



Financial dependence, global growth opportunities, and growth revisited[☆]



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HIGHLIGHTS

- We analyze non-linearities in the finance-and-growth nexus.
- We find that financial development has a non-monotonic effect on industry growth.
- Beyond a threshold, finance-dependent industries grow relatively more slowly.
- 6+ countries in [Rajan and Zingales \(1998\)](#) and [Fisman and Love \(2007\)](#) lie beyond threshold.
- Results call for studying mechanisms rather than for downsizing the financial sector.

ARTICLE INFO

Article history:

Received 17 August 2012

Received in revised form

19 March 2013

Accepted 1 April 2013

Available online 11 April 2013

JEL classification:

O4

G1

Keywords:

Financial markets

Growth

Non-linearities

ABSTRACT

We show that financial development has a non-monotonic effect on growth in the [Rajan and Zingales \(1998\)](#) and [Fisman and Love \(2007\)](#) sample. Beyond a threshold, financially dependent industries and industries facing good growth opportunities grow disproportionately more slowly.

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1. Introduction

A large empirical literature dating back to [King and Levine \(1993\)](#)¹ has provided ample evidence that financial development affects economic growth in a positive, monotonic way. While few have questioned the positive effect financial markets exert on growth, a growing body of empirical work has recently cast doubts on the claim that this effect is monotonic. Using a variety of samples, time periods, and empirical methods, [Deidda and Fattouh](#)

(2002), [Rioja and Valev \(2004\)](#), and [Shen and Lee \(2006\)](#) have found that in general, the relationship between financial development and economic growth is non-linear: when of moderate size, financial markets strongly promote growth, but when too large, their effect on growth weakens and may even turn negative.

The recent global financial crisis certainly lends credibility to this claim. However, existing empirical studies have analyzed country-level dataset. Such an approach is prone to well-known endogeneity concerns: both financial development and growth could be driven by any of a long list of common omitted variables that financial sector development could merely be a proxy of, or financial markets may predict economic growth simply because they anticipate future growth. Any resulting bias will cast doubts on the non-linearity of the effect as well.

In this paper, we complement this strand of literature by extending the empirical method first suggested by [Rajan and Zingales \(RZ; 1998\)](#). The method rests on a cross-industry cross-country regression approach instead of on a cross-country one, and thus

[☆] We thank Raghu Rajan and Luigi Zingales for sharing their data with us. The opinions expressed herein are those of the authors and do not necessarily reflect those of the ECB or the Eurosystem.

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¹ For a recent survey, see [Levine \(2005\)](#).

Table 1
Financial dependence, global growth opportunities, and growth: non-linearities.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Industry share	−0.897*** (0.240)	−0.887*** (0.248)	−0.901*** (0.245)	−0.914*** (0.233)	−0.892*** (0.247)	−0.916*** (0.238)
Financial dependence × Domestic credit to private sector	0.518** (0.207)		0.262 (0.226)	0.743** (0.249)		0.481 (0.308)
Financial dependence × Domestic credit to private sector squared	−0.440** (0.195)		−0.233 (0.215)	−0.654*** (0.233)		−0.438 (0.290)
Growth opportunities × Domestic credit to private sector		6.886** (3.014)	4.723 (3.589)		8.367*** (2.911)	4.385 (3.614)
Growth opportunities × Domestic credit to private sector squared		−5.748** (2.863)	−3.825 (3.450)		−7.201*** (2.775)	−3.555 (3.463)
Observations	1217	1217	1217	1217	1217	1217
R ²	0.30	0.30	0.30	0.29	0.30	0.28
Panel B						
Industry share	−0.902*** (0.243)	−0.896*** (0.245)	−0.912*** (0.246)	−0.755*** (0.251)	−0.742*** (0.273)	−0.745*** (0.264)
Financial dependence × Financial development	0.137* (0.083)		0.038 (0.090)	0.596*** (0.226)		0.206 (0.251)
Financial dependence × Financial development squared	−0.038 (0.038)		−0.004 (0.041)	−0.332** (0.134)		−0.100 (0.145)
Growth opportunities × Financial development		2.095* (0.726)	1.809 (1.487)		9.481*** (3.575)	7.586* (4.249)
Growth opportunities × Financial development squared		−0.620 (0.584)	−0.607 (0.682)		−5.492*** (2.159)	−4.548* (2.553)
Observations	1217	1217	1217	1217	1217	1217
R ²	0.29	0.30	0.30	0.23	0.19	0.19

