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Financial Development, Reforms and Growth

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Abstract

Is there any specific structure of the financial system which promotes economic growth or does this structure depend on the level of economic growth itself? Financial development and financial reforms affect economic growth, but less is known on how this effect varies across different levels of the conditional distribution of the growth rates. We examine this by using panel data for 81 countries for more than 30 years. We account for unobserved heterogeneity and operate within alternative econometric approaches. The findings indicate that financial reforms are important determinants of growth, especially when a country faces relatively low levels of economic growth. Financial development does matter for growth, however, the size and significance of the effect vary. Financial reforms affect economic growth more than financial development. We reveal that the components of financial reforms, which are more important for economic growth, are the supervision of banks and the regulation of securities markets.

Keywords: Financial Development; Financial Reforms; Economic Growth; Quantile Regression; Panel Data

JEL Classification: O16; O40; G10; G20; C21; C23

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1 Introduction

Since Schumpeter (1912) linked the expansion of the financial sector to economic growth, a considerable number of influential studies such as King & Levine (1993a), King & Levine (1993b), Rajan & Zingales (1998), Levine et al. (2000), Beck et al. (2000), Levine (2005), have thoroughly investigated this topic. In view of new data and advanced econometric specifications, recent contributions challenge the conventional idea that financial development spurs economic growth (Arcand et al., 2015; Capelle-Blancard & Labonne, 2016; Demetriades & Rousseau, 2016; Fajeau, 2021, among others). For instance, Rousseau & Wachtel (2011) suggest that the finance-growth relationship has been curbed over time, while a more recent study by Capelle-Blancard & Labonne (2016) fail to find a positive association for the OECD countries. Sahay et al. (2015) have further encouraged the debate on the finance-growth nexus for countries at different stages of development. They show that although financial development stimulates growth, the effect cancels out when higher levels of financial development are taken into account, and becomes negative.

While the importance of financial development on growth has weakened, another strand of the literature is seeking to address the role of financial reforms on growth. It is believed that financial reforms make the financial system more liberalized which arises the following question: Does the liberalization of the financial sector lead to better financial outcomes and in turn to economic growth? McKinnon (1973) and Shaw (1973) were the first to point out that the liberalization of the financial sector is crucial for overcoming financial repression and, hence, can lead to economic growth. In particular, liberalization policies could improve government's supervision of banks which leads to higher stability of the banking system. They increase the degree of privatization in the banking system which reduces bureaucracy in providing loans. They reduce capital controls and reserve requirements. They facilitate the security markets as an alternative source of financing relative to the banking sector. All the previous components of financial liberalization could promote investments, leading to higher efficiency in the allocation of capital and risk, and thus, could result in economic growth.[1] Many empirical attempts have been made in this direction. For instance, Bekaert et al. (2005) and, more recently, Quinn & Toyoda (2008) argue that equity market and capital account liberalizations are positively associated with economic growth. Also, Gehringer (2013) shows that financial openness contributes to economic growth for the European Union countries. Demetriades & Rousseau (2016) argue that financial reforms, such as banks' regulations and supervisions, can be beneficial for economic growth.[2] On the other hand, a plethora of studies advocate that financial liberalization could be disadvantageous for growth, lead to immoderate risk-taking in financial markets and trigger financial crises (e.g., Demirgüç-Kunt & Detragiache, 1998; Kaminsky & Reinhart, 1999, Stiglitz, 2000; Joyce, 2011). Ranciere et al. (2006) demonstrate that although financial liberalization is linked to long-run growth, it could also lead to occasional crises. Ahmed (2013) report a negative relationship

[1] See Cho (1986), Fry (1989), Fry (1997), Auerbach & Siddiki (2004).

[2] In addition, they show that financial depth is beneficial for growth over the period 1975-1989, while this is not the case for the period 1990-2004.

between financial liberalization and growth in Sub-Saharan Countries.[3,4] Within the literature of economic growth, there is theoretical and empirical justification that different economies belong to different convergence clubs which contain economies with similar characteristics. The economies that belong to the same group react in a similar way in any policy implementation and reform.[5]

The inconclusive results regarding the role of financial development and financial reforms on economic growth together with the fact that the economies may belong to specific types of groups underline the exigency of revisiting the finance-growth nexus from a different point of view. The empirical studies on the finance-growth nexus mainly abound with traditional regression techniques that focus on conditional mean responses. Hence, most of these studies might fail to capture the potential heterogeneous effect of finance on growth across different levels of economic growth. Quantile regression methods "relax" the assumptions of symmetric distributions and, in our case, can quantify the effects of the financial sector on growth by modeling the entire conditional growth distribution. These approaches can be more informative than the "traditional" ones, as they can shed further light on the behaviour of the financial system on the tails (low or high levels) of growth. To the best of our knowledge, only Andini & Andini (2014) employed a quantile regression approach to investigate the role of financial development on growth.

We contribute to the literature in the following ways: (a) we explore the effect of financial reforms across different quantiles of the conditional distribution of economic growth. As far as we are concerned, this is the first study to include both financial development and financial reforms in a growth model under a panel quantile regression framework and (b) we employ two recent panel quantile regression approaches and thus we address concerns of potentially biased estimations in prior studies. Hence, we employ (i) the panel quantile estimator of Canay (2011) which considers fixed effects as "location shifter" and (ii) the "quantiles via moments" estimator of Machado & Silva (2019) that allows fixed effects to affect the entire growth distribution.

Using annual data for 81 countries over the period 1973-2005, we find evidence supporting that financial reforms are important determinants of growth, especially at lower levels of the conditional distribution of income growth. Hence, countries facing conditional low growth rates could benefit more from financial reforms. Financial development matters for growth, however, the size and significance of the effect are subject to different specifications. In particular, our findings indicate that when we employ the estimator of Canay (2011), financial development is positively associated with economic growth and its effect diminishes as far as higher levels of the conditional growth distribution are concerned. In terms of sign, similar patterns are observed when we apply the estimator of

[3]For a discussion, see also Andersen & Tarp (2003), Kose et al. (2009), Bumann et al. (2013) and Arestis & Sawyer (2016).

[4]At the same time, several studies investigate the role of financial reforms across different dimensions. For instance, Agnello et al. (2012) show that financial reforms reduce income inequality, Jha (2020) finds that liberalization policies reduce corruption, while Jha & Bhuyan (2020) suggest that financial reforms promote entrepreneurship.

[5]Important representative literature, which provides theoretical and empirical justification regarding the convergence clubs, can be represented by the following papers: Baumol (1986), Chatterji (1992), Durlauf & Johnson (1995), Galor (1996) and Beylunioğlu et al. (2020), among others.

Machado & Silva (2019), however, the corresponding effect is not statistically significant. We proxy the financial development with the ratio of credit to private sector. Financial reforms are measured by a graded index provided by Abiad et al. (2010). The results remain robust when we use the extensive and more recent dataset of financial reforms provided by Denk & Gomes (2017).[6]

In addition, we decompose financial reforms into seven relative dimensions and we show that liberalization policies on credit controls and reserve requirements, banking supervision, banking privatization, easing restrictions on capital account flows and securities markets' regulations are important for growth and in most cases, their effect is heterogeneous across the conditional distribution of growth. In contrast, we did not find strong evidence in favor of liberalization policies on interest rate controls and banking entry restrictions. Finally, we split the sample into two groups of countries based on their income and we find that financial development is important at lower levels of the conditional growth distribution in high-income countries, while it turns negative in higher quantiles in low-income countries. Financial reforms are found to have a greater impact on low-income countries rather than on high-income ones. The components of financial reforms react heterogeneously across the conditional distribution of economic growth in both income groups. While the majority of the reforms' components are positively associated with economic growth, this is not happening with the easing of banking entry restrictions, which in high-income countries can lead to negative effects on growth. Our findings provide additional insights in the finance-growth literature.

The paper is organized as follows: Section 2 describes the quantile regression methodology. Section 3 presents the model and analyzes the data. Section 4 contains the empirical findings and section 5 includes the robustness analysis. The last section concludes.

2 Methodology

2.1 Quantile regression with fixed effects

Since the seminal work of Koenker & Bassett (1978), literature has documented considerable advances in the field of quantile regression (see for example, Koenker, 2004; Chernozhukov & Hansen, 2005; Harding & Lamarche, 2009; Canay, 2011; Galvao Jr, 2011; Galvao & Kato, 2016; Powell, 2016; Machado & Silva, 2019). Quantile regression methods offer a more comprehensive picture of the effects of the covariates on the outcome variable as they allow one to model the entire conditional distribution of the latter rather than only focusing on the conditional means. In addition, these approaches can handle non-normally distributed data and can provide robust results even in the presence of outliers, unobserved heterogeneity and endogeneity. In this paper, we operate within two panel quantile regression approaches with fixed effects: the well-established "two-step" estimator, henceforth FEQR, proposed by Canay (2011) and the novel "Methods of Moments" QR , henceforth "MMQR", proposed by Machado & Silva (2019).

[6]We describe this in Section 3.

More concisely, the FEQR approach involves the following steps: first, we estimate the equation of interest ($Y_{it} = \beta_0 + \beta X'_{it} + \alpha_i + \epsilon_{it}$, where Y is the dependent variable and X is a vector of covariates) by using a fixed-effects regression technique. Second, we obtain the fixed effects ($\hat{\alpha}_i = Y_{it} - \beta_0 - \hat{\beta}_j X'_{it}$) and we subtract them from the dependent variable ($\hat{Y}_{it} = Y_{it} - \hat{\alpha}_i$). Given that $\hat{\alpha}_i$ is a "location-shifter" (i.e., it remains constant across all quantiles), the FEQR estimator is obtained after estimating equation (1) but with the dependent variable being the $\hat{Y}_{it}$, using a standard quantile regression approach.[7]

We also implement the "Method of Moments-Quantile Regression". The MMQR estimator is built on a location-scale model of the form: $Y_{it} = \alpha_i + X'_{it}\beta + (\delta_i + Z'_{it}\gamma)U_{it}$, where, X is a vector of covariates, α_i and δ_i denote the individual effects, Z is a vector of known differentiable transformations of the components of X, U_{it} are $i.i.d.$ (across i and t), statistically independent of X_{it}, and normalized to satisfy the moment conditions as presented in detail in Machado & Silva (2019). This approach, allows the individual effects to affect the entire distribution of economic growth and thus could provide additional support for the investigation of our research question.[8]

3 The model and data

We follow the traditional finance-growth literature (e.g., King & Levine, 1993a) and we estimate a panel model that is very much in line with the specification of Demetriades & Rousseau (2016). However, we differentiate from the latter in the following ways: i) we use annual data instead of 5-year intervals. In this way, we take advantage of a higher time dimension in terms of the number of observations that is important for quantile regression to achieve consistent estimates; ii) we enhance the model by including more control variables and iii) we apply quantile regression approaches that account for the unobserved heterogeneity. We consider the following equation under a fixed effect approach:

$$\Delta log(Y_{it}) = \beta_0 + \beta_1 Y_{it-1} + \beta_2 FinDev_{it} + \beta_3 FinRef_{it} + \beta Controls_{it} + \alpha_i + \epsilon_{it} \quad (1)$$

where Y_{it} captures the real GDP per capita and Y_{it-1} is one period lag of the GDP per capita. As far as the financial development ($FinDev$) is concerned, we use the ratio of domestic credit to private sector as a share of GDP, as it captures better the development of private firms, which is a situation more closely related to economic growth. The specific measure for financial development is

[7] Although the FEQR methodology is widely used in the empirical literature, the estimator has not escaped criticism regarding its reliability in some cases. Besstremyannaya & Golovan (2019) state that studies with a large ratio of cross-sectional to time dimension (i.e., large N/T) could lead to incorrect results when applying the FEQR estimator. However, this is not the case for our analysis, given the structure of our sample. Andini & Andini (2014) use data in 5-year intervals for a sample of 78 countries and thus, the short time dimension of the data ($T = 7$) could arise the previously mentioned criticism.

[8] The MMQR estimator performs well in the case of an endogenous explanatory variable in a cross-sectional model, as presented in Machado & Silva (2019).

used extensively in the literature.[9] Unlike existing indices that measure financial reforms based on binary dummy variables, we follow Abiad et al. (2010) who introduce a graded index that measures financial reforms by capturing financial liberalization policies based on seven components.[10] These components are aggregated into a composite index which is used as a proxy for financial reforms (*FinRef*) in our study. The latter provides higher variation over time than binary reform indices and hence can quantify more efficiently the complex nature of liberalization policies.[11]

Moreover, we account for human capital (measured as average years of schooling, *Schooling*), capital stock (measured as capital formation as a share of GDP, *Capital*), government size (measured as government consumption as a percentage of GDP, *GovSize*), trade openness (measured as the sum of exports and imports as a percentage of GDP, *Openness*), crises in the banking sector (measured by a binary dummy variable that takes the value 1 when a banking crisis is taking place and zero otherwise, *BankCrisis*) and quality of governance (measured by the civil liberties index that ranges from 0 to 7, with higher values corresponding to a higher level of liberties, *Liberty*). In all specifications, we include country-specific and time-specific effects.

