ON THE GROWTH EFFECTS OF FINANCIAL LIBERALIZATION

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Tashi Sun

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On the Growth Effects of Financial Liberalization

By Tashi Sun

Abstract

Over the past few decades, a wave of financial liberalization has occurred throughout the world. This thesis studies the growth effects of financial liberalization reforms on economic growth. I use a new comprehensive database of financial reform, and conduct regression analysis with both country-level and industry-level data. At the country-level, I employ the OLS fixed effect models and GMM panel techniques, and find that liberalization has a positive and significant impact on the long run economic growth rates. At the industry-level, liberalization also contributes positively to the growth of real value-added and the level of investment in manufacturing industries. Further disaggregation of the growth effects reveals that it is more prominent in industries that have a higher level of external capital dependence and a higher R&D intensity. The findings confirm the hypotheses that liberalization reduces information barriers and transaction costs in the financial system.

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I. Introduction

Before the 1970s, the world was dominated by the "repressive" financial system. In developing countries, state banks allocated credits at below-market interest rates; security markets were virtually nonexistent; for private entrepreneurs, the barriers to entry in the financial industry were high; cross-border capital flows were tightly controlled. Even in the United States, interest rate ceiling continued to exist, banks were not allowed to expand across state boundaries, and capital mobility was restricted.

On August 15, 1971, the Bretton Woods system came to its end, leading to the dismantling of capital controls in the developed world. Since then, the world also witnessed a great wave of globalization, as people and goods became more mobile across the borders. Gradually, it became clear that if a country wants to take advantage of the opportunities in the integrated world economy, it must liberalize its financial system. In addition, compared to the centrally planned economies in Eastern Europe and Soviet Union, the market economies had been performing better for decades. By the late 80s, when the iron curtain began to collapse, the idea that a liberalized economy functions better than a repressive system became widely accepted in both academia and government. As a result, many developing countries adopted financial liberalization reforms. The measures included liberalizing the interest rate, removing entry barriers of the banking sector, abolishing capital account restrictions, and so on.

A few decades have gone by since the initiation of financial liberalization worldwide. Did those reforms spur economic growth? Using both industry-level and country-level data during 1973 to 2005, I investigated the growth effects of financial liberalization. The country-level analysis focuses on overall growth impact of financial liberalization,

whereas the industry-level studies gauge the disparate impacts on different industries in order to understand the underlying mechanism. Overall, I find that the financial liberalization reforms have a positive and significant effect on economic development. The benefits of liberalization reforms are more heavily distributed in those industries that inherently depend more on external finance and those in which information is difficult to acquire. It suggests that financial liberalization reduces information barriers and transaction costs in the economy.

The question regarding the growth effects of financial liberalization is highly relevant to economic theory. First, economists hold contrary views on whether financial system matters to economic development at all. Some believe the financial system merely responds to the expectations of the economy (Lucas 1988, 3-42). Others contend that finance affects economic growth through both the quantity channel and quality channel (King and Levine 1993, 717-737). Second, whether liberalization reforms can improve the function of financial system is also debatable.

The study is also policy-relevant: if financial liberalization truly promotes growth, then more developing countries should follow this path, and those that have already liberalized their markets should not seek to reverse this ongoing trend. Since the financial crisis in 2008, people cast doubt on the benefits of financial system, and emphasize the dreadful consequences of financial innovations. Therefore, it is necessary for us to examine the long-term growth impacts of financial liberalization, and evaluate this process objectively.

The paper is organized as follows. Section II summarizes related literature. Section III discusses the data that I use. Section IV includes the hypothesis, methods, and results of the country-level studies. Section V presents the industry-level studies. Finally, Section VI concludes.

II. Literature Review

To study the growth effects of financial liberalization, we must first understand how the financial system affects economic growth. A good summary is given by *Financial Development and Economic Growth: Views and Agenda* (Levine 2004). The paper emphasizes a functional approach towards finance: when studying the financial system, we should focus on the functions provided by the financial system, rather than a specific institution alone. The financial system has five basic functions: to facilitate the trading, hedging, diversifying and pooling or risk; to acquire information about investment projects and allocate resources; to achieve better corporate governance; to mobilize savings from households; to facilitate exchange of goods and services. Each of the five functions can contribute to economic development.

Levine (2004) also provides some empirical evidence on the impact of financial development (measured by financial depth) on economic growth. Many cross-sectional studies indicate that finance-growth link is a first-order relationship, and this stylist fact is further supported by country-case studies. In addition, he summarizes some empirical studies that focus on the effect of a specific function of finance on growth, and suggests that ameliorated risk levels and better information in the financial system affect growth positively.

Other papers also try to examine the empirical validity of the finance-growth link. Ang (2008, 536-576) provides a survey of these literatures. These studies make use of cross-sectional data, time series data, and panel data. Most results confirm a positive role of finance on growth, although some methodological reservations remain. Since panel data contain most information and allows us to address the issue of Endogeneity using techniques such as the GMM estimator, I also use panel data in this paper.

Beck, Levine and Loayza (2000, 261-300) has country-level panel data that cover the period from 1960 to 1995, and employ a GMM estimator proposed by Arellano and Bover (2002). They discover a positive relationship between finance (private credit) and both real per capita GDP growth and total factor productivity. However, the link between finance and physical capital growth is ambiguous. Thus, the study suggests that finance affects growth mainly through the quality channel.

