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Non-linearities in the Relationship between Finance and Growth

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Abstract

This paper reviews the empirical literature on the links between finance and growth with a special focus on the empirical literature that has shown that the marginal contribution of financial depth to economic growth becomes negative in countries with large financial sectors (the "too much finance" result). It then assesses the empirical and theoretical validity of recent criticisms to this literature and concludes by discussing avenues for future research aimed at identifying the channels through which a very large financial sector can slow down economic growth.

Keywords: Financial development; Finance-growth Nexus; Too much finance
JEL Codes: G10, O16, F36, O40

*This article was prepared for a special issue of the *Revue d'Économie Financière*. I would like to thank Laurent Clerc for inviting me to write the paper. The article draws from joint work with Jean Louis Arcand and Enrico Berkes (Arcand et al., 2015a, 2015b) and on Panizza (2012, 2014). Therefore, there are substantial overlaps between certain sections of this article and the abovementioned papers. Email: Ugo.Panizza@graduateinstitute.ch.

1 Introduction

The idea that finance plays a key role in the process of economic development was central in the work of Bagehot (1873) and Schumpeter (1911). More recently, Levine (2005) described the four main mechanisms through which finance can promote economic development: pooling savings; facilitating exchange; improving capital allocation through the production of *ex ante* information about investment opportunities; and increasing investors' willingness to finance new projects through *ex post* monitoring.

However, Bagehot himself suggested that there can be decreasing returns to finance: "If such a man [a banker] is very busy, it is a sign of something wrong. Either he is working at detail, which subordinates would do better ... or he is engaged in too many speculations" (Bagehot, 1873, p. 214). The possible social costs of very large financial sectors have also been emphasized by Minsky (1974), Kindleberger (1978), and Tobin (1984).

Minsky (1974) and Kindleberger (1978) suggested that the process of financial deepening may increase macroeconomic volatility. They wrote extensively about financial instability and financial manias. More recently, Rajan (2005) suggested that financial markets can become victims of their own success. In an article that was controversial in 2005 (see the discussions by Kohn, 2005 and Summers, 2005) but looks almost prophetic after the global financial crisis, Rajan argued that the longer financial systems prove to be reliable, the more demands will be placed on their services. In this situation, the process of financial deepening may lead to a large and complicated financial system and to an accumulation of vulnerabilities that may then result into a "catastrophic meltdown"

Tobin (1984), instead, focused on the possibility that a large financial system may lead to a misallocation of human resources. Specifically, he worried about the fact that the financial sector could "steal" talents from the productive sectors of the economy. Like Minsky (1974) and Kindleberger (1978), he was also worried that possible benefits (in terms of liquidity and price discovery) of a large financial sector could be more than compensated by the creation of useless or even harmful financial instruments. His solution to this problem was a transaction tax (which came to be known as "Tobin Tax") aimed at limiting the incentives to use financial instruments for pure speculative purposes.

This paper starts with a flash review of the empirical literature on the positive link between finance and growth, it then describes the empirical literature that has shown that the marginal contribution of financial depth to economic growth becomes negative when credit to the private sector surpasses 100 percent of GDP (the "too much finance" result), and assesses the robust-

ness of this finding. The paper concludes by describing the possible channels through which a large financial sector can slow down economic growth and by highlighting possible avenues for future research.

2 Finance is good for growth

This section provides a flash review of the empirical literature showing that finance has a positive effect on economic growth.[1]

Goldsmith (1969) was the first to empirically show the existence of a correlation between the size of the financial sector and long-run economic growth. He assembled data on the size (measured by total assets over GDP) of financial intermediaries for 35 countries over 1860-1963 and graphically showed that the size of the financial sector was positively correlated with economic growth. Goldsmith was aware that he could only prove correlation and made no claim that his measure of financial depth had a causal effect on economic growth.

After a nearly 25-year hiatus, empirical research on the link between finance and growth restarted in earnest in the early 1990s when King and Levine (1993) showed that the size of the financial sector in 1960 predicted economic growth, investment, and productivity growth over 1960-89, even after controlling for initial income, school enrollment, government consumption and trade openness. Along similar lines, Levine and Zervos (1998) showed that stock market liquidity (but not the size of the stock market) predicts GDP growth.

In two follow-up papers (Levine, Loayza, and Beck, 2000, and Beck, Levine, and Loayza, 2000), Levine and co-authors used different econometric techniques to show that financial depth causes growth. Specifically, Levine, Loayza, and Beck (2000) used cross-sectional data and legal origin as an instrument for financial depth to show that the exogenous component of financial development has a statistically significant effect on long-run growth. Beck, Levine, and Loayza (2000), instead, used panel data and a set of internal instruments based on lagged variables to show that there is a causal link going from financial depth to economic growth.