The analysis covers the period 1973-2005 and includes annual data for 81 developing and developed countries.[12] From these, 14 countries are in Africa, 19 are in the American continent, 19 are in Asia, 27 are in Europe and 2 are in Oceania. Based on the World Bank Atlas Method, 2005, 37 economies are classified into low and lower-middle income groups (henceforth, low-income) and 44 countries into upper-middle and high-income groups (henceforth, high-income). The choice of variables is driven by data-availability, by following the past literature and by choosing the variables with the lower pairwise correlations to avoid multicollinearity concerns. The corresponding correlation table and the list of countries used in the analysis are reported in the Appendix, Tables A1 and A2, respectively. We present descriptive statistics and the source of the variables of interest in Table 1. In addition, we offer further insights into the distribution of the data across countries in Figures 1-6.

In particular, Figures 1 and 2 summarize the financial development and financial reforms across our sample. The darker the color of the country on the map, the higher the ratio of credit to private

[9] According to Levine (2005), the measures of financial development used in the empirical literature might not fully capture the concepts arising from theoretical models. In our case, the financial development variable captures the financial depth. Other measures of financial development (i.e., credit by banks to private sector and liquid liabilities to GDP) lead to equivalent findings in most cases. The correlation coefficients of different measures of financial development range from 0.601 to 0.823.

[10] For different measures of financial liberalization, see also Bumann et al. (2013).

[11] As provided by Abiad et al. (2010), the seven aspects of the aggregate index are based on liberalization policies on controlling credit allocation and reserve requirements (Ref_1), interest rates' liberalization (Ref_2), easing banking entry restrictions (Ref_3), supervision of banks (Ref_4), privatization of banks (Ref_5), easing restrictions on flows of capital account (Ref_6) and regulation of securities markets (Ref_7). Higher values of the composite index indicate greater levels of liberalization. A higher value of banking supervision implies a more effective and independent supervision of the banking sector by the authorities, and a higher value of the regulation of securities markets indicates that the authorities promote policies which support the development both for bond and stock markets. For the rest of the reforms indices, higher values imply more liberalization.

[12] We initiate our analysis by compiling an unbalanced panel of 91 countries over the 1973-2005 period as this is the sample for which Abiad et al., (2010) provides data on financial reforms. After compiling our data set and adding all variables needed for the analysis, we result in an unbalanced panel of 81 countries.

sector as a share of GDP or the level of liberalization, respectively.[13] Uganda, Kyrgyz Republic and Albania report the lowest values of financial development, while Japan, Switzerland and United States have the highest ones. Similarly, Latvia, Estonia and Switzerland are the most liberalized countries, while Nepal, China and India are the least liberalized ones.

To shed further insight into the timing of financial reforms, we present Figure 3. The left panel (Figure 3b) plots the aggregate reforms index over time and the right one (Figure 3b) depicts the evolution of the seven reforms components. It appears that most of the reforms have been implemented in the early 1990s. Although the majority of the liberalization policies have been implemented before 2005, and thus their growth effects are potentially captured in our time frame, one could worry that our findings are limited, given that the reform data are available until 2005.[14] For this reason, we have updated our sample using the extended dataset of Denk & Gomes (2017) who extended the dataset of Abiad et al. (2010) to 2015 for 43 OECD and G20 countries. To this end, we merge the initial dataset with the updated one and we replicate the analysis.[15] The findings remain qualitatively the same.[16]

We illustrate the distribution of GDP per capita growth in Figure 4 that depicts a roughly symmetric distribution for both developing and developed countries. Figure 5 demonstrates the average association between the growth rate of GDP per capita and the variables of interest (i.e., financial development and financial reforms). At first glance, low-income countries report lower values of financial development and financial reforms compared to high-income ones. The fitted lines appear to suggest that financial development is positively linked to the growth rate of GDP per capita, whilst financial reforms are negatively associated, in low-income countries. The opposite pattern holds for the high-income ones. To motivate quantile regression further, we present Figure 6. Instead of the linear regression fit, we present the predicted values after applying a simple quantile regression on the 5_{th}, $50th$ and 95_{th} conditional quantile levels between the main variables of interest on the full sample. The relationship between the growth rate of GDP per capita and the two variables of interest, changes across the different quantiles. Given this heterogeneity, quantile regression could show further evidence on the finance-growth nexus as it takes into account low, middle and high quantiles of the conditional growth distribution.

[13] The maps were drawn using the SPMAP command in STATA.

[14] We would like to thank one anonymous reviewer and the editor for pointing this out.

[15] We would like to thank Oliver Denk and Gabriel Gomes for sharing the updated reform dataset.

[16] Denk & Gomes (2017) report data for five countries that are not included in the dataset of Abiad et al. (2010). For purposes of comparison, we kept the number of the countries in our sample fixed. That is, the new sample consists of the same 81 countries as before. We present the findings in the Appendix, Tables A3-A6. Based on the updated data, we also provide Figure A1, which shows that, on average, the financial reforms index does not vary considerably after 2005.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Data Source
GDP_{pc} *Growth*	2,258	0.0206	0.0386	-0.1886	0.1697	World Bank (2020)
FinDev	2,258	3.5176	0.8429	-2.8225	5.3995	World Bank (2019)
FinRef	2,258	0.5172	0.2975	0	1	Abiad et al. (2010)
Capital	2,258	3.1231	0.2903	0.1461	3.9555	World Bank (2020)
Schooling	2,258	6.5441	3.0425	0.4406	13.1261	Barro & Lee (2013)
GovSize	2,258	2.6469	0.3932	1.0737	3.7723	World Bank (2020)
Openness	2,258	3.9909	0.5483	2.1897	6.0413	World Bank (2020)
BankCrisis	2,258	0.0943	0.2924	0	1	World Bank (2019)
Liberty	2,258	3.1156	1.6612	1	7	Freedom House (2019)

Notes: GDP_{pc} *Growth* is measured as the log difference of the real GDP per capita. All other variables are expressed in natural logarithms except for *FinRef*, *Schooling*, *BankCrisis* and *Liberty*. *FinRef* is normalized to take values from 0 to 1. *Schooling* data were transformed from 5-year averages to annual data using interpolation methods. *Schooling* and *Liberty* are drawn from the Quality of Government Dataset (Dahlberg et al., 2020).

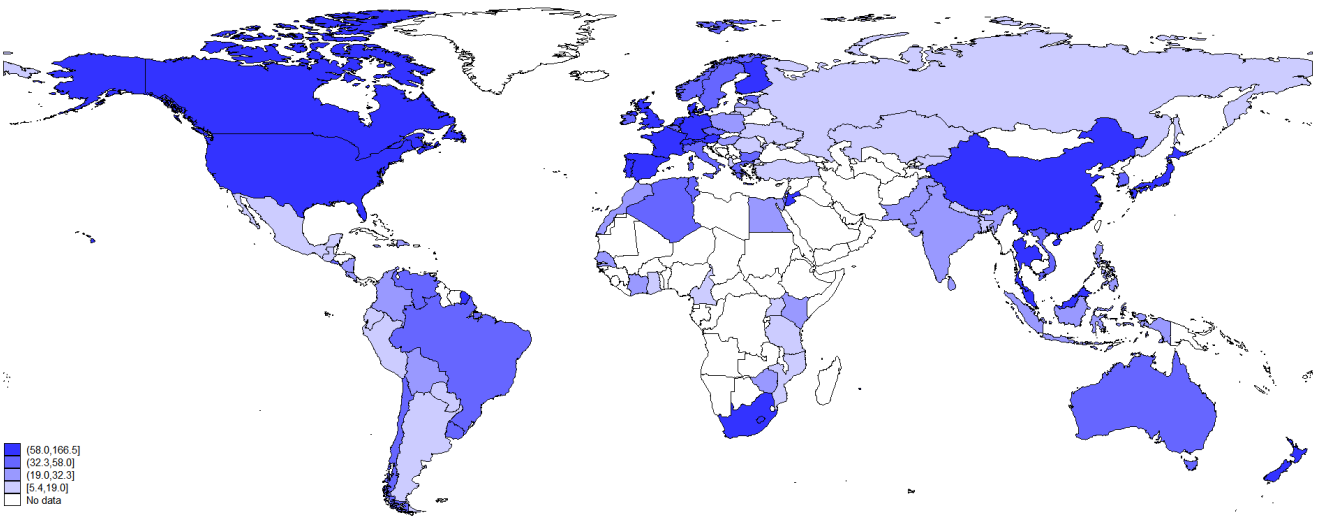


Figure 1: Financial Development (mean), 81 countries, 1973-2005

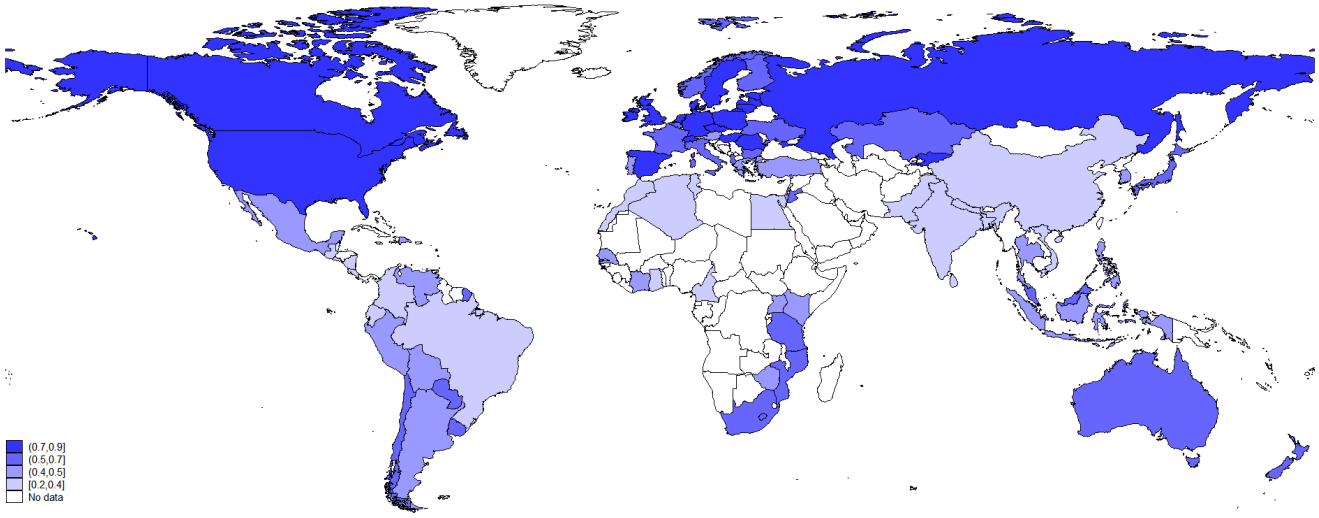
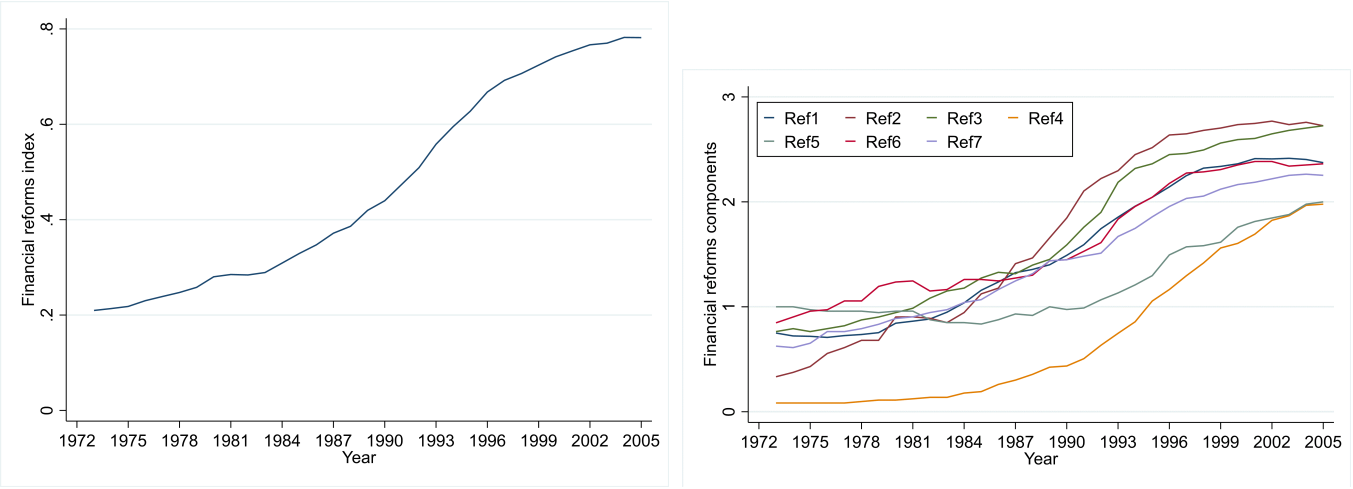