A similar study is done by Beck and Levine (2004, 423-442). This time they investigate the impact of stock markets and banks on growth separately. They have a panel dataset between 1976 and 1998, and apply GMM techniques including the Arellano and Bover estimator. The conclusion is that both banks and markets promote economic growth independently, although it is sometimes difficult to disentangle their effects when they are both included in the regression.

Rioja and Valev (2004, 429-447) explore the relationship between finance and economic development at different levels of financial development. Their dataset includes 74 countries for the period 1961 to 1995. Using the same GMM techniques, they find that the growth impact is uncertain in countries with low levels of financial development (low region), quite large in intermediate region, and small in high region.

Bekaert, Harvey and Lundblad (2005, 3-55) study the growth effect of equity market liberalization directly. Their largest sample covers 95 countries. They design a time dummy as the indicator of equity market liberalization, and contrast it with capital liberalization measures. Their main regressions use a GMM method estimator that account for the overlapping nature of the data. The results show that equity market liberalizations, on average, lead to a one percent increase in annual real economic growth

over a five-year period. Economically, this effect is quite large. In contrast, the growth effect of capital account openness is rather fragile.

The Bekaert, Harvey and Lundblad's paper has made three key contributions. First, they consider the possibility that financial liberalization is a strategic decision of the countries, and use country growth opportunities to account for the Endogeneity. Second, they consider the possibility that equity market liberalization may coincide with other reforms, including macro reforms, legal reform and post-banking crisis reforms. Third, they study the heterogeneity of the growth effects in countries with different institutions, and find that institution is a crucial factor.

To sum up, the literatures generally confirm the link between financial development and growth, and also suggest a positive growth impact of financial liberalization. However, these country-level studies do not explicitly demonstrate how liberalization triggers financial development and boosts the growth rates. We would like to answer questions like whether liberalization lowers the cost of capital, leads to more efficient capital allocation, and reduces information barrier for investors. In order to understand the underlying mechanisms, researchers resort to industry-level data.

In my industry-level study, I mainly follow *On the Growth Effect of Stock Market Liberalization* (Gupta and Yuan 2009, 4715-4752). In this paper, liberalization is used in a narrow sense, which means reducing the restrictions on foreign investment in domestic equity market and on local investment abroad. The authors use a panel data from UNIDO Industrial Statistics Database to investigate the impact of liberalization on industry growth in developing countries. The study confirms that industries that are more externally dependent and face better growth opportunities grow faster following equity market liberalization. In addition, the increase in industry growth seems to come from an

expansion of existing firms rather than new firms. Further studies reveal that the establishment growth in external fund depended industries grows at a much faster rate in countries and industries with low entry barriers.

Beck, Demirguc-Kunt, Laeven and Levine use industry-level data from UNIDO Industrial Statistics Database to study the distributional effects of financial development (Beck et al. 2008, 1379-1405). They employ a difference-in-difference approach, and find that industries with a larger share of small firms grow relatively faster in economies with better financial systems. The results remain robust even when controlling for informational opacity, industry concentration, asset intangibility, and growth prospects. It suggests that financial development disproportionally benefits small firms.

Using panel data on 394 firms in 13 developing countries during 1988-1998, Laeven (1999) tries to learn whether financial liberalization relaxes the financing constraints that firms face. He builds a model of investment with financial frictions, and estimates it with a GMM estimator. His conclusion is that financial liberalization affects small firms and large firms differently: it benefits small firms by decreasing its dependence on internal resources, but has little impact on large firms.

Levchenko, Ranciere and Thoenig (2009, 210-222) examine the relationship between financial liberalization, growth and volatility using an industry-level panel dataset. They adopt a difference-in-differences estimation strategy and use propensity score matching to create a control group for each liberalizing country. They find that financial liberalization has a positive effect on both growth and volatility of production across industries, although the growth effect is only temporary. By decomposing the growth effect, they find that it mainly comes from increased entry of firms, higher capital accumulation, and an expansion in total employment.