Rajan and Zingales (1998) provide further evidence of a causal link going from financial depth to economic growth by looking at the relative performance of different industrial sectors across countries. By checking whether financial development relaxes financing constraints, Rajan and Zingales test a specific mechanism through which finance may affect growth. They start by

[1] Readers should be aware that there is a vast literature on this topic. For comprehensive reviews see Levine (2005) and Beck (2011).

observing that industries that, for purely technological reasons, need more financial resources should do relatively better in countries with more developed financial sectors. Next, they use a difference in difference specification to show that the interaction between an industry-level index of financial needs and financial depth is positively correlated with industry-level value added growth. The Rajan and Zingales approach rules out reverse causality because there is no reason why the deviation between the average growth rate of the manufacturing sector and a given industry's growth rate should affect financial development in the country as a whole.

3 Too Much Finance?

In mid-2011, Jean Louis Arcand, Enrico Berkes and I first circulated a paper titled "Too Much Finance?" (Arcand et al., 2015a). The paper shows that the correlation between financial depth and economic growth becomes negative when credit to the private sector is close to 100 percent of GDP (the specific threshold depends on the estimation method and the specific sample).[2] While we were not the first to study the presence of non-linearities in the relationship between financial depth and growth, we were probably among the first (together with Cecchetti and Kharroubi, 2012) to do so in a systematic way. The paper has accumulated a good number of citations (more than 600 on Google Scholar at the time of writing) and the "too much finance" expression is now often used by journalists and policymakers.[3] A search on Google for "too much finance" shows that the number of hits jumps from 8 in 2010 to 52 in the year we first circulated our paper and surpasses 200 in 2016. In fact, the number of Google hits tracks the paper's citations in Google Scholar (Figure 1).

[2]The paper was first discussed in a VoxEU article in April 2011 http://voxeu.org/article/has-finance-gone-too-far, was then issued as an IMF working paper in June 2012 https://www.imf.org/external/pubs/ft/wp/2012/wp12161.pdf and eventually published in the Journal of Economic Growth in May 2015. In turn, the too much finance idea was based on a background note (Panizza, 2009) prepared for UNCTAD (2009).

[3]See, for Instance, "Warning: too much finance is bad for the economy" by The Economist (http://www.economist.com/blogs/buttonwood/2015/02/finance-sector-and-growth) (an article that, incidentally does not even cite the "Too much finance" paper), or Martin Wolf's Financial Times article titled "Why finance is too much of a good thing" (https://www.ft.com/content/64c2f03a-03a0-11e5-a70f-00144feabdc0). Or a "Too much finance?" question raised in the European Parliament (http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+WQ+E-2015-007727+0+DOC+XML+V0//EN&language=mt)

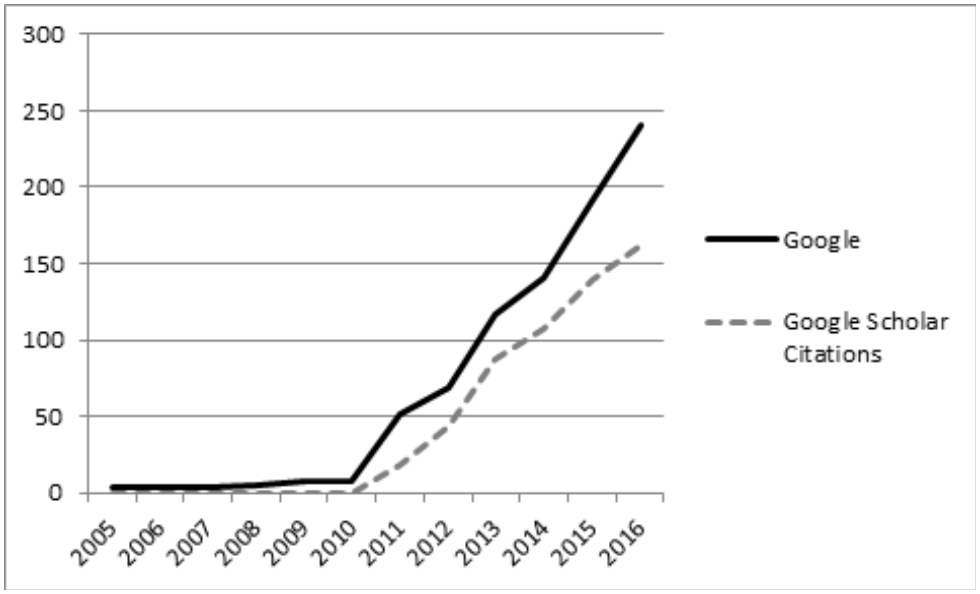

Figure1: Number of hits in Google for "too much finance" and citations of Arcand et al. in Google Scholar

