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The finance and growth nexus revisited☆

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HIGHLIGHTS

- Credit expansion has a positive output growth effect only up to a point.
- Beyond the threshold the impact of finance on growth vanishes.
- The non-linearity may stem from the omission of factors not considered so far.
- The omitted factors may have negative growth effects in mature financial sectors.
- Such factors include financial cycles and banks' non-intermediation activities.

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ABSTRACT

We find that an expansion of credit has a positive effect on per capita output growth only up to a point. Beyond this threshold the impact of finance on growth is not statistically significant anymore. We show, however, that the estimated non-linear relationship may stem from the omission of factors not considered in the literature so far. These factors may have a negative impact on growth in mature financial systems, and include the magnitude of financial cycles as well as the importance of non-intermediation activities in banks' business models.

1. Introduction

Since the seminal contribution of King and Levine (1993) a large body of empirical literature has shown that financial development exhibits a positive impact on growth.[1] Several recent cross-country studies have re-examined this relationship finding that finance indeed fosters growth, but only up to a point beyond which this positive effect vanishes. However, the possible sources of this non-linearity have not been addressed in this literature yet.[2]

Theory and recent experience suggest a number of possible mechanisms through which a non-linear effect of finance on growth may arise. First, intermediaries may build up excessive leverage in mature financial sectors, possibly accentuated by the ample availability of capital market funding (Rajan, 2006). In such an environment, an economy might experience more financial sector-induced fluctuations with protracted recoveries after crises and balance sheet recessions that dampen growth systematically (Rong et al., 2010). Second, large financial sectors may progressively rely on business models that are based on proprietary trading and other non-interest income generating activities, which might have a smaller effect on economic growth than the traditional intermediation of savings to productive investment (Turner, 2010; Beck et al., 2013). Third, mature financial systems may develop complex financial instruments whose opaqueness allows informed agents to extract rents from investors, leading to an over-allocation of human capital to the financial sector; as a result, research and development in the non-financial sector is reduced and growth slows down (Tobin, 1984; Philippon, 2010). Fourth, the progressive share of loans extended to households instead of firms in more mature financial sectors may fail to foster growth, as the

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1 See, Rajan and Zingales (1998), Levine and Zervos (1998), Beck et al. (2000), and Wurgler (2000). For a survey of the literature see Levine (2005).

2 See Favara (2003), Rioja and Valev (2004), Panizza et al. (2012), and Cecchetti and Kharroubi (2012). Manganelli and Popov (2013) study the underlying channels using industry-level data.

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Table 1
Descriptive statistics.

Variable	# obs	Mean	Std. dev.	Min	Max
Private credit rel. to GDP	575	0.47	0.43	0.00	2.23
Stock market cap. rel. to GDP	393	0.44	0.54	0.00	4.81
Bank credit to deposits	573	1.00	0.58	0.10	5.77
Financial sector assets rel. to GDP	575	0.59	0.52	0.00	3.16
Financial reform index	362	0.66	0.25	0	1
Banking crisis dummy	575	0.09	0.20	0	1
Value added share	401	0.05	0.03	0.01	0.27
Researchers per million people	204	6.69	1.58	2.05	8.96
Household credit share	130	0.37	0.14	0.02	0.62

financing is used for consumption rather than investment (Beck et al., 2012). Fifth, while reducing distortionary state intervention generally fosters the development of financial markets, recent experiences in many countries suggest that excessive deregulation may increase the frequency of boom and bust cycles (Rajan, 2006).

In this paper, we complement the existing empirical literature by examining whether the failure to control for such features of countries' financial systems in cross-country panel regressions may be responsible for the finding of a non-linear effect of finance on growth. Our results suggest that the non-linear relationship may partly be explained by the omission of financial variables reflecting the magnitude of financial cycles and the importance of non-intermediation, but not so much by the increase in household relative to corporate lending and the extent of financial sector deregulation.