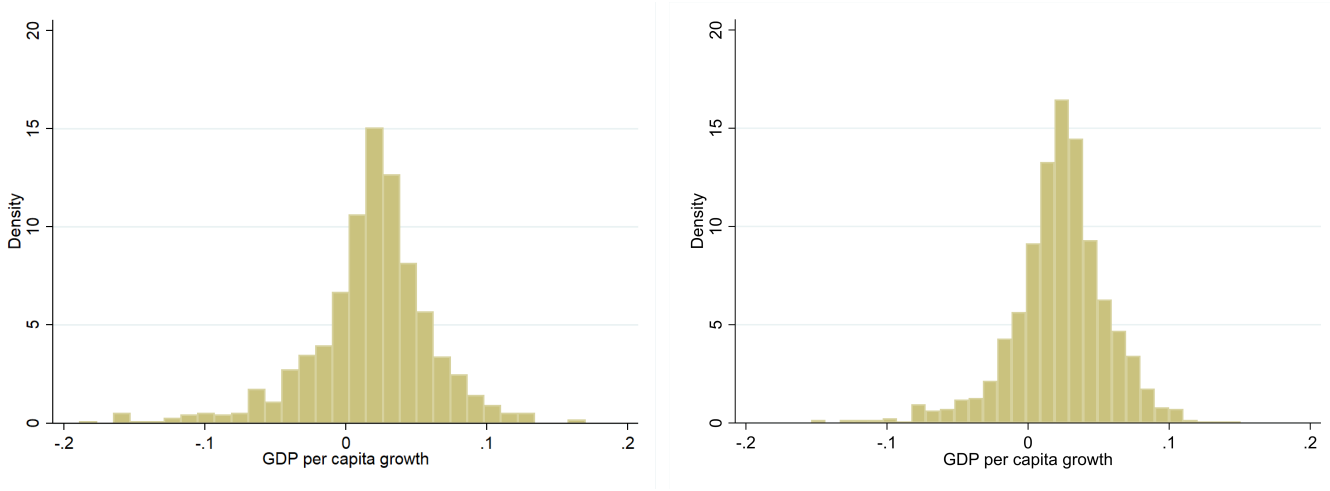
Figure 2: Financial Reforms (mean), 81 countries, 1973-2005



(a) Aggregate Financial Reforms index

(b) Financial Reforms components

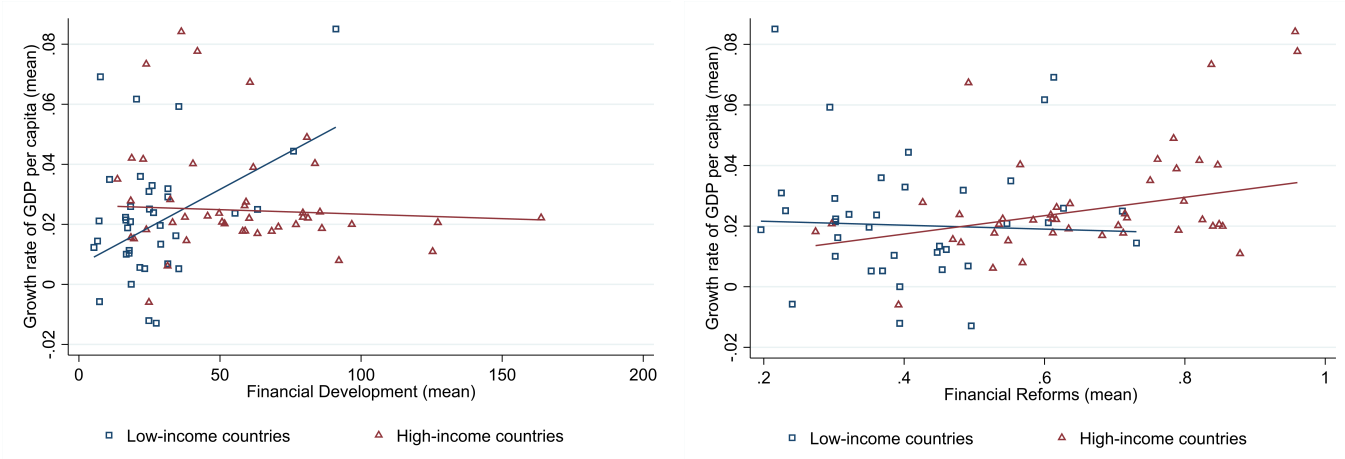
Figure 3: The evolution of Financial Reforms



(a) Low-income countries

(b) High-income countries

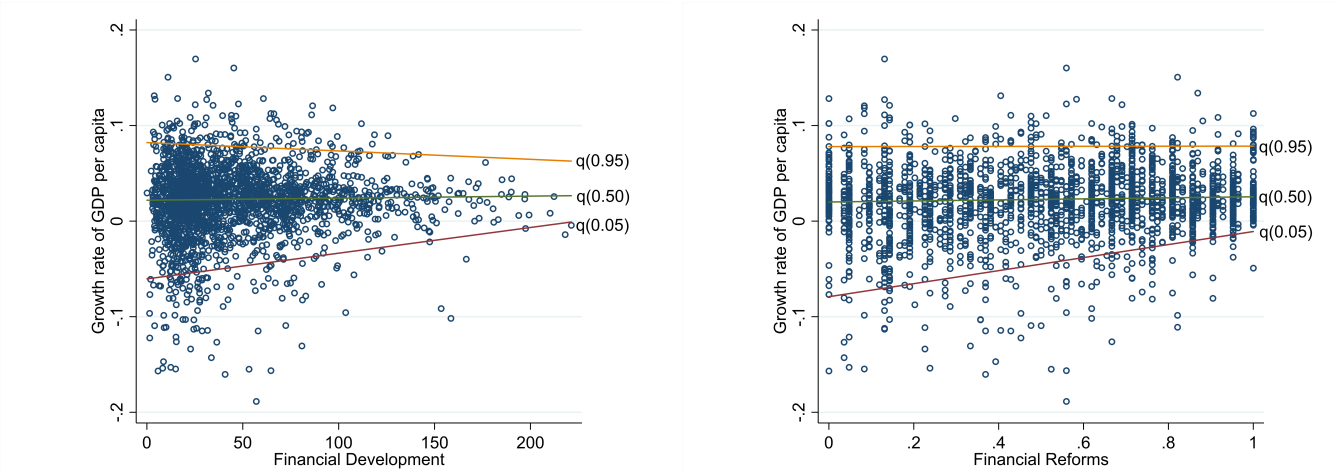
Figure 4: Histograms: Growth rate of GDP per capita



(a) Growth rate of GDP per capita and Financial Development

(b) Growth rate of GDP per capita and Financial Reforms

Figure 5: Scatter plots with linear regression fitted lines



(a) Growth rate of GDP per capita and Financial Development

(b) Growth rate of GDP per capita and Financial Reforms

Figure 6: Scatter plots with quantile regression fitted lines

4 Empirical findings

4.1 Baseline estimations

We initiate our analysis with the FEQR approach and we report the results in Table 2. For comparison reasons, we also provide estimates based on the conditional mean regression (i.e., fixed effects regression analysis, henceforth FE). Column (1) corresponds to the estimates of FE and columns (2)-(6) report the findings for selected quantiles with respect to the quantile regression approach. Consistent with the endogenous growth literature, the speed of conditional convergence, $lagGDP_{pc}$, is statistically significant and negatively associated with economic growth, both in the FE and FEQR model. Regarding the two variables of interest, *FinDev* and *FinRef*, key findings emerge. First, the FE model fails to support financial development as a determinant of growth. On the contrary, FEQR reveals that financial development matters for growth. More specifically, the lower the conditional growth rate a country experiences, the higher the magnitude of its effect. The effect of *FinDev* on growth disappears at higher levels of the conditional growth distribution.[17] Second, financial reforms are found to have a positive and statistically significant effect on growth that holds in both cases. Remarkably, in terms of magnitude, the effect of financial liberalization on growth at the lower quantiles of the distribution (i.e., q_{05}) is approximately two and three times greater than

[17] Andini & Andini (2014) report a positive relationship between financial development and growth, with the corresponding coefficient to increase in some cases, as higher quantiles of the growth distribution are considered. However, the aforementioned result could be attributed to different sample selection, sample size and econometric specification. The authors use the estimator of Koenker & Bassett (1978), which does not take into account the unobserved heterogeneity and the estimator of Canay (2011) for a panel set of 78 countries over the period 1960-1995 using 5-year intervals.

the effect at the higher ones (i.e., q_{75}, q_{95}).[18] As regards the rest explanatory variables, the results indicate that *Capital*, *GovSize*, *BankCrisis* have the expected signs as literature predicts and are statistically significant in both specifications. More precisely, capital stock is positively associated with economic growth and this holds for the entire growth distribution. Its effect diminishes as we move from lower to higher quantiles. Additionally, we observe a negative effect of the government size on economic growth. One more interesting result is that countries in the lower tail of the conditional growth distribution tend to be more vulnerable to banking crises than countries in the upper one. *Schooling* is positive and statistically significant only at the conditional median. Trade openness contributes to economic growth as the relevant coefficient is positive and statistically significant above the 25_{th} quantile. Finally, *Liberty* appears to have a negative effect at low parts of the conditional growth distribution and it becomes positive above the 50_{th} quantile. However, the positive effect is statistically significant at the upper tail of the distribution.

As described in section 3, to explore the finance-growth linkage further, we also apply the MMQR. Table 3 presents the findings. Column (1) corresponds to the results obtained after performing a two-stage least squares regression analysis (henceforth, 2SLS).[19] Two major implications arise from Table 3. First, although the coefficient of *FinDev* in each quantile follows a similar pattern as in the case of FEQR, it remains statistically insignificant for the entire conditional distribution of growth. Second, *FinRef* is positively associated with economic growth for all quantiles of the conditional distribution and its effect declines in the higher tail of the distribution. The importance of *FinRef* in economic growth is also supported in the 2SLS model, as the relevant coefficient is statistically significant at the 1% level. Apart from the financial development that was found to play no significant role in explaining economic growth, the outcomes provided by applying the MMQR are very much in line with the outcomes of the FEQR. Overall, in comparison with the traditional regression techniques (i.e., FE and 2SLS), quantile regression approaches reveal further evidence for the finance-growth nexus at the lower, middle and upper parts of the conditional distribution of economic growth. A graphical illustration of the coefficients of the variables of interest along the conditional distribution of growth is presented in Figures 7 to 10. The shading area represents the confidence interval at the 90% level. The dashed line depicts the corresponding coefficients at the conditional means of either FE or 2SLS model.

[18] To shed further light on these observations, one could formally test whether the reported coefficients across low and high quantiles are equal for the variables of interest. In most cases, the heterogeneity of coefficients across quantiles is confirmed. In what follows, for the estimates of *FinDev*, we reject the null hypothesis that coefficients between the q_{05} and the q_{50} are equal at the 10% significance level. For the estimates of *FinRef*, we reject equality of the coefficients between the q_{05} and the q_{75} at the 5% significance level. However, the null hypothesis of equality is not rejected when testing the coefficients of *FinRef* between the q_{05} and the q_{75}. The results of the tests are available upon request.

[19] We instrument the $lagGDP_{pc}$ and *FinDev* with their first and second lags, respectively. The relevant tests perform well in most cases. We have also replicated the analysis by instrumenting the rest regressors and the results remain, in most cases, remarkably similar.

Table 2: Results using the FEQR

Dependent variable: GDPpc growth	(1) FE	(2) q_{05}	(3) q_{25}	(4) q_{50}	(5) q_{75}	(6) q_{95}
$lagGDP_{pc}$	-0.0419***	-0.0480***	-0.0422***	-0.0411***	-0.0402***	-0.0406***
	(0.0075)	(0.0037)	(0.0014)	(0.0011)	(0.0015)	(0.0031)
FinDev	0.0016	0.0104**	0.0043**	0.0024**	0.0000	-0.0045
	(0.0034)	(0.0045)	(0.0019)	(0.0012)	(0.0015)	(0.0032)
FinRef	0.0393***	0.0780***	0.0356***	0.0264***	0.0267***	0.0375***
	(0.0094)	(0.0189)	(0.0075)	(0.0047)	(0.0057)	(0.0131)
Capital	0.0425***	0.0541***	0.0449***	0.0411***	0.0370***	0.0232***
	(0.0072)	(0.0094)	(0.0050)	(0.0034)	(0.0035)	(0.0098)
Schooling	0.0002	-0.0013	0.0005	0.0007**	0.0007	0.0005
	(0.0021)	(0.0013)	(0.0005)	(0.0003)	(0.0005)	(0.0012)
GovSize	-0.0250***	-0.0306***	-0.0274***	-0.0244***	-0.0263***	-0.0275***
	(0.0062)	(0.0070)	(0.0030)	(0.0018)	(0.0034)	(0.0068)
Openness	0.0101	0.0018	0.0090***	0.0110***	0.0121***	0.0147***
	(0.0062)	(0.0041)	(0.0018)	(0.0012)	(0.0017)	(0.0036)
BankCrisis	-0.0184***	-0.0490***	-0.0202***	-0.0131***	-0.0122***	-0.0169***
	(0.0033)	(0.0113)	(0.0050)	(0.0026)	(0.0028)	(0.0043)
Liberty	-0.0005	-0.0073***	-0.0019**	0.0003	0.0013	0.0028*
	(0.0013)	(0.0024)	(0.0009)	(0.0008)	(0.0009)	(0.0017)
Observations	2258	2258	2258	2258	2258	2258
Countries	81	81	81	81	81	81
R-squared	0.232					

Notes: Column (1) reports the findings based on the fixed effects model. Robust standard errors clustered at the country level are in parentheses. Columns (2)-(6) report the findings for selected quantiles based on the FEQR model. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively. All regressions include a constant term and time dummies.

