China's stock market
- No 3 Bing Xu: Permissible collateral and access to finance: Evidence from a quasi-natural experiment
- No 4 Stefan Angrick and Naoyuki Yoshino: From window guidance to interbank rates. Tracing the transition of monetary policy in Japan and China
- No 5 Veronika Belousova, Alexander Karminsky and Ilya Kozyr: Bank ownership and profit efficiency of Russian banks
- No 6 Chengsi Zhang and Chao Dang: Is Chinese monetary policy forward-looking?
- No 7 Israel Marques II: Firms and social policy preferences under weak institutions: Evidence from Russia
- No 8 Ivan Lyubimov, Margarita Gvozdeva and Maria Lysyuk: Towards increased complexity in Russian regions: networks, diversification and growth
- No 9 Jeannine Bailliu, Xinfen Han, Mark Kruger, Yu-Hsien Liu and Sri Thanabalasingam: Can media and text analytics provide insights into labour market conditions in China?
- No 10 Sanna Kurronen: Oil price collapse and firm leverage in resource-dependent countries
- No 11 Marlene Amstad, Huan Ye and Guonan Ma: Developing an underlying inflation gauge for China
- No 12 Michael Funke, Rongrong Sun and Linxu Zhu: The credit risk of Chinese households – A micro-level assessment
- No 13 Yiyi Bai, Tri Vi Dang, Qing He and Liping Lu: Does lending relationship help or alleviate the transmission of liquidity shocks? Evidence from a liquidity crunch in China
- No 14 Hao Wang, Jan Fidrmuc and Yunhua Tian: Growing against the background of colonization? Chinese labor market and FDI in a historical perspective
- No 15 Paul-Olivier Klein and Laurent Weill: Bank profitability and economic growth

BOFIT Discussion Papers
http://www.bofit.fi/en • email: bofit@bof.fi
ISSN 1456-4564 (print) // ISSN 1456-5889 (online)