

ECO 318: Empirical Evidence on Finance and Growth¹

I will rely on the following working paper throughout these class notes:

Cecchetti, S. and E. Kharroubi. July 2012. “Reassessing the Impact of Finance on Growth.”

Background

As developed economies have become increasingly financialized, the finance sector is now over 8% of U.S. GDP, there has been increased attention paid to the relationship between aggregate macroeconomic performance and the size of the financial sector. This interest was only heightened by the clear connections between the Great Recession and the financial sector. This paper and these notes will discuss some of the evidence between finance and long term macroeconomic performance (growth).

Until recently, most of the literature believed that there was a strong strong casual relationship, running both ways, between finance and growth. That is growth caused finance and finance caused growth with these effects providing positive feedback. At first glance, the causal relationship running from finance to growth is obvious— because GDP includes financial activities, a \$1 increase in finance, all else equal, increases GDP by \$1 in a direct, and largely uninteresting way. But theory suggests other channels. Financial activities may match borrowers and lenders more efficiently, allowing capital to be better directed to its most productive uses. Finance (*e.g.* insurance or market research) may also mitigate risk which, under the common assumption that agents are risk averse, may incentivize greater economic activity.

The basic idea of this paper is that the relationship is more complicated. The authors regularly find an upside down U-shaped relationship where more finance initially leads to growth, but where at empirically relevant levels, the effect reverses and additional financialization reduces growth. There are good reasons why finance could reduce growth. Finance consumes resources, including highly skilled labor. The paper provides an example where smart people choose to become hedge

¹These are undergraduate lecture notes. They do not represent academic work. Expect typos, sloppy formatting, and occasional (possibly stupefying) errors.

fund managers instead of rocket scientists. If the latter leads to larger productivity gains to society than the former, then finance might take resources from more useful fields and thus reduce growth.

Data

The authors face two initial challenges: correctly defining their dependent and key independent variables. For the former, you might be tempted to use the growth rate of real per-capita GDP as many empirical growth papers do. The problem here is that GDP includes financial services. Because the authors want to test whether additional finance has indirect effects on growth, they instead use a measure of productivity as their dependent variable. They do so by using output per worker.

Output per worker is not a flawless measure. If more finance increases the labor force participation rate, then it does not correct the problem that output includes finance. If the steady state labor force participation rate is invariant to finance, then it is a decent measure.

Conceptually, financial services are economic activities related to risk management or credit. It is not obvious, however, how to best measure this variable for an econometric study. The authors consider several variables for their key financial independent variable. Initially, they focus on the aggregate ratio of private credit to GDP.

The authors collect data for 50 countries. The dataset includes both developed and non-developed economies. Because they are studying growth, they use the common tactic of dividing data into 5 year blocks. The hope is that this will wash out business cycle effects.

They begin by presenting a simple histogram that presents average GDP per-worker growth for the different quartiles of private credit per GDP. The most striking feature is that the 25% of observations with the highest levels of credit have growth closer to 1% instead of 2% which is close to the average for the lower 75%. This does not tell us much. Very wealthy economies have both high levels of credit and grow slowly due to other factors such as convergence. Rigorous regressions analysis is a more promising tool.

The authors employ the following specification:

$$\Delta_{k,t+5,t} = \alpha + \beta_k + \gamma_0(fd_{k,t+5,t}) + \gamma_1(fd_{k,t+5,t})^2 + \gamma_2 X_{k,t+5,t} - \delta y_{k,t} + \epsilon_{k,t} \quad (1)$$

The dependent variable is the change in output per-worker over the five year period. The term β_k is a country *fixed effect*. It allows the authors to estimate country specific effects that are not captured by any of the other independent variables. This is common when one is estimating using *panel data* which exhibits variation both over time and across some cross section(countries in this case). The authors do not explain why they do not use fixed effects for each time period.