Table 3: Results using the MMQR

Dependent variable: GDPpc growth	(1) 2SLS	(2) q_{05}	(3) q_{25}	(4) q_{50}	(5) q_{75}	(6) q_{95}
*lag*GDP$_{pc}$	-0.0474***	-0.0738***	-0.0528***	-0.0405***	-0.0306***	-0.0165
	(0.0089)	(0.0153)	(0.0097)	(0.0079)	(0.0080)	(0.0105)
FinDev	0.0009	0.0043	0.0025	0.0015	0.0007	-0.0004
	(0.0040)	(0.0070)	(0.0045)	(0.0034)	(0.0029)	(0.0032)
FinRef	0.0402***	0.0576***	0.0455***	0.0385***	0.0327***	0.0247**
	(0.0094)	(0.0181)	(0.0114)	(0.0090)	(0.0087)	(0.0109)
Capital	0.0450***	0.0782***	0.0547***	0.0409***	0.0298***	0.0141
	(0.0073)	(0.0106)	(0.0075)	(0.0072)	(0.0079)	(0.0100)
Schooling	0.0012	0.0046	0.0017	0.0000	-0.0013	-0.0032
	(0.0022)	(0.0042)	(0.0024)	(0.0023)	(0.0028)	(0.0041)
GovSize	-0.0257***	-0.0270**	-0.0257***	-0.0249***	-0.0243***	-0.0234***
	(0.0063)	(0.0110)	(0.0075)	(0.0063)	(0.0061)	(0.0070)
Openness	0.0113*	-0.0107	0.0030	0.0110*	0.0175**	0.0266***
	(0.0066)	(0.0124)	(0.0076)	(0.0064)	(0.0069)	(0.0091)
BankCrisis	-0.0181***	-0.0287***	-0.0219***	-0.0180***	-0.0148***	-0.0103***
	(0.0033)	(0.0080)	(0.0046)	(0.0030)	(0.0026)	(0.0037)
Liberty	-0.0005	-0.0036	-0.0016	-0.0004	0.0006	0.0019
	(0.0013)	(0.0029)	(0.0017)	(0.0013)	(0.0014)	(0.0021)
Observations	2208	2258	2258	2258	2258	2258
Countries	81	81	81	81	81	81
R-squared	0.234					

Notes: Column 1 reports the findings based on the 2SLS model. $lagGDP_{pc}$ and *FinDev* are instrumented using both their first and second lags as instruments, respectively. Under-identification test (Kleibergen-Paap) p-val: 0.000, Weak-identification test (Cragg-Donald) p-val: 0.000, Over-identification test (Sargan-Hansen) p-val: 0.8907. Robust standard errors clustered at the country level are in parentheses. Columns 2-6 report the findings for selected quantiles based on the MMQR model. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively. All regressions include a constant term and time dummies.

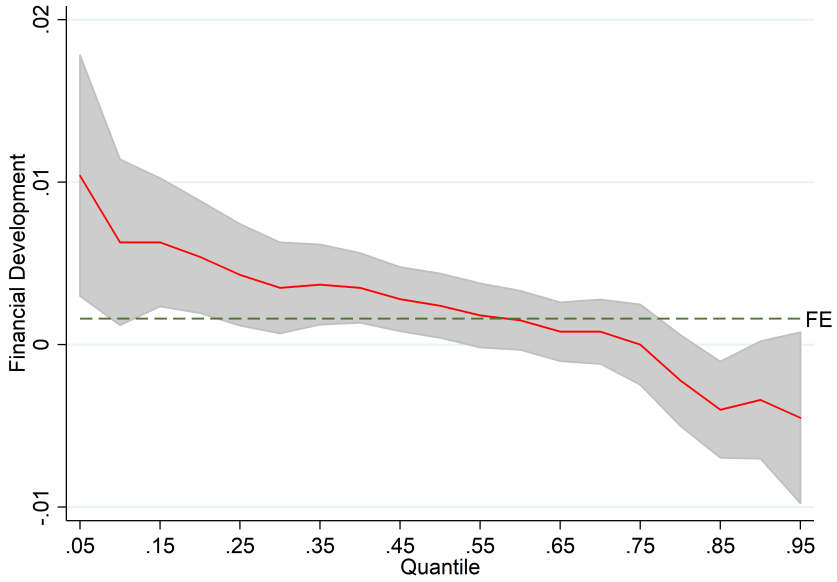


Figure 7: Financial Development and Growth: FEQR

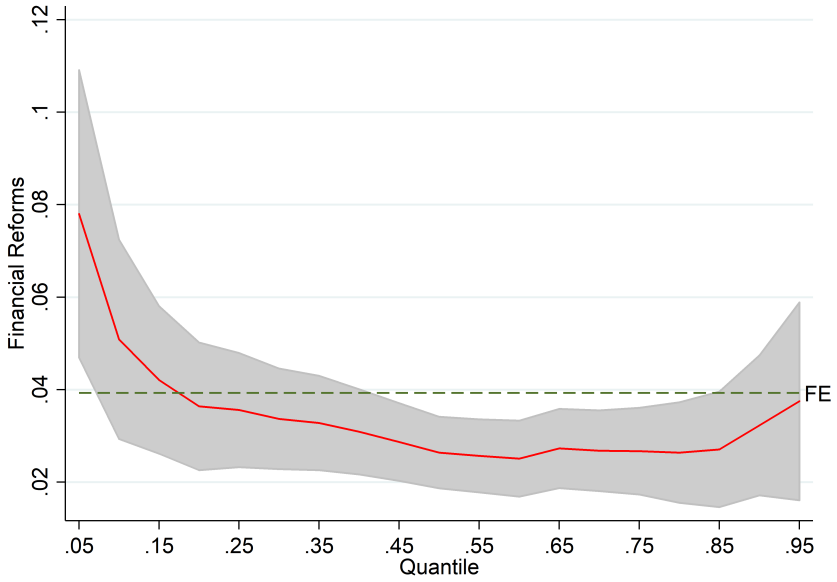


Figure 8: Financial Reforms and Growth: FEQR

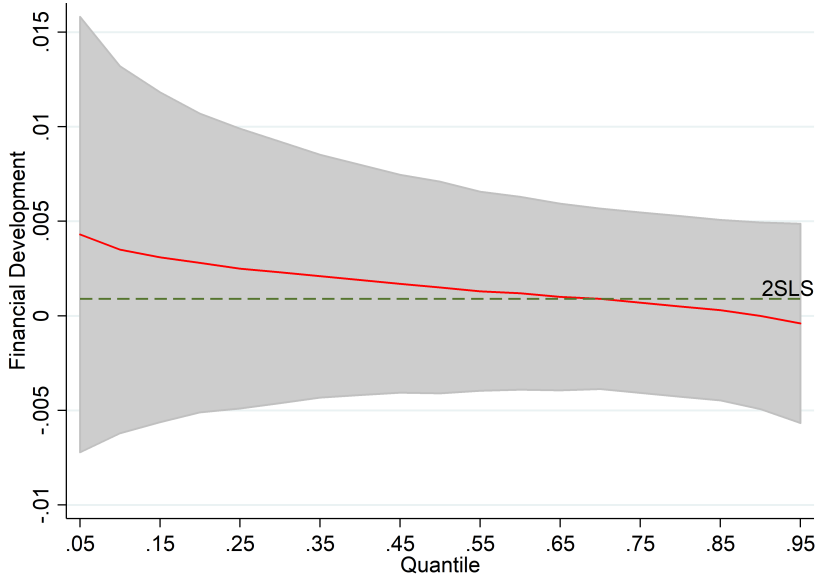


Figure 9: Financial Development and Growth: MMQR

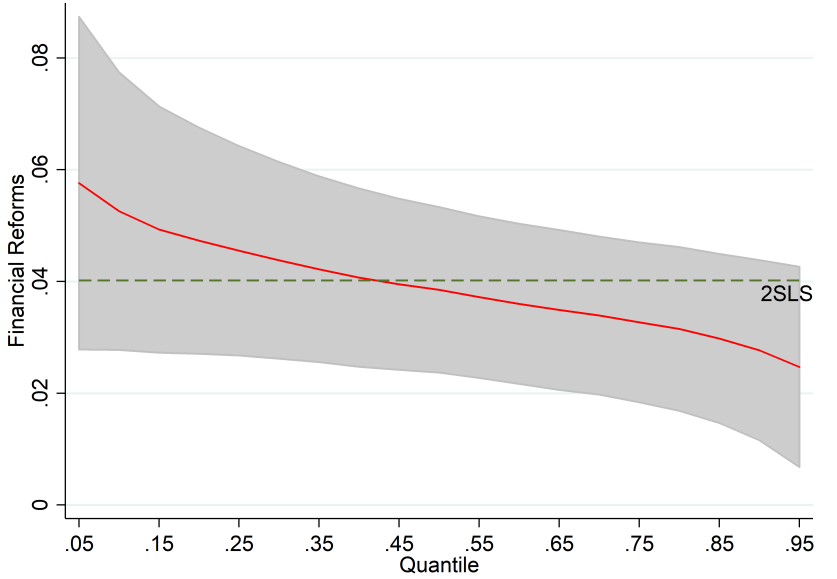


Figure 10: Financial Reforms and Growth: MMQR

5 Robustness analysis

5.1 Decomposition of financial reforms

The first type of robustness analysis is performed by splitting the composite index measuring financial reforms into seven components.[20] This is important mainly because the aggregate index of financial reforms contains a variety of components that may affect differently the financial system and the way that banks operate. Therefore, it would be meaningful for policymakers to know which component of the financial reforms has the most significant impact on economic growth. Moreover, the comparison between financial development and financial liberalization can provide valuable conclusions to the policymakers if we compare each component of financial reforms with the financial development.[21], In what follows, we replicate the analysis presented in Tables 2 and 3, but we replace *FinRef* with the individual components (i.e., Ref_i, with $i = 1, 2, ..7$) of the composite index.[22] To avoid potential multicollinearity issues between the individual reform sub-indices, we carry out the analysis for each component separately. For brevity, we report only the coefficients of the variables of interest. Table 4 corresponds to the method of FEQR and Table 5 to the method of MMQR. In the last row of each table, we report the relevant estimates of FE and 2SLS, respectively.

Focusing on Table 4, we arrive at the following observations: i) in all cases, financial development is found to be an important determinant of growth in countries in the lower tail of the conditional growth distribution. Moving to higher quantiles of the distribution, its effect shrinks and becomes insignificant; ii) from the seven components of financial reforms, the interest rates' controls (Ref_2) and the removal of banking entry restrictions (Ref_3) do not contribute to economic growth;[23] iii) the rest five components are, in most cases, statistically significant and their effects are heterogeneous across quantiles. Similar to the relevant aggregate index, the lower the quantile of the conditional distribution of growth, the higher the relative impact of the reform on economic growth. Among the significant components of financial reforms, banking supervision (Ref_4) and securities markets' regulation (Ref_7) show the highest impact on economic growth in terms of magnitude, especially in the lower tail of the conditional growth distribution. Regarding Table 5, we can note: i) in accordance with the results based on the composite index, financial development plays no role in explaining economic growth when applying the MMQR method; ii) the impact of financial reforms' indices are in most cases consistent with the FEQR results and iii) in terms of magnitude, banking supervision (Ref_4), banking privatization (Ref_5) and securities markets' regulation (Ref_7) have the strongest impact on growth.

[20] The same approach is also followed by Agnello et al. (2012) and Demetriades & Rousseau (2016).

[21] If in the composite index of the financial reform there is a component which has negative or no impact at all, then the aggregate index may underestimate the positive impact of other components of the financial reforms on economic growth.

[22] See also footnote 11.

[23] We find positive and statistically significant evidence only at the q_{05} for Ref_2.

Table 4: Decomposition of Financial Reforms: the case of FEQR

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Q	*FinDev*	Ref_1	*FinDev*	Ref_2	*FinDev*	Ref_3	*FinDev*	Ref_4	*FinDev*	Ref_5	*FinDev*	Ref_6	*FinDev*	Ref_7
q_{05}	0.0134***	0.0090***	0.0111**	0.0072**	0.0135***	-0.0002	0.0107**	0.0114***	0.0117***	0.0079***	0.0102**	0.0071**	0.0108**	0.0112***
	(0.0045)	(0.0027)	(0.0048)	(0.0030)	(0.0048)	(0.0029)	(0.0045)	(0.0038)	(0.0045)	(0.0028)	(0.0050)	(0.0032)	(0.0049)	(0.0036)
q_{25}	0.0050***	0.0036***	0.0053***	0.0014	0.0046**	-0.0010	0.0038**	0.0054***	0.0053***	0.0029***	0.0048***	0.0034***	0.0038**	0.0073***
	(0.0019)	(0.0012)	(0.0018)	(0.0013)	(0.0018)	(0.0012)	(0.0018)	(0.0016)	(0.0018)	(0.0009)	(0.0018)	(0.0013)	(0.0019)	(0.0017)
q_{50}	0.0027**	0.0024***	0.0024*	0.0003	0.0024*	-0.0006	0.0023**	0.0043***	0.0027**	0.0025***	0.0029**	0.0025**	0.0024**	0.0061***
	(0.0013)	(0.0009)	(0.0012)	(0.0010)	(0.0012)	(0.0009)	(0.0012)	(0.0013)	(0.0013)	(0.0007)	(0.0012)	(0.0010)	(0.0012)	(0.0013)
q_{75}	0.0004	0.0020**	0.0003	0.0004	0.0004	0.0002	-0.0004	0.0047***	0.0003	0.0024**	0.0004	0.0029***	0.0000	0.0053***
	(0.0015)	(0.0010)	(0.0015)	(0.0010)	(0.0015)	(0.0013)	(0.0014)	(0.0016)	(0.0015)	(0.0010)	(0.0014)	(0.0011)	(0.0015)	(0.0016)
q_{95}	-0.0050	0.0012	-0.0050	0.0009	-0.0037	0.0033	-0.0043	0.0048	-0.0044	0.0032	-0.0043	0.0050**	-0.0036	0.0088***
	(0.0031)	(0.0021)	(0.0032)	(0.0026)	(0.0031)	(0.0026)	(0.0032)	(0.0034)	(0.0036)	(0.0021)	(0.0033)	(0.0020)	(0.0031)	(0.0029)
FE	0.0025	0.0039***	0.0027	0.0014	0.0027	-0.0000	0.0018	0.0072***	0.0023	0.0037**	0.0024	0.0043***	0.0024	0.0076***
	(0.0035)	(0.0015)	(0.0035)	(0.0014)	(0.0035)	(0.0017)	(0.0033)	(0.0023)	(0.0034)	(0.0018)	(0.0035)	(0.0015)	(0.0035)	(0.0021)