2. Empirical strategy

We estimate dynamic panel regressions of output on a number of standard growth determinants including financial system characteristics. The model we estimate is given by

$$y_{it} = \alpha y_{i,t-1} + \beta \boldsymbol{x}_{it} + \pi_1 w_{it} + \pi_2 w_{it}^2 + \gamma_1 z_{it} + \mu_i + \lambda_t + u_{it}, \quad (1)$$

where the dependent variable y_{it} is the logarithm of real GDP per capita in PPP-adjusted US dollars, and the explanatory variables $\boldsymbol{x}_{it}$ include the rate of inflation, years of secondary schooling, government consumption and trade (imports plus exports) relative to GDP.[3] Our explanatory variable of interest w_{it} is the ratio of private credit by deposit money banks relative to GDP, which is entered in linear as well as in squared terms in order to allow for a non-linear effect of finance on growth. We also include time and country-fixed effects in order to account for common factors and unobservable, time-invariant, country-specific effects on output. Finally, we include additional financial system characteristics z_{it} as controls in order to address possible omitted variable bias that may be driving the finding of a non-linear effect of finance on growth.[4]

Specifically, we consider the inclusion of (i) stock market capitalisation, bank credit relative to deposits and a banking crisis dummy in order to examine whether the existence of more pronounced financial cycles in mature financial systems may account for the non-linear effects of finance on growth; (ii) the financial sector's share in total value added and financial sector total assets in order to test whether financial firms increasingly engaging in non-intermediation activities reduces their growth-promoting potential; (iii) the number of researchers per million people to address that the existence of rents in more complex financial systems might drain human capital from other sectors in the economy and thereby hamper productivity growth; (iv) an index of financial reform to capture whether excessive deregulation and risk-taking may be responsible for the non-linearity in the finance–growth nexus; (v) the share of household credit in total credit to investigate whether the declining growth effects stem from finance becoming less a facilitator for the accumulation of productive physical capital.

Our sample features data on up to 132 countries and spans the time period from 1980 to 2005. As is standard in the empirical growth literature, we purge business cycle frequencies from the data by using five-year averages. Table 1 provides summary statistics of the financial system characteristics we use in the regressions. Due to the resulting small time-series dimension and the presence of the lagged dependent variable in Eq. (1), it is well known that the dynamic fixed effects estimator is biased. Therefore, we resort to system GMM estimation (see Blundell and Bond (1998)).[5] The GMM approach also allows us to account for the possibility that the explanatory variables might not be exogenous or predetermined. Importantly, we pay careful attention to limit the instrument count in order to avoid problems stemming from excessive instrument proliferation, such as over-fitting, weakened tests for over-identifying restrictions, biased two-step variance estimators and imprecise estimates of the optimal weighting matrix (see Roodman, 2009a,b).

3. Results

Table 2 presents our results for the estimation of the coefficients π_1 and π_2 from Eq. (1) for our baseline model as well as a number of alternative specifications with one additional explanatory variable included at a time. Table 2 also reports the associated coefficient estimates for γ_1. In addition to coefficient estimates, Table 2 also reports the number of instruments that were used, the p-values for the tests of second-order residual serial correlation, and the Hansen test for the validity of over-identifying restrictions. Finally, Table 2 also reports the values of the implied thresholds beyond which a further expansion of credit does not foster growth any longer. Notice that we also calculate the implied thresholds of the baseline model specification using the restricted sample of the extended model. Overall, the diagnostics suggest that the models are correctly specified. Moreover, the number of instruments is reasonably small, mitigating concerns that excessive instrument proliferation could compromise the reliability of the estimation results.

All coefficient estimates are consistent with a non-linear effect of finance on growth across specifications. In the baseline specification, we find that an expansion of credit beyond 109% of GDP does not foster growth anymore.[6] While the estimates in the specifications with additional financial variables are not

[3] See Barro (1998) for a discussion of these standard growth regressions.

[4] A description of the data sources can be found in the Appendix.

[5] The dependent variable, the logarithm of GDP per capita, is highly persistent so that the GMM estimator introduced by Arellano and Bond (1991) is likely to suffer from weak instrument problems.

[6] Our threshold estimate is very similar to that in Panizza et al. (2012) of 100% of GDP.