De Gregorio and Guidotti (1995) were probably the first to empirically show that high income countries may have reached a point in which financial development no longer contributes to increasing the efficiency of investment. Specifically, they showed that that in high income countries financial depth is positively correlated with output growth over the 1960-1985 period, but that this result is not robust to dropping the 1960s. A similar result is the "vanishing effect" of Rousseau and Wachtel (2011). These authors show that the positive effect of finance on growth is not robust to using more recent data and suggest that the vanishing effect may be due to the financial crises which are often associated with rapid financial deepening.

Arcand et al. (2015a) and Cecchetti and Kharroubi (2012) provide an alternative explanation for the vanishing effect. Specifically, they check whether there are decreasing returns to financial deepening and test whether there is a point in which these decreasing returns become negative.

In Arcand et al. (2015a), we use different estimation techniques and types of data (pure cross section, cross-country panels, and industry-level data) and find that the relationship between financial development and economic growth is non-monotone. Our point estimates suggest that the marginal effect of financial depth on economic growth becomes negative when credit to the private sector reaches 100 percent of GDP (the exact threshold depends on the specification).

While we do not study the channels through which a large financial sector may reduce GDP growth, we conduct extensive robustness checks and also explore cross country heterogeneity. We find that the too much finance result is not driven by poor institutions, financial crises or macroeconomic volatility. We also find that there is no vanishing effect in our quadratic specification. In the last two decades there has been an increase in the number of countries where the size of the financial sector is above the too much finance threshold. As a consequence, the vanishing relationship between financial depth and growth identified by Rousseau and Wachtel's (2011) could be due to the fact that models that do not allow for non-monotonicity suffer from an omitted variable bias. Empirical work that uses data up to the 1990s does not pick up this misspecification because the sample does not include enough countries with a level of financial depth above the threshold.

An alternative explanation for the vanishing effect is that not all credit is created equal. Most theoretical models focus on how the financial system allocates credit to productive investment projects. However, households finance (especially mortgages) plays an important role in most countries (see, for instance Jordá et al., 2016). Using data for a sample of 45 countries, Beck et al. (2012) find that credit to households ranges between 20 and 85 percent of total credit to the private sector. They also show that, while there is a statistically significant correlation between economic growth and credit to enterprise, there is no significant correlation between economic growth and credit to households. It is thus possible that the "too much finance" result is really a "too much household finance" result. While in Arcand et al. (2015), we show that the too much finance result is robust to controlling for the share of household finance, data on household finance are limited in terms of country coverage and time periods. More research in this direction is required.

More importantly, credit to the private sector (the standard indicator of financial depth used in cross country regressions) is likely to be an imperfect indicator of financial development. Therefore, this measure cannot fully capture the various channels and mechanisms through which a well-developed financial system can support economic development (Beck 2015). If this is the case, we need new measures of financial development that can assess whether a country's financial system is appropriate for this country's institutional framework and macroeconomic environment. Attempts to build richer indicators of financial development that encompass a large number of structural and policy variables include Barajas et al. (2013), De la Torre et al. (2013), and IMF (2015).

Be as it may, the too much finance result showing that there is an inverted U-shaped relationship between credit to the private sector and economic

growth has proven to be robust and has now been corroborated by a large number of papers (Cecchetti and Kharroubi, 2012, 2015, Cournède and Denk, 2015, Eugster, 2014, Law and Singh, 2014, Mbome, 2016 Pagano, 2012, and Sahay et al., 2015). However, Cline (2015a, b) argues that the this result is mostly a statistical artifact. I now describe Cline's main argument and provide a rebuttal to his claim that the too much finance result is just a statistical artifact.

3.1 . . . or statistical illusion?

Cline (2015a, b) suggests that the "Too Much Finance" result is an artifact of spurious attribution of causality. He uses a small theoretical model that, in his view, shows that quadratic effects in a typical finance-growth regression are subject to a negative bias. He corroborates his argument by showing that regressing growth over the number of doctors, R&D technicians, and telephones always yield coefficients that imply an inverted U relationship between each of these variables and economic growth. As there is no theoretical justification for such a result, he concludes that the finding is due to a statistical artifact similar to that leading to an inverted U relationship between growth and financial depth.