Notes: Columns (1)-(7) report the findings for selected quantiles for different components of financial reforms based on the FEQR model (obs=2,258). Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. In the last row of the table, the fixed effects estimates and their corresponding robust standard errors clustered at the country level are reported. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 5: Decomposition of Financial Reforms: the case of MMQR

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Quantile	*FinDev*	Ref_1	*FinDev*	Ref_2	*FinDev*	Ref_3	*FinDev*	Ref_4	*FinDev*	Ref_5	*FinDev*	Ref_6	*FinDev*	Ref_7
q_{05}	0.0061	0.0068***	0.0063	0.0029	0.0065	-0.0008	0.0047	0.0103***	0.0057	0.0082**	0.0055	0.0070**	0.0057	0.0075*
	(0.0071)	(0.0026)	(0.0072)	(0.0026)	(0.0073)	(0.0030)	(0.0066)	(0.0035)	(0.0070)	(0.0032)	(0.0072)	(0.0033)	(0.0072)	(0.0042)
q_{25}	0.0036	0.0048***	0.0039	0.0019	0.0039	-0.0003	0.0028	0.0082***	0.0034	0.0052**	0.0034	0.0052***	0.0035	0.0076***
	(0.0045)	(0.0017)	(0.0045)	(0.0016)	(0.0046)	(0.0021)	(0.0042)	(0.0026)	(0.0044)	(0.0021)	(0.0046)	(0.0020)	(0.0046)	(0.0027)
q_{50}	0.0023	0.0038***	0.0026	0.0013	0.0025	0.0000	0.0017	0.0070***	0.0022	0.0035**	0.0022	0.0042***	0.0022	0.0076***
	(0.0034)	(0.0014)	(0.0034)	(0.0013)	(0.0035)	(0.0018)	(0.0032)	(0.0023)	(0.0034)	(0.0018)	(0.0035)	(0.0015)	(0.0034)	(0.0022)
q_{75}	0.0012	0.0030**	0.0015	0.0008	0.0014	0.0003	0.0008	0.0061**	0.0011	0.0022	0.0013	0.0034***	0.0012	0.0076***
	(0.0029)	(0.0014)	(0.0029)	(0.0014)	(0.0030)	(0.0019)	(0.0028)	(0.0024)	(0.0030)	(0.0018)	(0.0030)	(0.0013)	(0.0029)	(0.0021)
q_{95}	-0.0004	0.0017	-0.0001	0.0001	-0.0003	0.0006	-0.0004	0.0047*	-0.0004	0.0001	-0.0002	0.0021	-0.0004	0.0077***
	(0.0032)	(0.0016)	(0.0033)	(0.0019)	(0.0034)	(0.0024)	(0.0032)	(0.0028)	(0.0034)	(0.0023)	(0.0033)	(0.0017)	(0.0033)	(0.0026)
2SLS	0.0018	0.0039***	0.0021	0.0016	0.0018	0.0004	0.0004	0.0078***	0.0016	0.0029	0.0017	0.0043***	0.0017	0.0083***
	(0.0041)	(0.0014)	(0.0041)	(0.0014)	(0.0041)	(0.0017)	(0.0038)	(0.0025)	(0.0041)	(0.0018)	(0.0041)	(0.0015)	(0.0041)	(0.0022)

Notes: Columns (1)-(7) report the findings for selected quantiles for different components of financial reforms based on the MMQR model (obs=2,258). Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. In the last row of the table, the 2SLS estimates and their corresponding robust standard errors clustered at the country level are reported (obs=2,208). ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

5.2 Low- and high-income countries

The second type of robustness analysis is performed by splitting the sample into low- and high-income countries. For each group of countries, we perform the same analysis as presented in Tables 2-5. Although fixed effects in FEQR and MMQR are enough to capture countries' heterogeneity, focusing separately on different country groups could provide further evidence on the finance-growth nexus and, at the same time, it will reveal whether our results are driven by a specific sample group. Tables 6 and 7 report the FEQR findings for the low- and high-income countries, respectively, while Tables 8 and 9 present the corresponding MMQR results. Similarly, Tables 10-13 report the estimation results based on the decomposition of financial reforms.

More precisely, focusing on the variables of interest in Table 6, it becomes apparent that financial development has a negative effect on income growth at the upper quantile of the distribution in low-income countries. The relevant coefficient is statistically significant at the 10% level and is negative. On the contrary, financial reforms are statistically significant and their effect declines when considering higher quantiles of the distribution. The latter is supported in both specifications. When the analysis is restricted to high-income countries (Table 7), we find that financial development positively affects growth in lower quantiles. However, the effect becomes negative at the q_{95}. Financial reforms remain statistically significant (as in the main analysis) and their effect declines as we move to higher quantiles of the conditional income growth distribution. These findings are only supported by the FEQR method. The most surprising result emerging from the FEQR analysis is that the magnitude of the effect of financial reforms in low-income countries is almost two times greater than the corresponding effect in high-income ones. While the MMQR method fails to support the role of financial development on growth in high-income countries, this is not the case for financial reforms which remain statistically significant at higher levels of the conditional growth distribution. Interestingly, the coefficients of *FinDev*, *Openness* and *Liberty* are statistically insignificant in the mean-regression approaches for both income groups. However, this does not apply to the quantile regression approaches, where the aforementioned coefficients are statistically significant in certain parts of the conditional distribution of growth.

Finally, we analyze the different components of financial reforms and, as in section 4, we present only the coefficients of interest for brevity. As regards our proxy for financial development, the findings in most cases match the results of the composite index (i.e., financial development contributes to economic growth at lower levels of the conditional growth distribution, the effect declines and becomes negative and insignificant as we move to higher quantiles; this effect is driven by high-income countries, while it is only supported by the FEQR model). It is worth noting that in most cases we observe quantile parameter heterogeneity across the variables of interest. While FE and 2SLS fail in some cases to support the role of financial development and financial reforms on economic growth, the quantile regression method reveals considerable insights for various parts of the conditional growth distribution. This analysis has implications for different income-groups. In terms of magnitude, supervision of banks (Ref_4) and liberalization of capital account flows (Ref_6) are the most important

determinants of growth in low-income countries. We also find significant evidence supporting the role of reforms on controlling credit allocation and reserve requirements (Ref_1), privatization of banks (Ref_5) and regulation of securities markets (Ref_7) in economic growth. Interest rates' liberalization (Ref_2) and easing banking entry restrictions (Ref_3) play no statistically significant role for growth. The latter holds for both specifications.[24]

When we take into account high-income countries, both specifications support that reforms on banking entry restrictions (Ref_3) have a negative impact on growth. In other words, higher competition in the domestic banking sector and the entrance of new domestic banks could negatively affect economic growth. In addition, the findings imply that interest rates' liberalization (Ref_2), banking supervision (Ref_4) and banking privatization (Ref_5), liberalization of capital account flows (Ref_6) and regulation of securities markets (Ref_7) are positively associated with economic growth.[25]

In what follows, we find heterogeneous effects and patterns between countries with different income levels. By splitting the sample into two income groups, we reduce the number of observations. Thus, these findings should be interpreted with caution.[26] When comparing our results in FEQR to those of MMQR, it must be pointed out that we observe differences in the size and significance of the coefficients in some cases. However, the main notion driven by the analysis highlights: (i) the importance of financial development at lower levels of the conditional growth distribution in high-income countries; (ii) the heterogeneous effect of financial reforms' components in different parts of the conditional distribution of economic growth in both income groups and (iii) the negative impact of easing banking entry restrictions on economic growth in high-income countries.

[24] We find positive and statistically significant evidence at the 10% level only at the q95 for Ref_3 under MMQR.
[25] The coefficients of Ref_4 Ref_6 are statistically significant only under the FEQR approach.
[26] Given the reduction of the sample, to further support the reliance of our results in the MMQR, we have implemented the split-panel jackknife bias correction of Dhaene & Jochmans (2015) as suggested in Machado & Silva (2019).

Table 6: Low-income countries' results: the case of FEQR

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
GDPpc growth	FE	q_{05}	q_{25}	q_{50}	q_{75}	q_{95}
*lag*GDP$_{pc}$	-0.0467***	-0.0509***	-0.0475***	-0.0462***	-0.0461***	-0.0417***
	(0.0120)	(0.0063)	(0.0031)	(0.0022)	(0.0035)	(0.0065)
FinDev	-0.0005	0.0079	0.0023	0.0018	-0.0007	-0.0076*
	(0.0065)	(0.0064)	(0.0031)	(0.0023)	(0.0025)	(0.0046)
FinRef	0.0590***	0.0938***	0.0479***	0.0412***	0.0422***	0.0517***
	(0.0159)	(0.0290)	(0.0125)	(0.0112)	(0.0120)	(0.0193)
Capital	0.0541***	0.0587***	0.0557***	0.0491***	0.0469***	0.0538***
	(0.0073)	(0.0118)	(0.0059)	(0.0053)	(0.0043)	(0.0075)
Schooling	0.0034	0.0017	0.0037***	0.0040***	0.0039***	0.0038**
	(0.0030)	(0.0019)	(0.0011)	(0.0006)	(0.0009)	(0.0019)
GovSize	-0.0178**	-0.0295***	-0.0198***	-0.0162***	-0.0107**	-0.0010
	(0.0084)	(0.0087)	(0.0049)	(0.0032)	(0.0045)	(0.0079)
Openness	0.0084	-0.0006	0.0032	0.0097**	0.0147***	0.0161*
	(0.0093)	(0.0076)	(0.0042)	(0.0040)	(0.0054)	(0.0089)
BankCrisis	-0.0150***	-0.0405***	-0.0178**	-0.0091**	-0.0101***	-0.0163***
	(0.0043)	(0.0152)	(0.0081)	(0.0038)	(0.0036)	(0.0059)
Liberty	0.0022	0.0023	0.0018	0.0021	0.0027*	0.0025
	(0.0019)	(0.0026)	(0.0013)	(0.0014)	(0.0016)	(0.0025)
Observations	1019	1019	1019	1019	1019	1019
Countries	37	37	37	37	37	37
R-squared	0.220					

Notes: Column (1) reports the findings based on the fixed effects model. Robust standard errors clustered at the country level are in parentheses. Columns (2)-(6) report the findings for selected quantiles based on the FEQR model. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively. All regressions include a constant term and time dummies.

Table 7: High-income countries' results: the case of FEQR

Dependent variable: GDPpc growth	(1) FE	(2) q_{05}	(3) q_{25}	(4) q_{50}	(5) q_{75}	(6) q_{95}
*lag*GDP$_{pc}$	-0.0546***	-0.0531***	-0.0527***	-0.0553***	-0.0555***	-0.0537***
	(0.0106)	(0.0070)	(0.0026)	(0.0016)	(0.0019)	(0.0034)
FinDev	0.0016	0.0122**	0.0044**	0.0005	-0.0025	-0.0061*
	(0.0029)	(0.0056)	(0.0020)	(0.0018)	(0.0020)	(0.0032)
FinRef	0.0241*	0.0517***	0.0192**	0.0138*	0.0179***	0.0064
	(0.0132)	(0.0200)	(0.0097)	(0.0077)	(0.0068)	(0.0101)
Capital	0.0392***	0.0625***	0.0525***	0.0363***	0.0358***	0.0073
	(0.0129)	(0.0125)	(0.0066)	(0.0061)	(0.0060)	(0.0105)
Schooling	0.0002	-0.0013	-0.0001	0.0008	0.0009	0.0005
	(0.0021)	(0.0016)	(0.0006)	(0.0006)	(0.0007)	(0.0011)
GovSize	-0.0342***	-0.0057	-0.0291***	-0.0361***	-0.0421***	-0.0599***
	(0.0086)	(0.0097)	(0.0046)	(0.0038)	(0.0041)	(0.0077)
Openness	0.0094	0.0020	0.0101***	0.0097***	0.0094***	0.0119***
	(0.0091)	(0.0053)	(0.0020)	(0.0016)	(0.0019)	(0.0038)
BankCrisis	-0.0203***	-0.0400***	-0.0232***	-0.0177***	-0.0138***	-0.0114***
	(0.0044)	(0.0111)	(0.0054)	(0.0039)	(0.0043)	(0.0041)
Liberty	-0.0023	-0.0099***	-0.0034**	-0.0012	-0.0011	-0.0004
	(0.0014)	(0.0032)	(0.0014)	(0.0011)	(0.0010)	(0.0018)
Observations	1239	1239	1239	1239	1239	1239
Countries	44	44	44	44	44	44
R-squared	0.258					

Notes: Column (1) reports the findings based on the fixed effects model. Robust standard errors clustered at the country level are in parentheses. Columns (2)-(6) report the findings for selected quantiles based on the FEQR model. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively. All regressions include a constant term and time dummies.