Note: The dependent variable is the annual compounded growth rate in real value added for the period 1980–1990 for each of 36 3-digit ISIC industry in each of 41 countries in the [Rajan and Zingales \(RZ; 1998\)](#) and [Fisman and Love \(FL; 2007\)](#) dataset. 'Industry share' is the beginning-of-period share of a particular industry out of total manufacturing in a particular country. 'Financial dependence' is the industry median fraction of capital expenditures not financed with internal funds for mature COMPUSTAT companies during 1980–1990, from RZ. 'Growth opportunities' is the industry median growth in real sales for mature COMPUSTAT companies during 1980–1990, from FL. 'Domestic credit to private sector' is the beginning-of-period ratio of domestic credit held by monetary authorities and depositary institutions to GDP. 'Financial development' is the sum of 'Domestic credit to private sector' and the beginning-of-period ratio of stock market capitalization to GDP. Heteroskedasticity robust standard errors reported in parentheses.

* Indicates significance at the 10% level.

** Indicates significance at the 5% level.

*** Indicates significance at the 1% level.

allows us to exploit the specific mechanisms through which financial markets affect economic growth, strengthening the causality claim. Using this approach, RZ find that by alleviating problems related to adverse selection and moral hazard, financial markets exert a relatively stronger effect on the growth of industries that are naturally dependent on external finance. In a complementary paper, [Fisman and Love \(FL; 2007\)](#) argue that financial development increases resource allocation to firms with good growth opportunities. They augment the original RZ dataset with a measure of global growth opportunities and find that financial development has a relatively stronger effect on growth in industries facing higher such opportunities.

Using the RZ–FL sample, we find strong evidence of threshold effects: for example, beyond a private credit-to-GDP ratio of around 0.57–0.60, a further expansion of the financial sector is associated with a relatively weaker effect on growth in industries with stronger financial dependence and/or higher growth opportunities. The results are broadly confirmed when the legal origin of countries is used as an instrument for financial development in the spirit of [La Porta et al. \(1998\)](#). Our findings are empirically important: in the RZ–FL sample, at least 6 and as many as 13 of the 41 countries have levels of financial development beyond the estimated threshold.

The literature has so far highlighted at least two possible reasons for the non-linear effect of finance on growth. First, as the financial sector grows too large and complex, financial intermediaries take on more risk, exposing economies to financial sector-induced fluctuations ([Rajan, 2006](#)). Second, an excessively large financial industry may lead to a misallocation of human capital to

the financial sector, resulting in an overall decrease in labor productivity in the real sector ([Tobin, 1984](#); [Philippon, 2010](#)).

2. Empirical strategy

In a simple extension to the RZ–FL framework, we add a quadratic term to the standard cross-industry cross-country regression where data on value added for each industry–country pair and on financial development for each country has been averaged over the sample period:

$$\begin{aligned}
 Growth_{ic} = & \alpha_i + \alpha_c + \gamma \times Share_{ic} + \beta_1 \times FD_i \times Fin_c \\
 & + \beta_2 \times FD_i \times Fin_c^2 + \beta_3 \times GO_i \times Fin_c \\
 & + \beta_4 \times GO_i \times Fin_c^2 + \varepsilon_{ic}.
 \end{aligned} \quad (1)$$

The specification is similar to the one used in [Shen and Lee \(2006\)](#), but adapted for a cross-country cross-industry analysis. $Growth_{ic}$ is the annual compounded growth rate in real value added for industry i in country c over the sample period. α_i and α_c are industry and country fixed effects, respectively. $Share_{ic}$ is the beginning-of-period share in total manufacturing of industry i in country c . FD_i is RZ's benchmark industry dependence on external finance, proxied by the industry median value of the sum across years of total capital expenditures minus cash flow from operations, divided by capital expenditures, for mature Compustat firms. GO_i is FL's benchmark industry growth opportunities, proxied by the annual compounded growth rate of industry i in the US over the sample period. Finally, Fin_c is the beginning-of-period value of any of two proxies for financial sector size in

country *c*: either the ratio of private credit to GDP, or of the sum of the ratio of private credit to GDP and the ratio of stock market capitalization to GDP. By including the two sets of fixed effects, we fully absorb the effect of any unobservable confounding factor that may be precluding identification. This minimizes the risk that our estimates are driven by reverse causality or by omitted variable bias. In this specification, finance would have a non-monotonic effect on growth if $\beta_1 > 0$ but $\beta_2 < 0$, and if $\beta_3 > 0$ but $\beta_4 < 0$.