In Arcand et al. (2015b), we provide a rebuttal to Cline's criticism of the too much finance result. First, we show that his simple model does not show that the quadratic term in the growth finance relationship is negative. It simply shows that the quadratic term has a sign which is the opposite of the linear term. As such, he implicitly assumes that the linear term is positive and hence the quadratic term is negative. But, of course, this is no longer a proof but an assumption. More importantly, we show that if we use Cline's assumptions and then set the quadratic term equal to zero (i.e., we use Cline's model to derive the equation which is normally estimated in the finance and growth literature), we find that the linear term becomes negative: a result that contradicts the findings of the whole body of the finance and growth literature. Therefore, either Cline's main assumptions are right and the linear models used in the pre-2011 literature are wrong or Cline's assumptions are wrong.[4]

In Arcand et al. (2015b), we also show that Cline's finding of a quadratic relationship between growth and each of number of doctors and R&D is not robust to controlling for unobserved heterogeneity. When we re-estimate Cline's

[4] Cline (2015b) responded to our rebuttal by suggesting that one should think about two types of finance. However, these two types of finance are not part of his model and therefore our rebuttal remains valid.

regressions including country fixed effects, the quadratic relationship between growth and each of number of doctors and R&D disappears. The quadratic relationship between finance and growth is instead robust to controlling for country (and year) fixed effects. In fact, the baseline estimates of Arcand et al. (2015a) always include fixed effects. Cline (2015b) responds that, in his view, a model that does not include fixed effect is preferable to our fixed effects model (even if standard specification tests reject poled OLS or random effect estimations). I disagree.

4 Avenues for future research

There is convincing evidence of an inverted U-shaped relationship between financial depth and economic growth. However, there is no consensus on the drivers of this result. Instead of providing concluding remarks that would repeat what already stated in the paper, this section provides a quick assessment of the possible explanations for the too much finance result and points to potential avenues for future research.

Crises. The first potential explanation has to do with financial crises. There is evidence that rapid credit expansion is often followed by financial crises, and financial crises have large macroeconomic costs (for a review, see Claessens et al., 2014). While Arcand et al. (2015) show that the "too much finance" result is robust to controlling for banking crises, it would be interesting to test whether banking crises that are associated with rapid financial deepening are different from other types of banking crises and then check whether this difference can explain the too much finance result.

Misallocation of talents. In 1984, James Tobin pointed out that: "All university educators know that finance is engaging a large and growing proportion of the most able young men and women in the country." (Tobin, 1984, p.1) and hinted that an excessively large financial sector may lead to a misallocation of talents. Philippon and Reshef (2012) describe the evolution of the wage premium (i.e., differences in remuneration that are not explained by observable individual characteristics) in the US and show that there is a close association among the financial sector premium, the size of the financial sector, and financial deregulation. Philippon and Reshef (2013) provide international evidence which is consistent with the US data and Boustanifar et al. (2017) use data for 23 countries to show that financial deregulation has a causal effect on wages in the financial sector and may lead to socially inefficient risk-taking. Finally, Kneer (2013) and Cecchetti and Kharroubi (2015) show that misallocation of talents may indeed play a role in explaining why an excessively large financial

sector has a negative effect on economic growth. Future research should try to ground these findings in a structural model aimed at evaluating the social costs and benefits of a large financial sector.

Different types of finance. The third possible explanation has to do with the fact that there are different types of finance: good finance (which pools saving, facilitates exchange and improves capital allocation through the production of *ex ante* information and *ex post* monitoring) and moral-hazard fueled bad finance (excessive household lending and speculative risk-taking activities which do not contribute to price discovery). The too much finance results could thus be explained by the fact that, as the financial sector grows, the bad finance component becomes relatively more important. A test of this hypothesis would require collecting detailed data on the different components of the financial sector. This is a challenging but potentially fruitful endeavor.

Political capture. The last explanation focuses on the political economy of financial regulation (Johnson, 2009). There is evidence of substantial lobbing by the financial industry (Igan et al., 2011) and given that financial deregulation affects the rents captured by financial industry participants (Boustanifar et al., 2017), it is possible that a large financial sector, which increases the lobbing power of the financial industry, would lead to more pressure for socially inefficient financial regulation which, in turn, further increases the lobbying power of the financial industry. While the results of Boustanifar et al. (2017) are consistent with this interpretation, I am not aware of any study that specifically examines the growth implications of this political capture channel.

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