Table 8: Low-income countries' results: the case of MMQR

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
GDPpc growth	2SLS	q_{05}	q_{25}	q_{50}	q_{75}	q_{95}
$lag\text{GDP}_{pc}$	-0.0534***	-0.0905***	-0.0592***	-0.0438***	-0.0338***	-0.0150
	(0.0139)	(0.0221)	(0.0154)	(0.0128)	(0.0120)	(0.0139)
FinDev	-0.0002	-0.0075	-0.0025	-0.0001	0.0015	0.0045
	(0.0066)	(0.0120)	(0.0083)	(0.0066)	(0.0058)	(0.0058)
FinRef	0.0646***	0.0762**	0.0639***	0.0579***	0.0539***	0.0465**
	(0.0159)	(0.0359)	(0.0214)	(0.0164)	(0.0165)	(0.0229)
Capital	0.0568***	0.1145***	0.0713***	0.0501***	0.0363***	0.0102
	(0.0077)	(0.0145)	(0.0090)	(0.0076)	(0.0075)	(0.0097)
Schooling	0.0053*	0.0152*	0.0068	0.0026	-0.0001	-0.0051
	(0.0031)	(0.0092)	(0.0049)	(0.0040)	(0.0050)	(0.0078)
GovSize	-0.0191**	-0.0187	-0.0180*	-0.0177**	-0.0175**	-0.0171
	(0.0083)	(0.0160)	(0.0106)	(0.0089)	(0.0088)	(0.0107)
Openness	0.0105	-0.0085	0.0036	0.0095	0.0134	0.0207
	(0.0098)	(0.0190)	(0.0118)	(0.0097)	(0.0101)	(0.0133)
BankCrisis	-0.0136***	-0.0176	-0.0157**	-0.0148***	-0.0142***	-0.0131**
	(0.0045)	(0.0117)	(0.0066)	(0.0042)	(0.0034)	(0.0052)
Liberty	0.0027	0.0047	0.0029	0.0020	0.0014	0.0004
	(0.0018)	(0.0037)	(0.0023)	(0.0018)	(0.0019)	(0.0026)
Observations	993	1019	1019	1019	1019	1019
Countries	37	37	37	37	37	37
R-squared	0.257					

Notes: Column 1 reports the findings based on the 2SLS model. $lagGDP_{pc}$ and *FinDev* are instrumented using both their first and second lags as instruments, respectively. Under-identification test (Kleibergen-Paap) p-val: 0.000, Weak-identification test (Cragg-Donald) p-val: 0.000, Over-identification test (Sargan-Hansen) p-val: 0.6837. Robust standard errors clustered at the country level are in parentheses. Columns 2-6 report the findings for selected quantiles based on the MMQR model. Estimates are corrected using Jackknife bias corrections. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively. All regressions include a constant term and time dummies.

Table 9: High-income countries' results: the case of MMQR

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
GDPpc growth	2SLS	q_{05}	q_{25}	q_{50}	q_{75}	q_{95}
$lag\text{GDP}_{pc}$	-0.0578***	-0.0849***	-0.0636***	-0.0537***	-0.0445***	-0.0317*
	(0.0120)	(0.0217)	(0.0152)	(0.0139)	(0.0150)	(0.0184)
FinDev	-0.0008	0.0072	0.0032	0.0014	-0.0003	-0.0027
	(0.0037)	(0.0074)	(0.0045)	(0.0032)	(0.0026)	(0.0032)
FinRef	0.0202*	0.0245	0.0242	0.0241*	0.0240*	0.0239*
	(0.0117)	(0.0238)	(0.0173)	(0.0142)	(0.0127)	(0.0124)
Capital	0.0415***	0.1065***	0.0592***	0.0372***	0.0168	-0.0117
	(0.0124)	(0.0176)	(0.0137)	(0.0136)	(0.0146)	(0.0170)
Schooling	0.0003	-0.0009	-0.0001	0.0002	0.0005	0.0010
	(0.0023)	(0.0046)	(0.003)	(0.0025)	(0.0025)	(0.0031)
GovSize	-0.0330***	-0.0252	-0.0315**	-0.0344***	-0.0371***	-0.0410***
	(0.0086)	(0.0177)	(0.0122)	(0.0100)	(0.0094)	(0.0104)
Openness	0.0107	-0.0121	0.0031	0.0101	0.0166*	0.0257**
	(0.0098)	(0.0170)	(0.0118)	(0.0100)	(0.0096)	(0.0108)
BankCrisis	-0.0209***	-0.0408***	-0.0264***	-0.0197***	-0.0135***	-0.0048
	(0.0044)	(0.0107)	(0.0065)	(0.0043)	(0.0036)	(0.0047)
Liberty	-0.0023	-0.0087*	-0.0042	-0.0021	-0.0001	0.0026
	(0.0015)	(0.0047)	(0.0026)	(0.0016)	(0.0015)	(0.0024)
Observations	1215	1239	1239	1239	1239	1239
Countries	44	44	44	44	44	44
R-squared	0.284					

Notes: Column 1 reports the findings based on the 2SLS model. $lagGDP_{pc}$ and *FinDev* are instrumented using both their first and second lags as instruments, respectively. Under-identification test (Kleibergen-Paap) p-val: 0.000, Weak-identification test (Cragg-Donald) p-val: 0.000, Over-identification test (Sargan-Hansen) p-val: 0.3683. Robust standard errors clustered at the country level are in parentheses. Columns 2-6 report the findings for selected quantiles based on the MMQR model. Estimates are corrected using Jackknife bias corrections. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively. All regressions include a constant term and time dummies.

Table 10: Low-income Countries: Decomposition of Financial Reforms: the case of FEQR

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Q	*FinDev*	Ref_1	*FinDev*	Ref_2	*FinDev*	Ref_3	*FinDev*	Ref_4	*FinDev*	Ref_5	*FinDev*	Ref_6	*FinDev*	Ref_7
q_{05}	0.0092	0.0059	0.0109	0.0048	0.0081	-0.0001	0.0085	0.0130***	0.0072	0.0070**	0.0108	0.0110**	0.0062	0.0103**
	(0.0070)	(0.0040)	(0.0066)	(0.0045)	(0.0069)	(0.0033)	(0.0062)	(0.0048)	(0.0063)	(0.0033)	(0.0072)	(0.0048)	(0.0072)	(0.0045)
q_{25}	0.0048	0.0059***	0.0051	0.0001	0.0054*	0.0020	0.0044	0.0093***	0.0042	0.0033**	0.0045	0.0029*	0.0048	0.0066**
	(0.0032)	(0.0021)	(0.0032)	(0.0024)	(0.0031)	(0.0015)	(0.0029)	(0.0036)	(0.0031)	(0.0016)	(0.0031)	(0.0016)	(0.0034)	(0.0026)
q_{50}	0.0026	0.0054***	0.0032	-0.0012	0.0024	0.0001	0.0018	0.0095***	0.0027	0.0042***	0.0029	0.0035**	0.0022	0.0074***
	(0.0023)	(0.0021)	(0.0024)	(0.0020)	(0.0023)	(0.0013)	(0.0022)	(0.0036)	(0.0023)	(0.0016)	(0.0025)	(0.0016)	(0.0025)	(0.0025)
q_{75}	0.0005	0.0057***	0.0008	-0.0014	0.0010	0.0015	0.0008	0.0137***	0.0005	0.0043**	0.0012	0.0028	0.0007	0.0059**
	(0.0025)	(0.0022)	(0.0024)	(0.0023)	(0.0024)	(0.0019)	(0.0027)	(0.0039)	(0.0024)	(0.0020)	(0.0025)	(0.0019)	(0.0026)	(0.0030)
q_{95}	-0.0071	0.0070*	-0.0072	-0.0019	-0.0091**	0.0014	-0.0077*	0.0226***	-0.0060	0.0079**	-0.0050	-0.0014	-0.0072	0.0027
	(0.0044)	(0.0042)	(0.0047)	(0.0042)	(0.0045)	(0.0032)	(0.0040)	(0.0055)	(0.0045)	(0.0031)	(0.0046)	(0.0034)	(0.0047)	(0.0051)
FE	0.0010	0.0061**	0.0017	0.0002	0.0015	0.0012	0.0008	0.0130***	0.0007	0.0058**	0.0016	0.0053*	0.0006	0.0079**
	(0.0068)	(0.0029)	(0.0066)	(0.0027)	(0.0066)	(0.0021)	(0.0058)	(0.0047)	(0.0066)	(0.0026)	(0.0067)	(0.0028)	(0.0067)	(0.0038)

Notes: Columns (1)-(7) report the findings for selected quantiles for different components of financial reforms based on the FEQR model for low-income countries (obs=1,019). Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. In the last row of the table, the fixed effects estimates and their corresponding robust standard errors clustered at the country level are reported. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 11: High-income Countries: Decomposition of Financial Reforms: the case of FEQR

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Q	*FinDev*	Ref_1	*FinDev*	Ref_2	*FinDev*	Ref_3	*FinDev*	Ref_4	*FinDev*	Ref_5	*FinDev*	Ref_6	*FinDev*	Ref_7
q_{05}	0.0132**	0.0038	0.0127**	0.0070**	0.0085	-0.0084***	0.0069	0.0069**	0.0120**	0.0058*	0.0110**	-0.0003	0.0107*	0.0112***
	(0.0056)	(0.0037)	(0.0059)	(0.0033)	(0.0052)	(0.0032)	(0.0049)	(0.0033)	(0.0059)	(0.0030)	(0.0056)	(0.0037)	(0.0056)	(0.0043)
q_{25}	0.0042**	0.0023	0.0055***	0.0029*	0.0049**	-0.0059***	0.0041**	0.0019	0.0054***	0.0034***	0.0044**	0.0015	0.0036*	0.0069***
	(0.0020)	(0.0017)	(0.0021)	(0.0017)	(0.0020)	(0.0016)	(0.0020)	(0.0015)	(0.0020)	(0.0012)	(0.0020)	(0.0019)	(0.0020)	(0.0024)
q_{50}	0.0007	0.0014	0.0009	0.0028*	0.0022	-0.0049***	0.0012	-0.0007	0.0012	0.0027***	0.0002	0.0021	0.0001	0.0070***
	(0.0020)	(0.0013)	(0.0019)	(0.0015)	(0.0020)	(0.0012)	(0.0018)	(0.0012)	(0.0018)	(0.0008)	(0.0018)	(0.0017)	(0.0016)	(0.0018)
q_{75}	-0.0015	0.0014	-0.0018	0.0039***	-0.0002	-0.0034**	-0.0016	-0.0026	-0.0011	0.0022**	-0.0026	0.0024*	-0.0021	0.0062***
	(0.0019)	(0.0012)	(0.0018)	(0.0011)	(0.0017)	(0.0014)	(0.0018)	(0.0016)	(0.0020)	(0.0011)	(0.0021)	(0.0014)	(0.0018)	(0.0018)
q_{95}	-0.0064*	-0.0016	-0.0043	0.0018	-0.0041	-0.0039	-0.0052	-0.0008	-0.0054*	0.0028*	-0.0062*	0.0023	-0.0050	0.0025
	(0.0034)	(0.0019)	(0.0032)	(0.0020)	(0.0033)	(0.0025)	(0.0036)	(0.0026)	(0.0032)	(0.0017)	(0.0035)	(0.0020)	(0.0032)	(0.0025)
FE	0.0021	0.0024	0.0025	0.0035*	0.0032	-0.0047**	0.0021	0.0003	0.0019	0.0039*	0.0019	0.0021	0.0022	0.0067***
	(0.0028)	(0.0019)	(0.0030)	(0.0019)	(0.0031)	(0.0020)	(0.0029)	(0.0025)	(0.0029)	(0.0023)	(0.0029)	(0.0018)	(0.0029)	(0.0025)

Notes: Columns (1)-(7) report the findings for selected quantiles for different components of financial reforms based on the FEQR model for high-income countries (obs=1,239). Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. In the last row of the table, the fixed effects estimates and their corresponding robust standard errors clustered at the country level are reported. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 12: Low-income countries. Decomposition of Financial Reforms: the case of MMQR