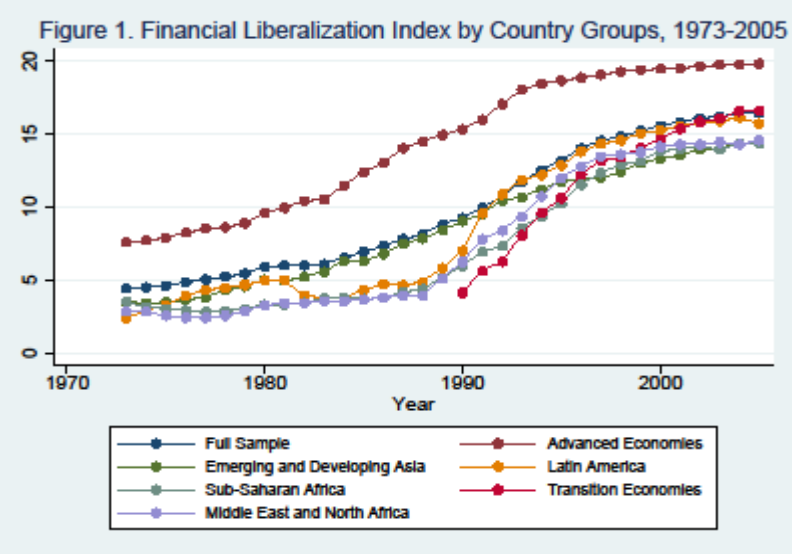
III. Data

Perhaps the most crucial variable in this paper is the index of financial liberalization. It comes from a new database of financial reform covering 91 countries over the period 1973-2005, designed by Abiad, Detragiache, and Tressel (2010, 281-302). They assign a score between 0-3 for each of the following seven dimensions: (1) credit controls and reserve requirements, (2) interest rate controls, (3) entry barriers, (4) state ownership, (5) policies on securities markets, (6) banking regulations, and (7) restrictions on the capital account. Then they combine the seven scores to get the overall financial reform score of a particular country-year observation. I normalize the overall score to be between 0 and 1, and use it as the main indicator of financial liberalization.

Comparing to other measures of financial liberalization, this index has three advantages. First, it covers a wide range of countries and a period of over 30 years. Second, it is continuous rather than binary. Most countries implement financial liberalization reforms gradually. Thus, it is quite arbitrary and unrealistic to pick a cutoff point and create a time dummy of liberalization. Third, this measure captures the overall level of liberalization, rather than just a simple dimension. Since liberalization reform is an integrated process, it is both theoretically and empirically difficult to disentangle the effects of complementary policies. For example, reforms of state ownership, entry barriers and interest rate controls all work together to encourage competition in the banking sector. Since the various measures of liberalization are usually highly correlated with one another, when we examine the growth effect of a simple dimension (e.g. allowing foreign investors to invest in local stock market), we may be, in effect, capturing the overall level of financial liberalization anyway. Therefore, from a functional view of the financial system, I think

that it is more meaningful to study the growth effects of the overall level of financial liberalization.

In Figure 1, we can see that financial liberalization has advanced significantly during the past 30 years throughout the world. The developed countries always have a more liberalized financial system than other countries, and they made gradual progress during the 1970s and 1980s. Most developing countries conducted dramatic liberalization reforms in the early 1990s, except East Asian countries, which followed a steadier path.



To be more specific, Table 1 shows that, on average, the financial liberalization index has increased from 0.210 to 0.782 from 1973 to 2005. However, the discrepancy between the developed and developing countries remain significant. In 1973, countries like Switzerland, United States and Hong Kong had financial systems with far less restrictions than countries like Argentina, Chile, India, and Egypt. In 2005, many of those developed countries have attained a score of 1, whereas most developing countries still linger behind, for example, Ethiopia only has a score of 0.381.

Table 1

Year		*Financial Liberalization*	Examples
1973	Min	0.000	Argentina, Chile, India, etc.
1973	Max	0.810	Switzerland
1973	Mean	0.210	
2005	Min	0.381	Ethiopia
2005	Max	1.000	Britain, US, Spain, etc.
2005	Mean	0.782	

Country-level data

The country-level data come from the *World Development Indicators*, 2012. Since this database does not include information for Taiwan, the sample is reduced to 90 countries. Except for *GDP per capita Growth*, these variables are used as controls in my regressions. Their definitions are summarized in Table 1, along with data from other sources.

Table 2

Description of the variables

Variable	**Description**	**Source**
Liberalization	An Index that measures the level of financial liberalization for a particular country-year, normalized to be 0 to 1.	Abiad, Detragiache, and Tressel (2010)
Fertility	The number of children that would be born to a woman.	World Development Indicators, The World Bank
GDP per capita	Gross domestic product divided by mid-year population. Data are in current US dollars.	Same as above
GDP per capita Growth	Annual percentage growth rate of GDP per capita based on constant local currency.	Same as above
Government Consumption	Government consumption divided by GDP. General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defense and security, but excludes government military expenditures that are part of government capital formation.	Same as above
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	Same as above
Initial GDP	Logarithm of real per capita gross domestic product in 1975.	Same as above

Life Expectancy	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	Same as above
Openness	Openness is the sum of exports and imports of goods and services measured as a share of gross domestic product.	Same as above
Secondary School	Gross enrolment ratio for secondary school. Total is the total enrollment in secondary education, regardless of age, expressed as a percentage of the population of official secondary education age.	Same as above
OECD Growth	Growth of per capita GDP for high-income OECD countries.	Same as above
Share of Industry	The share of each industry's value added in the total value added of all industries in that country.	Industrial Statistics Database 2006, UNIDO
Growth in Vad	Annual change in real value added in each industry in each country.	Same as Above
Growth in Nst	Annual change in number of establishments in each industry in each country.	Same as above
Growth in Size	Annual change in ratio of real value added to the number of establishments in each industry in each country.	Same as above
Growth in Inv/Est	Annual change in ratio of investment to the number of establishments in each industry in each country.	Same as above
Investment	Annual fixed capital formation.	Same as above
External Dependence	Industry median difference between capital expenditure and cash flow from operations, divided by capital expenditure in each industry.	Rajan and Zingales (1998)
R&D Intensity	Industry median of a ratio of R&D expenses over the total sales.	Fisman and Love (2004)
Firm Size	Share in the industry of employment in firms with <= 20 employees in each industry in the US.	Demirguc-Kunt, Laeven and Levine (2008)
Growth Opportunity	Industry median of real sales growth between 1980 and 1990.	Fisman and Love (2004)

Because the paper focuses on the long-run relationship between financial liberalization and growth, I use the five-year averages of the data instead of annual data to abstract from the effects of business cycles. As a result, I have a panel dataset that includes seven non-overlapping five-year periods[1].