$fd_{k,t+5,t}$ is financial development. The existing literature suggests that this will have a positive effect. The authors also include the square of financial development. If γ_0 is positive while γ_1 is negative, then financial development will have a U-shaped relationship with growth. X is a vector of controls. These include population growth, government consumption, inflation, and openness to trade. Their inclusion has only small effects on γ_0 and γ_1 . $y_{k,t}$ is the initial level (not growth rate) of productivity. A negative coefficient implies convergence where richer countries go slower. $\epsilon_{k,t}$ is the error term.

Table 1 shows the first major results. $\gamma_0 = 0.048$ and $\gamma_1 = -0.022$ and both are statistically significant with 99% confidence. We can then differentiate (1) with respect to financial development and (after pretending to check second-order conditions), calculate the level of financial development that maximizes growth.

$$0.048 - 2 * 0.022fd = 0 \quad (2)$$

Solving, this yields $fd = 1.08$. A level of private credit to GDP of 108% maximizes growth (assuming one buys the results of the paper, of course). This is a high level, but one that countries sometimes exceed. the paper provides the example of Thailand which ran its private debt up to 150% of GDP prior to the East Asian Financial Crisis of 1997. According to this result, this reduced Thai trend growth by 0.5%.

The authors are careful to note that 108% should not be interpreted as a policy target. Although growth is important, there are other considerations, such as business cycle effects, that impact welfare. Also, debt tends to increase during financial crises and the authors suggest that countries should give themselves some slack so that they do not dramatically exceed 108% during crises because doing so would be a drag on growth which would make recovery harder.

Unresolved Econometric Issues

1. Endogeneity. Although financial development may cause growth, growth could also cause financial development. This is endogeneity that makes it risky to make causal statements from the regression results. As in much of the empirical growth literature, the authors here do not make much of an effort. In my opinion, this is a weakness that has held back much of empirical growth. Many papers ignore it and just seem to hope for the best.

Part of the problem is that a good instrument, a common way of dealing with this problem, is not readily available. We would need something correlated with financial development but not caused by growth. It is hard to think of one. The best candidate would be lagged financial development, but this is far from perfect. Another option would be to employ more complicated time-series techniques.

2. Omitted Variables. The growth literature has found that many variables may be connected to growth. X cannot include all of them. But it is not obvious that the authors have included all of the important controls.

3. Alternate Shapes. Including squared financial development allows the authors to find a U-shape relationship. That they find an upside down shape suggests diminishing returns to financialization that eventually turn negative. An alternate hypothesis is that financial development asymptotes to having no marginal effect (think of a production function). The authors' specification does not allow them to discriminate between these two types of diminishing returns.

Alternate Measures of Financial Development

Because financial services is not defined by a single variable, the authors check their results for robustness to other measures. They find similar results.

1. They first use the ratio of banking credit to GDP. They again find the upside down U-shape. With all of the controls, they find that productivity growth peaks when banking credit equals 104% of GDP. The biggest difference here is that countries exceed this threshold more often than the peak result for private credit.

2. They next use the fraction of the workforce employed by the financial sector. Here, they find that growth peaks when 2.69% (with all controls) of the workforce is in finance. Notably, quite a few countries in the sample exceed this threshold. For the United States, over 4% of the workforce is in the financial sector.

Using the growth rate of financial development

As a final check, the authors switch to using the change in financial development (measured using financial sector employment) as the key independent variable. This is especially important if we are concerned that financial development is non-stationary. This seems quite possible and would render the previous results biased.

The authors include each of the other measures of financial development (which is problematic if non-stationarity is an issue). The authors consistently find that a 1% increase in the financial sector leads to a 0.3% decline in productivity. They thus conclude that financial sector growth is a drag on productivity. Because of the concerns over non-stationarity, I find this the most striking result in the paper.

Conclusions

This paper illustrates that the relationship between finance and growth is not well established empirically, and that it may be more complicated than a simple positive or negative linear effect. We will next turn to a theoretical examination of this relationship.