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Quantile	*FinDev*	Ref_1	*FinDev*	Ref_2	*FinDev*	Ref_3	*FinDev*	Ref_4	*FinDev*	Ref_5	*FinDev*	Ref_6	*FinDev*	Ref_7
q_{05}	-0.0041	0.0080*	-0.0040	0.0009	-0.0034	-0.0040	-0.0068	0.0163**	-0.0057	0.0128**	-0.0026	0.0074	-0.0035	0.0001
	(0.0119)	(0.0046)	(0.0119)	(0.0048)	(0.0121)	(0.0044)	(0.0104)	(0.0073)	(0.0116)	(0.0051)	(0.0120)	(0.0061)	(0.0120)	(0.0070)
q_{25}	-0.0005	0.0067**	0.0001	0.0004	0.0002	-0.0002	-0.0014	0.0140***	-0.0011	0.0077**	0.0006	0.0058	-0.0005	0.0058
	(0.0083)	(0.0033)	(0.0082)	(0.0031)	(0.0083)	(0.0028)	(0.0071)	(0.0049)	(0.0081)	(0.0033)	(0.0082)	(0.0037)	(0.0083)	(0.0045)
q_{50}	0.0013	0.0060**	0.0021	0.0002	0.0018	0.0015	0.0012	0.0128***	0.0009	0.0055**	0.0018	0.0052*	0.0009	0.0084**
	(0.0068)	(0.0029)	(0.0067)	(0.0027)	(0.0068)	(0.0023)	(0.0059)	(0.0045)	(0.0066)	(0.0027)	(0.0067)	(0.0027)	(0.0068)	(0.0039)
q_{75}	0.0028	0.0055*	0.0035	0.0000	0.0031	0.0028	0.0031	0.0120**	0.0025	0.0037	0.0029	0.0046*	0.0020	0.0104**
	(0.0060)	(0.0029)	(0.0060)	(0.0029)	(0.0060)	(0.0023)	(0.0055)	(0.0049)	(0.0060)	(0.0029)	(0.0060)	(0.0025)	(0.0060)	(0.0042)
q_{95}	0.0052	0.0046	0.0061	-0.0003	0.0053	0.0051*	0.0068	0.0104*	0.0055	0.0004	0.0047	0.0037	0.0037	0.0136**
	(0.0062)	(0.0035)	(0.0062)	(0.0037)	(0.0064)	(0.0028)	(0.0061)	(0.0062)	(0.0063)	(0.0037)	(0.0062)	(0.0031)	(0.0060)	(0.0056)
2SLS	0.0016	0.0058**	0.0021	0.0015	0.0018	0.0015	0.0006	0.0148***	0.0013	0.0049*	0.0020	0.0055**	0.0011	0.0093**
	(0.0069)	(0.0029)	(0.0066)	(0.0027)	(0.0067)	(0.0022)	(0.0057)	(0.0048)	(0.0068)	(0.0027)	(0.0067)	(0.0028)	(0.0068)	(0.0039)

Notes: Columns (1)-(7) report the findings for selected quantiles for different categories of financial reforms based on the MMQR model (obs=1,019). Estimates are corrected using Jackknife bias corrections. Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. In the last row of the table, the 2SLS estimates and their corresponding robust standard errors clustered at the country level are reported (obs=993). ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 13: High-income Countries. Decomposition of Financial Reforms: the case of MMQR

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Quantile	*FinDev*	Ref_1	*FinDev*	Ref_2	*FinDev*	Ref_3	*FinDev*	Ref_4	*FinDev*	Ref_5	*FinDev*	Ref_6	*FinDev*	Ref_7
q_{05}	0.0079	0.0027	0.0082	0.0043	0.0098	-0.0076**	0.0066	0.0040	0.0077	0.0040	0.0077	0.0023	0.0075	0.0091*
	(0.0073)	(0.0034)	(0.0075)	(0.0033)	(0.0072)	(0.0035)	(0.0071)	(0.0048)	(0.0075)	(0.0040)	(0.0070)	(0.0037)	(0.0074)	(0.0052)
q_{25}	0.0039	0.0025	0.0043	0.0037	0.0050	-0.0055**	0.0035	0.0014	0.0037	0.0040	0.0035	0.0022	0.0037	0.0074**
	(0.0045)	(0.0024)	(0.0047)	(0.0023)	(0.0046)	(0.0026)	(0.0044)	(0.0031)	(0.0046)	(0.0029)	(0.0044)	(0.0025)	(0.0045)	(0.0034)
q_{50}	0.0018	0.0024	0.0023	0.0034*	0.0029	-0.0046*	0.0019	0.0001	0.0017	0.0039	0.0016	0.0021	0.0019	0.0066***
	(0.0031)	(0.0020)	(0.0033)	(0.0020)	(0.0034)	(0.0024)	(0.0032)	(0.0026)	(0.0032)	(0.0024)	(0.0032)	(0.0020)	(0.0032)	(0.0025)
q_{75}	0.0002	0.0023	0.0005	0.0032	0.0010	-0.0038	0.0007	-0.0010	-0.0000	0.0039*	0.0000	0.0021	0.0005	0.0060***
	(0.0026)	(0.0019)	(0.0027)	(0.0020)	(0.0029)	(0.0024)	(0.0027)	(0.0027)	(0.0027)	(0.0023)	(0.0027)	(0.0017)	(0.0026)	(0.0021)
q_{95}	-0.0023	0.0021	-0.0019	0.0028	-0.0017	-0.0026	-0.0011	-0.0025	-0.0024	0.0038	-0.0024	0.0020	-0.0016	0.0050**
	(0.0032)	(0.0020)	(0.0031)	(0.0023)	(0.0034)	(0.0028)	(0.0031)	(0.0034)	(0.0033)	(0.0025)	(0.0032)	(0.0017)	(0.0030)	(0.0022)
2SLS	-0.0003	0.0021	0.0003	0.0028	0.0011	-0.0043**	-0.0004	0.0003	-0.0005	0.0032	-0.0006	0.0017	-0.0002	0.0065***
	(0.0038)	(0.0017)	(0.0038)	(0.0017)	(0.0042)	(0.0021)	(0.0040)	(0.0027)	(0.0038)	(0.0022)	(0.0038)	(0.0017)	(0.0038)	(0.0025)

Notes: Columns (1)-(7) report the findings for selected quantiles for different categories of financial reforms based on the MMQR model (obs=1,239). Estimates are corrected using Jackknife bias corrections. Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. In the last row of the table, the 2SLS estimates and their corresponding robust standard errors clustered at the country level are reported (obs=1,215). ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

5.3 Endogeneity concerns: further evidence

This section investigates the robustness of the analysis in response to endogeneity concerns. While research of quantile regression estimators that account for fixed effects and at the same time control for endogeneity issues is still in progress, one can handle potential endogenous regressors by introducing lags. For this reason, we substitute the $lagGDP_{pc}$ and *FinDev* with their respected two-period lagged values and replicate the main analysis presented in Section 4.[27] We have also carried out the analysis by taking lags for *FinRef* as well as for all right-hand side variables in our model. Tables 14 and 15 report the findings. For space reasons, we report only the coefficients of the variables of interest. We observe differences both in the magnitude and significance of the corresponding coefficients between the FEQR and MMQR methods when we control for possible endogeneity, nonetheless, the results are in line with the main findings of the study.

Table 14: Lagged regressors: the case of FEQR

Dependent variable:	(1)	(2)	(3)	(4)	(5)
GDPpc growth	q_{05}	q_{25}	q_{50}	q_{75}	q_{95}
$FinDev_{(t-2)}$	0.0078**	0.0034**	0.0011	-0.0009	-0.0029
	(0.0039)	(0.0015)	(0.0010)	(0.0014)	(0.0025)
FinRef	0.0727***	0.0307***	0.0243***	0.0241***	0.0333***
	(0.0163)	(0.0069)	(0.0050)	(0.0054)	(0.0116)
$FinDev_{(t-2)}$	0.0030	0.0018	0.0005	-0.0018	-0.0035
	(0.0042)	(0.0013)	(0.0010)	(0.0014)	(0.0025)
$FinRef_{(t-2)}$	0.0578***	0.0239***	0.0198***	0.0183***	0.0248**
	(0.0141)	(0.0070)	(0.0050)	(0.0049)	(0.0114)
$FinDev_{(t-2)}$	0.0043	0.0027	-0.0004	-0.0025*	-0.0079***
	(0.0047)	(0.0017)	(0.0009)	(0.0013)	(0.0030)
$FinRef_{(t-2)}$	0.0508***	0.0208***	0.0236***	0.0292***	0.0415***
	(0.0170)	(0.0067)	(0.0044)	(0.0055)	(0.0117)

Notes: Columns (1)-(5) report the findings for selected quantiles based on the FEQR model where we introduce two-period lags. We lag $lagGDP_{pc}$ and *FinDev* in rows (1)-(2), $lagGDP_{pc}$, *FinDev* and *FinRef* in rows (3)-(4) and all regressors in rows (5)-(6). Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

[27] A similar approach is followed by Martínez-Zarzoso et al. (2017) where the variable of interest is lagged two periods to handle possible endogeneity in a panel quantile regression framework.

Table 15: Lagged regressors: the case of MMQR

Dependent variable: GDPpc growth	(1) q_{05}	(2) q_{25}	(3) q_{50}	(4) q_{75}	(5) q_{95}
$FinDev_{(t-2)}$	0.0022	0.0011	0.0005	0.0000	-0.0007
	(0.0048)	(0.0028)	(0.0023)	(0.0024)	(0.0034)
$FinRef$	0.0541***	0.0425***	0.0360***	0.0308***	0.0233**
	(0.0174)	(0.0104)	(0.0084)	(0.0085)	(0.0115)
$FinDev_{(t-2)}$	0.0006	0.0000	-0.0003	-0.0006	-0.0009
	(0.0049)	(0.0029)	(0.0024)	(0.0026)	(0.0037)
$FinRef_{(t-2)}$	0.0329**	0.0291***	0.0271***	0.0255***	0.0231**
	(0.0154)	(0.0101)	(0.0086)	(0.0088)	(0.0109)
$FinDev_{(t-2)}$	0.0019	0.0002	-0.0008	-0.0015	-0.0025
	(0.0063)	(0.0032)	(0.0022)	(0.0025)	(0.0041)
$FinRef_{(t-2)}$	0.0309*	0.0315***	0.0319***	0.0322***	0.0325***
	(0.0185)	(0.0116)	(0.0095)	(0.0096)	(0.0121)

Notes: Columns (1)-(5) report the findings for selected quantiles based on the MMQR model where we introduce two-period lags. We lag $lagGDP_{pc}$ and $FinDev$ in rows (1)-(2), $lagGDP_{pc}$, $FinDev$ and $FinRef$ in rows (3)-(4) and all regressors in rows (5)-(6). Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

6 Concluding Remarks

We investigate the importance of financial development and financial reforms in explaining economic growth under alternative quantile regression approaches. By accounting for unobserved heterogeneity and handling possible endogeneity concerns, we find that financial reforms are important determinants of growth and that their effect is greater at lower quantiles of the conditional distribution of economic growth. Financial development contributes to economic growth, however, the magnitude and significance of the effect are subject to different specifications. We investigate seven different components of financial reforms and we show that each of them responds heterogeneously in the growth process. The aforementioned effects vary across different income groups of countries. Overall, banking supervision and securities markets' regulations are found to be vital components of financial reforms for economic growth. The importance of banking supervision on economic growth is consistent with the results of Demetriades & Rousseau (2016) and Neanidis (2019). The importance of the securities markets, such as stock markets, is well-documented in the literature (e.g., Levine, 1991 and Levine & Zervos, 1998). Our findings are consistent with previous literature supporting the role of liberalization of the financial sector on boosting economic growth (e.g., Bekaert et al., 2005) while at the same time they enhance our understanding of the reforms-growth nexus. As regards the role of financial development on economic growth our findings corroborate previous evidence suggesting that its effect varies across countries (e.g., Rousseau & Wachtel, 2011) and different stages of economic development (e.g., Deidda & Fattouh, 2002 and Sahay et al., 2015). Although the majority of financial reforms' components is found to be positively associated with economic growth,

the easing of banking entry restrictions could lead to negative effects (the latter is found statistically significant only in high-income countries). This is in line with a strand of literature suggesting that banking competition is not helpful for economic growth as a more concentrated banking sector can finance firms which are more risky by nature, such as more oriented technological firms (see Petersen & Rajan, 1995 and Di Patti & Dell'Ariccia, 2004, among others).[28]

Our research suggests some policy implications. First, economic policy for enhancing economic growth through the financial system could be formulated through financial reforms rather than financial development (i.e., financial reforms are found to be more important determinants of growth than financial development). Second, policymakers, before implementing any policy-measure related to the financial system, could take into account the level of economic growth of a country. (i.e., the presence of parameter heterogeneity across different quantiles of the conditional distribution could mean that countries respond differently with respect to their relative growth level). Third, decision-making could be oriented towards specific income-groups of countries (i.e., financial liberalization appeared to contribute more to economic growth in low-income countries for the entire conditional distribution, while financial development found positive for high-income countries at lower quantiles of the distribution). Finally, policymakers should take into account that not all the components of financial reforms can promote economic growth. More precisely, it seems that banking supervision and the promotion of stock-bond markets and of other alternative than the official banking system financial structures could be the most growth promoting factors. In addition, liberalization policies on credit controls and reserve requirements, banking supervision and the easing of restrictions on capital account flows could also be driving factors of economic growth. On the other hand, the elimination of banking entry barriers could negatively affect economic growth. Since our sample is restricted to the period 1973-2005, the aforementioned policy implications should be put into the context of the period analyzed. Nonetheless, in the majority of the countries, financial reforms have been implemented within the period of our analysis. In addition, our findings tend toward the same direction when we consider more recent data. Therefore, our findings could be promising for an effective policy design in the future.

The current paper has shown that there is a heterogeneous effect of financial development and financial reforms across different groups of countries which have been categorized according to their degree of development. Therefore, since economic development is determined by the degree of the institutional quality, for future research it would be interesting to analyze the interrelationship that may exist between the institutional quality and the different types of financial reforms and how this relation can determine economic growth.

[28] We have examined the finance-growth nexus across a number of dimensions (i.e., various econometric contexts, different components of financial reforms, different groups of countries). It is quite common in empirical analyses to split the sample into sub-periods and check whether the results are driven by specific time periods. Given the asymptotic properties of quantile regression estimators, any reduction of the observations of the sample could affect the reliability and the consistency of the findings. To this end, as stated in Section 3, all specifications include specific-time effects that capture all time-variant shocks and effects.