[1] The first period covers 1973 to 1975; the rest six periods each covers five years, for example, the last period comprises the years 2001 to 2005.

Industry-level data

The industry-level data are mainly from *INDSTAT3, 2006, ISIC Revision 2*, produced by the United Nations Industrial Development Organization. The dataset covers 27 ISIC 3-digit categories in 180 countries between 1963 and 2004. After merging it with the financial liberalization index and WDI data, I have a sample of 87 countries from 1973 to 2004. However, due to the underdevelopment of the statistical investigation in developing countries, *INDSTAT3* has a lot of missing values. That's a drawback of my industry-level study.

I pick the following variables from *INDSTAT3*: gross fixed capital formation, real value added, number of establishment, average establishment size, and investment per establishment. According to past literature, the most appropriate measure of the condition of an industry is real value-added. The growth rates of those variables are calculated as the following: $Growth\ in\ Vad = \log\left(\frac{ValueAdded_{it}}{ValueAdded_{i,t-1}}\right)$. *Investment* is defined to be the annual gross fixed capital formation. These variables are also summarized in Table 2.

There are also several variables that measure the characteristics of industries. I use them to study the heterogeneous effects of financial liberalization on different industries. Unfortunately, these variables are only cross-sectional measures that do not vary across time, rendering my results less conclusive. *External Dependence* is from Rajan and Zingales (1998, 559-586). It requires the following assumptions: first, industries have technological reasons for their different dependence levels on external finance; second, this pattern persists across countries and time; and third, the US market is largely frictionless so that the use of external funds by US firms can serve as a proxy for the technological demand for external finance. Under these assumptions, Rajan and Zingales

use the data on listed US firms in the 1980s to construct $External\ Dependence = \frac{Capital\ Expenditure - Operating\ Cash\ Flow}{Capital\ Expenditure}$. They also use data in the 1990s and show that this measure is pretty stable across time.

R&D intensity and *Growth Opportunity* are from Fisman and Love (2004). *Growth Opportunity* is the industry median of real sales growth between 1980 and 1990. It aims to capture the global growth shock for a particular industry in the 1980s. *R&D intensity* is calculated as industry median of the ratio of R&D expenditures over the total sales. Lastly, *Firm Size* comes from Beck, Demirguc-Kunt, Laeven and Levine (2008, 1379-1405). The *Firm size* of an industry equals the industry's share of employment in firms that have less than 20 employees, and is calculated using Census data in 1992.

IV. Country-level analysis

Hypotheses and methods

As I described in the previous section, what I have is an unbalanced panel with 90 countries in 7 time periods. The growth model follows the standard Barro growth equations (Barro 1996), which takes the form:

$$\Delta y_{i,t} = \gamma y_{i,0} + \beta' X_{i,t} + \theta Finlib_{i,t} + \varepsilon_{i,t} \quad (1);$$

In equation (1), $\Delta y_{i,t}$ is the growth rate of country i at time t, and $y_{i,0}$ is the log initial GDP per capital. $X_{i,t}$ include the following six control variables: *ln(Fertility)*, *ln(Life Expectancy)*, *Secondary School*, *Inflation*, *Openness*, *Gov Consumption*.

I run a pooled regression, a regression that accounts for country fixed effects, and one with both country and time fixed effects. The hypothesis is that $\theta > 0$. Note that in the second and third regressions, $y_{i,0}$ is omitted since its effects are submerged by the country fixed effects.

Next, I use GMM techniques to estimate a model that is more theoretically appropriate. The method also helps deal with Endogeneity of financial liberalization. Here I closely follow the work of Beck, Levine and Loayza (2000, 261-300), and Beck and Levine (2004, 423-442). This model takes the form:

$$\Delta y_{i,t} = \gamma y_{i,t-1} + \beta' X_{i,t} + \theta Finlib_{i,t} + \mu_i + \varepsilon_{i,t} \quad (2);$$

Equation (2) can be rewritten as:

$$y_{i,t} = (\gamma + 1) y_{i,t-1} + \beta' X_{i,t} + \theta Finlib_{i,t} + \mu_i + \varepsilon_{i,t} \quad (3);$$

To apply the Arellano and Bond estimator (*difference estimator*), I first difference the equation to get rid of the fixed effects. I now estimate the following equation:

$$y_{i,t} - y_{i,t-1} = (\gamma + 1)\left(y_{i,t-1} - y_{i,t-2}\right) + \beta'\left(X_{i,t} - X_{i,t-1}\right) + \theta\left(Finlib_{i,t} - Finlib_{i,t-1}\right) + \varepsilon_{i,t} - \varepsilon_{i,t-1} \quad (4);$$

Clearly, $\left(y_{i,t-1} - y_{i,t-2}\right)$ correlates with the error term. In order to address this issue and account for the Endogeneity of financial liberalization, we use the lagged levels of $y_{i,t}$ and $Finlib_{i,t}$ as the GMM type instruments. To be more specific, assuming that the error term is not serially correlated and the lags of $Finlib_{i,t}$ are weakly exogenous, I use the following moment conditions:

$$\mathrm{E}\left[y_{i,t-s}\left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0 \; for \; s \geq 2; t = 3, \ldots, T;$$

$$\mathrm{E}\left[Finlib_{i,t-s}\left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0 \; for \; s \geq 2; t = 3, \ldots, T;$$

In addition, since $X_{i,t}$ are assumed to be strictly exogenous, their differences are also used as standard IV to create moment conditions.