The data on financial sector size used in this paper, by country, are summarized in Table 2 in RZ. For the data on external financial dependence and growth opportunities, by industry, see Table 2 in FL.

3. Results

Table 1 presents the estimates of Model (1). In Column (1) of Panel A, we find that financial development has a non-monotonic effect on industry growth, the estimate on the quadratic term being negative. The threshold is given by $-\frac{\beta_1}{2\beta_2}$ and implies that in countries with a ratio of private credit to GDP of more than 0.589, a further expansion in credit results in industries dependent on external finance growing more slowly than industries not dependent on external finance. There are 6 such countries in the sample implying that the threshold is not a theoretical one.² The estimates in Column (2) yield a similar threshold (0.599) when industries are distinguished by their global growth opportunities. When we include interactions with both external dependence and growth opportunities in Column (3), the non-monotonic effect of finance is statistically weakened.³ When in Columns (4)–(6) we repeat the tests from (1) to (3) after having instrumented private credit and its interactions with dummies for country origin (see La Porta et al., 1998) and their interactions, we find that the significance of the interaction terms is even higher than in the OLS case (Columns (4) and (5)).

Panel B of Table 1 reports the estimates from the same fixed effect models where instead of credit to the private sector, we use the sum of credit to the private sector and of stock market capitalization as a proxy for financial development. The main results are broadly unchanged, and the estimates are even more consistently significant in the IV regressions (Columns (4)–(6)). Fully 13 countries have a level of financial development beyond the implied threshold in Column (6), $-\frac{\beta_1}{2\beta_2} = 0.834$.

4. Conclusion

This paper extends the existing literature on the non-linearities in the finance-and-growth nexus by employing a cross-country cross-industry analysis of the theoretical mechanisms underpinning the nexus. We find that financial development exerts a positive effect on the growth of sectors in need of external finance and of sectors facing good growth opportunities only up to a threshold. Beyond the threshold, the effect of finance becomes negative. For different empirical proxies for financial development, we find that between 6 and 13 of the 41 countries in the original RZ–FL dataset lie beyond that threshold.

These results do not necessarily call for an indiscriminate downsizing of the financial sector, as there might be other factors that influence the impact of finance on growth. For instance, the quality of property rights and law enforcement may also affect the optimal size of financial development so that countries with better institutional characteristics may thrive with larger financial sectors. A better understanding of the mechanisms via which an excessively large financial sector affects economic productivity is clearly needed.

References

- Deidda, L., Fattouh, B., 2002. Nonlinearity between finance and growth. *Economics Letters* 74, 339–345.
- Fisman, R., Love, I., 2007. Financial dependence and growth revisited. *Journal of the European Economic Association* 5, 470–479.
- King, R., Levine, R., 1993. Finance and growth: schumpeter might be right. *Quarterly Journal of Economics* 108, 717–737.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1998. Law and finance. *Journal of Political Economy* 106, 1113–1155.
- Levine, R., 2005. Finance and growth: theory, evidence, and mechanisms. In: Aghion, Philippe, Durlauf, Steve (Eds.), *The Handbook of Economic Growth*. North-Holland, Amsterdam, Netherlands.
- Philippon, T., 2010. Financiers vs. engineers: should the financial sector be taxed or subsidized? *American Economic Journal: Macroeconomics* 2, 158–182.
- Rajan, R., 2006. Has finance made the world riskier? *European Financial Management* 12, 499–533.
- Rajan, R., Zingales, L., 1998. Financial dependence and growth. *American Economic Review* 88, 559–586.
- Rioja, F., Valev, N., 2004. Does one size fit all? A reexamination of the finance and growth relationship. *Journal of Development Economics* 74, 429–447.
- Shen, C., Lee, C., 2006. Same financial development yet different economic growth—why? *Journal of Money, Credit and Banking* 38, 1907–1944.
- Tobin, J., 1984. On the efficiency of the financial system. *Lloyds Bank Review* 153, 1–15.

² These countries are Austria, Germany, Israel, Japan, Netherlands, and Spain.

³ Our results confirm the argument in FL, according to which financial dependence is simply a proxy for growth opportunities and it becomes insignificant once growth opportunities are properly accounted for.