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Appendix

Table A1: List of countries

Classification	Countries
Low-Income group:	Albania, Algeria, Bangladesh, Bolivia, Cameroon, China, Colombia, Cote d'Ivoire, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Ghana, Guatemala, India, Indonesia, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Morocco, Mozambique, Nepal, Nicaragua, Pakistan, Paraguay, Peru, Philippines, Senegal, Sri Lanka, Tanzania, Thailand, Tunisia, Uganda, Ukraine, Vietnam, Zimbabwe.
High-Income group:	Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Jamaica, Japan, Korea, Rep., Latvia, Lithuania, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States, Uruguay, Venezuela, RB.

Notes: Countries are classified into low-income (includes low- and lower-middle income) and high-income (includes upper-middle and high-income) based on the Atlas Method of the World Bank in 2005.

Table A2: Correlation matrix

	$lag\text{GDP}_{pc}$	*FinDev*	*FinRef*	*Capital*	*Schooling*	*GovSize*	*Openness*	*BankCrisis*
FinDev	0.63							
FinRef	0.54	0.41						
Capital	0.23	0.34	0.04					
Schooling	0.74	0.42	0.69	0.12				
GovSize	0.47	0.34	0.29	0.11	0.42			
Openness	0.18	0.18	0.35	0.22	0.23	0.24		
BankCrisis	-0.06	-0.06	-0.04	-0.14	-0.02	-0.01	-0.04	
Liberty	-0.73	-0.39	-0.43	-0.07	-0.65	-0.38	-0.05	0.06

Table A3: Results using the FEQR: Updated sample

Dependent variable: GDPpc growth	(1) q_{05}	(2) q_{25}	(3) q_{50}	(4) q_{75}	(5) q_{95}
$lagGDP_{pc}$	-0.0433***	-0.0371***	-0.0360***	-0.0357***	-0.0362***
	(0.0034)	(0.0015)	(0.0012)	(0.0015)	(0.0028)
FinDev	0.0074*	0.0014	-0.0009	-0.0026	-0.0097***
	(0.0043)	(0.0016)	(0.0012)	(0.0017)	(0.0030)
FinRef	0.0766***	0.0264***	0.0199***	0.0189***	0.0331***
	(0.0182)	(0.0071)	(0.0050)	(0.0058)	(0.0125)
Capital	0.0563***	0.0478***	0.0435***	0.0411***	0.0379***
	(0.0086)	(0.0046)	(0.0033)	(0.0034)	(0.0086)
Schooling	-0.0011	0.0006	0.0007**	0.0006	0.0003
	(0.0012)	(0.0004)	(0.0003)	(0.0005)	(0.0012)
GovSize	-0.0304***	-0.0283***	-0.0247***	-0.0262***	-0.0275***
	(0.0064)	(0.0029)	(0.0017)	(0.0031)	(0.0062)
Openness	0.0035	0.0123***	0.0128***	0.0129***	0.0171***
	(0.0036)	(0.0015)	(0.0011)	(0.0017)	(0.0037)
BankCrisis	-0.0438***	-0.0176***	-0.0137***	-0.0134***	-0.0146***
	(0.0107)	(0.0039)	(0.0023)	(0.0024)	(0.0037)
Liberty	-0.0059***	-0.0020**	0.0003	0.0009	0.0018
	(0.0021)	(0.0008)	(0.0008)	(0.0009)	(0.0015)
Observations	2,629	2,629	2,629	2,629	2,629
Countries	81	81	81	81	81

Notes: Columns (1)-(5) report the findings for selected quantiles based on the FEQR model using the updated index data. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively. All regressions include a constant term and time dummies.

Table A4: Results using the MMQR: Updated sample

Dependent variable:	(1)	(2)	(3)	(4)	(5)
GDPpc growth	q_{05}	q_{25}	q_{50}	q_{75}	q_{95}
$lagGDP_{pc}$	-0.0617***	-0.0449***	-0.0360***	-0.0286***	-0.0180**
	(0.0161)	(0.0108)	(0.0084)	(0.0075)	(0.0086)
FinDev	-0.0007	-0.0010	-0.0012	-0.0014	-0.0016
	(0.0066)	(0.0042)	(0.0033)	(0.0029)	(0.0032)
FinRef	0.0536***	0.0391***	0.0314***	0.0251***	0.0159*
	(0.0174)	(0.0108)	(0.0084)	(0.0078)	(0.0097)
Capital	0.0817***	0.0573***	0.0445***	0.0338***	0.0184*
	(0.0102)	(0.0069)	(0.0067)	(0.0074)	(0.0096)
Schooling	0.0025	0.0009	0.0000	-0.0007	-0.0017
	(0.0033)	(0.0019)	(0.0017)	(0.0019)	(0.0028)
GovSize	-0.0240**	-0.0250***	-0.0256***	-0.0260***	-0.0267***
	(0.0109)	(0.0073)	(0.0063)	(0.0063)	(0.0077)
Openness	-0.0053	0.0065	0.0128**	0.0180***	0.0254***
	(0.0108)	(0.0070)	(0.0061)	(0.0064)	(0.0082)
BankCrisis	-0.0268***	-0.0209***	-0.0178***	-0.0152***	-0.0115***
	(0.0069)	(0.0040)	(0.0026)	(0.0023)	(0.0033)
Liberty	-0.0040	-0.0017	-0.0006	0.0004	0.0019
	(0.0029)	(0.0016)	(0.0013)	(0.0013)	(0.0020)
Observations	2,629	2,629	2,629	2,629	2,629
Countries	81	81	81	81	81

Notes: Columns 1-5 report the findings for selected quantiles based on the MMQR model using the updated index data. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively. All regressions include a constant term and time dummies.

Table A5: Decomposition of Financial Reforms: FEQR, updated sample

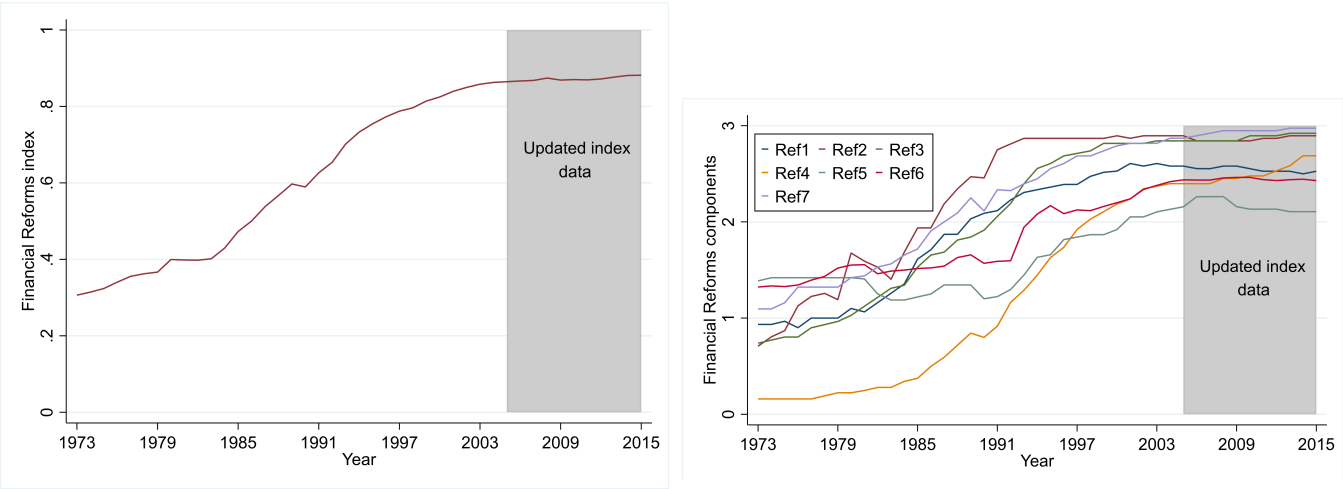
	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Q	*FinDev*	Ref_1	*FinDev*	Ref_2	*FinDev*	Ref_3	*FinDev*	Ref_4	*FinDev*	Ref_5	*FinDev*	Ref_6	*FinDev*	Ref_7
q_{05}	0.0083*	0.0091***	0.0089**	0.0056**	0.0077*	0.0009	0.0049	0.0091**	0.0093**	0.0044*	0.0064	0.0054*	0.0070	0.0105***
	(0.0043)	(0.0023)	(0.0044)	(0.0027)	(0.0044)	(0.0028)	(0.0045)	(0.0036)	(0.0043)	(0.0024)	(0.0046)	(0.0029)	(0.0044)	(0.0035)
q_{25}	0.0021	0.0031***	0.0021	0.0016	0.0017	-0.0004	0.0009	0.0049***	0.0017	0.0013	0.0013	0.0017	0.0015	0.0081***
	(0.0015)	(0.0011)	(0.0015)	(0.0012)	(0.0015)	(0.0012)	(0.0015)	(0.0013)	(0.0015)	(0.0009)	(0.0015)	(0.0012)	(0.0015)	(0.0016)
q_{50}	-0.0006	0.0015	-0.0005	0.0004	-0.0004	0.0001	-0.0010	0.0038***	-0.0004	0.0010	-0.0009	0.0016*	-0.0001	0.0069***
	(0.0012)	(0.0010)	(0.0011)	(0.0010)	(0.0011)	(0.0009)	(0.0011)	(0.0011)	(0.0011)	(0.0008)	(0.0011)	(0.0009)	(0.0012)	(0.0013)
q_{75}	-0.0024	0.0004	-0.0026	0.0009	-0.0028*	0.0004	-0.0031**	0.0045***	-0.0023	0.0005	-0.0025	0.0015	-0.0033**	0.0060***
	(0.0016)	(0.0011)	(0.0016)	(0.0010)	(0.0016)	(0.0014)	(0.0015)	(0.0016)	(0.0017)	(0.0010)	(0.0016)	(0.0010)	(0.0016)	(0.0015)
q_{95}	-0.0078***	-0.0008	-0.0091***	0.0004	-0.0092***	0.0031	-0.0098***	0.0055**	-0.0085***	0.0015	-0.0106***	0.0044**	-0.0083***	0.0092***
	(0.0028)	(0.0020)	(0.0028)	(0.0025)	(0.0028)	(0.0026)	(0.0028)	(0.0027)	(0.0033)	(0.0018)	(0.0028)	(0.0020)	(0.0026)	(0.0028)

Notes: Columns (1)-(7) report the findings for selected quantiles for different components of financial reforms based on the FEQR model for the updated sample (obs=2,629). Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table A6: Decomposition of Financial Reforms: MMQR, updated sample

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Q	*FinDev*	Ref_1	*FinDev*	Ref_2	*FinDev*	Ref_3	*FinDev*	Ref_4	*FinDev*	Ref_5	*FinDev*	Ref_6	*FinDev*	Ref_7
q_{05}	0.0004	0.0057**	0.0008	0.0030	0.0006	0.0010	-0.0004	0.0094***	0.0004	0.0058*	0.0001	0.0051	0.0006	0.0091**
	(0.0067)	(0.0024)	(0.0067)	(0.0026)	(0.0068)	(0.0027)	(0.0064)	(0.0035)	(0.0067)	(0.0031)	(0.0068)	(0.0032)	(0.0067)	(0.0040)
q_{25}	-0.0003	0.0038**	0.0001	0.0019	-0.0001	0.0007	-0.0009	0.0076***	-0.0002	0.0033*	-0.0005	0.0036*	-0.0002	0.0082***
	(0.0043)	(0.0017)	(0.0043)	(0.0015)	(0.0043)	(0.0018)	(0.0041)	(0.0024)	(0.0043)	(0.0019)	(0.0044)	(0.0019)	(0.0043)	(0.0025)
q_{50}	-0.0007	0.0027*	-0.0003	0.0012	-0.0004	0.0005	-0.0011	0.0065***	-0.0006	0.0020	-0.0007	0.0028**	-0.0006	0.0077***
	(0.0033)	(0.0014)	(0.0033)	(0.0013)	(0.0033)	(0.0016)	(0.0031)	(0.0022)	(0.0033)	(0.0016)	(0.0034)	(0.0014)	(0.0033)	(0.0020)
q_{75}	-0.0010	0.0019	-0.0006	0.0007	-0.0007	0.0004	-0.0014	0.0057***	-0.0009	0.0009	-0.0010	0.0022*	-0.0010	0.0073***
	(0.0029)	(0.0013)	(0.0029)	(0.0013)	(0.0029)	(0.0018)	(0.0028)	(0.0022)	(0.0029)	(0.0015)	(0.0029)	(0.0012)	(0.0029)	(0.0020)
q_{95}	-0.0014	0.0006	-0.0011	-0.0001	-0.0012	0.0002	-0.0017	0.0044*	-0.0013	-0.0006	-0.0013	0.0012	-0.0015	0.0067***
	(0.0032)	(0.0015)	(0.0032)	(0.0019)	(0.0033)	(0.0023)	(0.0032)	(0.0026)	(0.0033)	(0.0019)	(0.0032)	(0.0016)	(0.0032)	(0.0025)

Notes: Columns (1)-(7) report the findings for selected quantiles for different components of financial reforms based on the MMQR model for the updated sample (obs=2,629). Estimates are corrected using Jackknife bias corrections. Only the coefficients of financial development and financial reforms are presented. Bootstrapped standard errors clustered at the country level using 999 repetitions are in parentheses. ***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.



(a) Aggregate Financial Reforms index (mean)

(b) Financial Reforms components (mean)

Figure A1: The evolution of Financial Reforms, 38 countries, updated index