Since the *difference estimator* may suffer from a loss of cross-sectional information, measurement error bias and weak instruments, I also use the Arellano and Bover estimator (*system estimator*), which combines the difference regression with an estimation of the levels equation. The instruments for the level equation are lagged differences of the corresponding variables. For these instruments to be valid, we need one additional assumption: although the levels of right hand side variables and the country-specific error term (μ_i) may be correlated in equation (2), there is no correlation between the difference in those explanatory variables and the error. To put it in another way, the correlation between explanatory variables and the country-specific error is constant.

Given this assumption, we have two additional GMM type moment conditions:

$$\mathrm{E}\left[(y_{i,t-1} - y_{i,t-2})(\mu_i + \varepsilon_{i,t})\right] = 0;$$

$$\mathrm{E}\left[(Finlib_{i,t-1} - Finlib_{i,t-2})(\mu_i + \varepsilon_{i,t})\right] = 0;$$

In this paper, I apply both the *difference estimator* and the *system estimator*. Moreover, for each estimator, I use both the one-step GMM method and the two-step method proposed by Arellano and Bond (1991, 277-297). The two-step estimator is asymptotically more efficient than the one-step, but its asymptotic standard errors are

biased. Since neither is superior to the other, I report the results of both methods to strengthen the analysis.

Results

The results from country-level regressions are reported in Table 3 below. The dependent variable is the growth rates of GDP per capita (in percentages). Overall, the impact of financial liberalization is statistically significant. Most regressions also suggest that financial liberalization is economically significant. For example, in column (3), where I control for both country and time fixed effects, the coefficient on *Finlib* is 5.986. On average, financial liberalization index is 0.210 at 1973 and 0.782 at 2005. Thus, for an average country, the entire financial liberalization process during this 30 year period has contributed to 3.42% of extra per capita GDP growth[2]. To put it in a different perspective, in 2005, the country with lowest level of liberalization is Ethiopia (0.381), whereas the United States has a score of 1. If Ethiopia liberalizes its financial market to match the average level in 2005, its GDP growth would be expected to increase by 2.4%. If it fully liberalizes its financial system to the level of the US, its GDP growth would improve by a stunning 3.7%.

In column (1), I report the estimation results of the simple pooled OLS regression. Here *Finlib* has a negative and insignificant sign. However, it's probably true that the unobserved country characteristics have biased the results. Column (2) controls for country fixed effects, and column (3) controls for both country and time fixed effects. They give very similar results and the impact of financial liberalization is positive and significant.

[2] This is obtained by: (0.782-0.210)*5.986=3.42.

Column (4) and (5) are the one-step and two-step estimation of the *difference estimator*. The growth effect of financial liberalization remains strong. The coefficients of the control variables also seem to be more compatible with theoretical predictions. For example, *Openness* now has a significantly positive impact on economic growth.

Column (6) and (7) are the one-step and two-step estimation of the *system estimator*. In both columns, the coefficients on *Finlib* become much smaller, and it even lost its significance in column (6). Thus, we also have some evidence suggesting that the growth impact of financial liberalization is not important.

Although in theory, the *system estimator* is an improvement upon the *difference estimator*, it has as many as 52 instruments and is more likely to be rejected by the Sargen test, especially in the one-step estimation. Moreover, it is also possible that the correlation between financial liberalization and the country fixed effects is not constant across time in reality, violating the additional assumption that *system estimator* requires. Thus, I still conclude that financial liberalization has a positive and significant growth effects, although the scale may actually be smaller than what the *difference estimator* indicates.

Table 3
Country-level regressions

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln(Fertility)	-2.238***	-2.537**	-2.552**	-1.655	-2.183**	-4.221***	-3.919***
	(0.470)	(1.191)	(1.147)	(1.401)	(0.903)	(0.949)	(0.465)
ln(Life Expectancy)	2.726*	-5.678	-2.709	-2.272	-9.284**	4.054***	3.959***
	(1.616)	(3.755)	(3.816)	(4.581)	(3.901)	(0.625)	(0.347)
Secondary School	-0.011	-0.086***	-0.071***	0.005	0.005	-0.013	-0.013
	(0.009)	(0.019)	(0.019)	(0.026)	(0.013)	(0.023)	(0.008)
Inflation	-0.003***	-0.007***	-0.006***	-0.002**	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)
Openness	0.005	-0.005	-0.005	0.058***	0.059***	0.028***	0.024***
	(0.003)	(0.010)	(0.010)	(0.012)	(0.006)	(0.010)	(0.006)
Gov Consumption	-0.006	-0.069	-0.058	-0.228***	-0.279***	-0.076	-0.070**
	(0.025)	(0.058)	(0.055)	(0.073)	(0.042)	(0.057)	(0.030)

Finlib	-0.646	4.474***	5.986***	3.538***	4.293***	0.364	0.768*
	(0.542)	(1.050)	(1.477)	(1.177)	(0.875)	(0.794)	(0.441)
Initial GDP	-0.650***						
	(0.167)						
GDP per capita (t-1)				-2.710***	-2.451***	-1.387***	-1.373***
				(0.676)	(0.295)	(0.335)	(0.165)
Constant	-1.523	33.526**	20.552				
	(6.779)	(16.050)	(16.273)				
Observations	397	458	458	302	302	397	397
R-squared	0.163	0.266	0.348				
Number of countries		85	85	84	84	85	85

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

V. Industry-level analysis

Hypotheses and methods

In order to understand how financial liberalization affects economic growth, I resort to industry-level studies. First, I estimate the following equation with industry-country fixed effects and time fixed effects. It measures the aggregate growth effects on manufacturing industries.

$$Growth_{i,j,t} = \gamma Finlib_{j,t} + \beta' X_{i,j,t-1} + \theta Year_t + \alpha_{i,j} + \varepsilon_{i,j,t} \quad (5);$$

The dependent variables are: (1) *Growth in Value-added*, (2) *Growth in Number of Establishment*, (3) *Growth in Size*, (4) *Growth in Investment per Number of Establishment*, and (5) the log level of *Investment*. $X_{i,j,t-1}$ include the lagged values of the following control variables: *Share of Industry*, *Openness*, *GDP per capita*, *Secondary School*. I also use the current value of *OECD Growth* to control for the effects of business cycles. The error term $\varepsilon_{i,j,t}$ captures the unobserved shocks and is clustered for each industry and country observation. The results are reported in Table 4.

Next, I propose four hypotheses to analyze the growth effects on different industries.

Hypothesis 1 (External Dependence): If financial liberalization lowers the cost of external capital, then industries that are more externally dependent will grow relatively faster in countries with more liberalized financial systems.

Due to information barriers and transaction costs, there exists a wedge between the cost of capital from internal sources and external sources. According to Rajan and Zingales (1998, 559-586), a more developed financial system should reduce this wedge, therefore disproportionally benefiting firms that are inherently more externally dependent.

To test this hypothesis, I use the following regression:

$$Growth_{i,j,t} = \gamma Finlib_{j,t} + \gamma_1 Finlib_{j,t} * External\ Dependence_i + \beta' X_{i,j,t-1} + \theta Year_t + \alpha_{i,j} + \varepsilon_{i,j,t} \quad (6);$$

Hypothesis 2 (Information Asymmetry): If financial liberalization reduces information asymmetry of high-tech firms, then industries with higher R&D intensities will obtain more financial resources and grow relatively faster in countries with more liberalized financial systems.

One major function of the financial market is to reduce information asymmetry between investors and entrepreneurs. Since certain types of firms (e.g. high-tech firms) contain more complex information, their qualities can only be revealed in a more developed financial market, and they are less likely obtain capital in a backward financial market. Thus, we would expect that this kind of information-heavy firms grows at a faster rate in countries with more developed capital markets.

To test this hypothesis, I use the following regression:

$$Growth_{i,j,t} = \gamma Finlib_{j,t} + \gamma_1 Finlib_{j,t} * R\&D\ intensity_i + \beta' X_{i,j,t-1} + \theta Year_t + \alpha_{i,j} + \varepsilon_{i,j,t} \quad (7);$$

Hypothesis 3 (Firm Size): If financial liberalization reduces the particular information barriers and transaction costs faced by smaller firms, then industries with a larger share of small firms will grow relatively faster in a more liberalized financial system.

Generally, the size of small firms implies more opaque information and higher transaction costs. Thus, small firms should have more difficulties in getting financial resources when the financial system is under-developed. Financial liberalization, if effective, should result in a more efficient allocation system, and channel adequate resources to those small firms.

To test this hypothesis, I use the following regression:

$$Growth_{i,j,t} = \gamma Finlib_{j,t} + \gamma_1 Finlib_{j,t} * Firm\ Size_i + \beta' X_{i,j,t-1} + \theta Year_t + \alpha_{i,j} + \varepsilon_{i,j,t} \quad (8);$$

Hypothesis 4 (Growth Opportunity): If financial liberalization improves capital allocation efficiency, then industries with better ex-ante growth opportunities will get more resources from the financial sector and have stellar growth rates.

To test this hypothesis, I use the following regression:

$$Growth_{i,j,t} = \gamma Finlib_{j,t} + \gamma_1 Finlib_{j,t} * Growth\ Opportunity_i + \beta' X_{i,j,t-1} + \theta Year_t + \alpha_{i,j} + \varepsilon_{i,j,t} \quad (9);$$

Since I only have the data of industries' growth opportunities during the 1980s, and growth opportunity varies dramatically across time periods, I run regression (9) on a restricted sample, i.e., using only data in the 1980s.

For regressions (5), (6), (7), and (8), the null hypotheses are the same: $\gamma_1 > 0$. In fact, they all adopt the difference-in-difference approach.

Results

Table 4
The average impact of financial liberalization

	(1) Growth in Vad	(2) Growth in Nst	(3) Growth in Size	(4) Log(inv)	(5) Growth in Inv/Nst
Finlib	0.208***	-0.002	0.201***	0.193**	0.100
	(0.020)	(0.024)	(0.034)	(0.096)	(0.070)
Share of Industry Value-added (t-1)	-0.029***	-0.004	-0.032***	0.073***	-0.007*
	(0.003)	(0.003)	(0.004)	(0.008)	(0.004)
Openness (t-1)	0.002***	0.001***	0.001***	0.010***	0.003***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
Log GDP per capita (t-1)	-0.077***	-0.008	-0.099***	0.667***	-0.093***
	(0.009)	(0.014)	(0.013)	(0.069)	(0.028)
OECD Growth	0.001	-0.028***	0.030***	-0.037***	0.027**
	(0.002)	(0.004)	(0.005)	(0.008)	(0.011)
Secondary School (t-1)	-0.001*	0.000	0.000	0.013***	0.006***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	13.049***	11.248***	-25.493***	10.209	-6.370
	(1.956)	(3.172)	(3.681)	(12.119)	(8.993)
Observations	33,252	19,691	19,338	24,040	15,483
R-squared	0.087	0.026	0.045	0.310	0.014
Number of id	1,971	1,813	1,791	1,660	1,540

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table 4, we can see that, on average, financial liberalization has a positive and significant impact on both the growth of real value-added (20.9%) and the level of

investment (19.3%), but it does not really affect the growth of number of establishments. Thus, after financial liberalization, industries grow mainly because of the expansion of existing firms, rather than the entry of new firms. This confirms the findings of Gupta and Yuan (2009, 4715-4752). The results also suggest that the relative size of industry, openness of the economy, and GDP per capita all significantly affect industry growth.

Now we move on to the disparate effects of financial liberalization across industries. Table 5 reports the results from regression (6). The result is consistent with Hypothesis 1, as the coefficient on *Finlib*External Dependence* is positive and significant at 5% level. The effect also has significant economic implications. For a country at the average level of financial liberalization in 2005, the growth rates of value-added is 1.91% higher in the Textile industry (75th percentile of external finance dependence) than in the Petroleum Refinery industry (25^{th} percentile)[3]. In contrast, for Ethiopia, a country with the lowest level of liberalization in 2005, the difference between the growth rates of those two industries would be only 0.93%. Thus, countries with higher level of financial liberalization see larger differences between their industries.

Table 5
Disaggregating the growth impact of liberalization by industry external finance dependence

	(1) Growth in Vad	(2) Growth in Nst	(3) Growth in Size	(4) Log(inv)	(5) Growth in Inv/Nst
Finlib	0.192***	-0.016	0.196***	0.000	0.092
	(0.021)	(0.026)	(0.036)	(0.109)	(0.075)
Finlib*External Dependence	0.068**	0.054	0.020	0.770***	0.031
	(0.027)	(0.040)	(0.050)	(0.190)	(0.083)
Share of Industry Value-added (t-1)	-0.029***	-0.004	-0.032***	0.072***	-0.007*
	(0.003)	(0.003)	(0.004)	(0.008)	(0.004)

[3] This is obtained as such: (0.4-0.04)*0.068*0.782=0.019, where 0.068 is the coefficient on the interaction term; 0.04 and 0.004 are the levels of external dependence for the 75^{th} and 25^{th} industries, respectively.

Openness (t-1)	0.002***	0.001***	0.001***	0.010***	0.003***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
Log GDP per capita (t-1)	-0.078***	-0.008	-0.099***	0.664***	-0.093***
	(0.009)	(0.014)	(0.013)	(0.069)	(0.028)
OECD Growth	0.001	-0.028***	0.030***	-0.037***	0.027**
	(0.002)	(0.004)	(0.005)	(0.008)	(0.011)
Secondary School (t-1)	-0.000*	0.000	0.000	0.013***	0.006***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	13.027***	11.254***	-25.491***	10.142	-6.361
	(1.954)	(3.166)	(3.683)	(12.086)	(8.992)
Observations	33,252	19,691	19,338	24,040	15,483
R-squared	0.087	0.026	0.045	0.313	0.014
Number of id	1,971	1,813	1,791	1,660	1,540

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In Table 6, I report the results from equation (7). The results confirm Hypothesis 2. The coefficient on the interaction term is again statistically significant at 5%. It even has a larger scale (1.825). For an average country in 2005, the difference between the growth rates of the 75th percentile industry and 25th percentile industry is 51.4%, whereas this difference is only 25.0% for Ethiopia. Therefore, financial liberalization seems to benefit the R&D intensive industries disproportionally as it reduces the information barriers in the financial system.

Table 6

Disaggregating the growth impact of liberalization by industry R&D intensities

	(1) Growth in Vad	(2) Growth in Nst	(3) Growth in Size	(4) Log(inv)	(5) Growth in Inv/Nst
Finlib	0.180***	-0.021	0.201***	-0.014	0.137*
	(0.024)	(0.029)	(0.040)	(0.123)	(0.079)
Finlib*R&D intensity	1.825**	1.195	0.009	13.160**	-2.321
	(0.836)	(0.994)	(1.434)	(5.171)	(1.993)
Share of Industry Value-added (t-1)	-0.029***	-0.004	-0.032***	0.072***	-0.007*
	(0.003)	(0.003)	(0.004)	(0.008)	(0.004)
Openness (t-1)	0.002***	0.001***	0.001***	0.010***	0.003***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)

Log GDP per capita (t-1)	-0.078***	-0.008	-0.099***	0.665***	-0.092***
	(0.009)	(0.014)	(0.013)	(0.069)	(0.028)
OECD Growth	0.001	-0.028***	0.030***	-0.037***	0.027**
	(0.002)	(0.004)	(0.005)	(0.008)	(0.011)
Secondary School (t-1)	-0.001*	0.000	0.000	0.013***	0.006***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	13.018***	11.269***	-25.493***	10.233	-6.400
	(1.953)	(3.169)	(3.682)	(12.110)	(8.998)
Observations	33,252	19,691	19,338	24,040	15,483
R-squared	0.087	0.026	0.045	0.311	0.014
Number of id	1,971	1,813	1,791	1,660	1,540

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 shows the results from regression (8). Again, the coefficient on *Finlib*Size* is statistically significant. However, it does not have great economic implications as the scale is merely 0.004. Thus, the results only tentatively support Hypothesis 3.

Table 7
Disaggregating the growth impact of liberalization by industry firm size

	(1) Growth in Vad	(2) Growth in Nst	(3) Growth in Size	(4) Log(inv)	(5) Growth in Inv/Nst
Finlib	0.183***	-0.017	0.188***	0.175	0.057
	(0.023)	(0.028)	(0.041)	(0.126)	(0.077)
Finlib*Size	0.004**	0.002	0.002	0.003	0.006
	(0.002)	(0.002)	(0.003)	(0.010)	(0.005)
Share of Industry Value-added (t-1)	-0.029***	-0.004	-0.032***	0.073***	-0.008*
	(0.003)	(0.003)	(0.004)	(0.008)	(0.004)
Openness (t-1)	0.002***	0.001***	0.001***	0.010***	0.003***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)
Log GDP per capita (t-1)	-0.077***	-0.008	-0.099***	0.667***	-0.093***
	(0.009)	(0.014)	(0.013)	(0.069)	(0.028)
OECD Growth	0.001	-0.028***	0.030***	-0.037***	0.027**
	(0.002)	(0.004)	(0.005)	(0.008)	(0.011)
Secondary School (t-1)	-0.000*	0.000	0.000	0.013***	0.006***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	13.063***	11.262***	-25.479***	10.191	-6.391
	(1.956)	(3.177)	(3.684)	(12.130)	(8.980)
Observations	33,252	19,691	19,338	24,040	15,483
R-squared	0.087	0.026	0.045	0.310	0.014
Number of id	1,971	1,813	1,791	1,660	1,540

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 record the last regression. This time we fail to confirm Hypothesis 4 since the coefficients on the interaction terms are not statistically significant. The result may

indicate that financial liberalization does not improve capital allocation efficiency at all. It may also be caused by other reasons. First, my measure of *Growth Opportunities* (the median real sales growth of industries) probably does not capture the true ex-ante global growth potentials across industries. For future researches, better measures that incorporate time-series information should be used. Second, restricting the analysis to the data of 1980s may be a problem because most developing countries conducted their major financial reforms in the early 1990s.

Table 8

Disaggregating the growth impact of liberalization by industry growth opportunities

	(1) Growth in Vad	(2) Growth in Nst	(3) Growth in Size	(4) Log(inv)	(5) Growth in Inv/Nst
Finlib	0.317***	0.176***	0.075	-0.447**	0.363**
	(0.090)	(0.053)	(0.075)	(0.185)	(0.177)
Finlib*Growth Opportunities	-1.015	0.678	0.931	11.018***	-8.334**
	(1.863)	(1.167)	(1.518)	(3.668)	(3.419)
Share of Industry Value-added (t-1)	-0.063***	-0.016*	-0.063***	0.021**	-0.011
	(0.010)	(0.009)	(0.013)	(0.011)	(0.011)
Openness (t-1)	0.004***	-0.000	0.002***	0.007***	0.003**
	(0.001)	(0.000)	(0.001)	(0.002)	(0.001)
Log GDP per capita (t-1)	-0.156***	-0.138***	0.022	0.561***	0.091*
	(0.023)	(0.022)	(0.026)	(0.064)	(0.049)
OECD Growth	0.002	-0.035***	0.026***	-0.112***	0.067***
	(0.008)	(0.011)	(0.010)	(0.017)	(0.024)
Secondary School (t-1)	-0.002**	-0.001	-0.001	-0.001	0.015***
	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)
Constant	-16.074*	-37.037***	22.514**	-171.042***	63.733***
	(8.311)	(9.308)	(10.071)	(18.281)	(19.437)
Observations	11,045	8,027	7,945	8,435	6,705
R-squared	0.119	0.020	0.062	0.148	0.020
Number of id	1,567	1,313	1,308	1,215	1,076

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Overall, I still find that financial liberalization reduces information barriers and lowers the cost of external capital, resulting in a faster growth in certain industries. Again, this growth mainly comes from the expansion of existing firms rather than new entrants.

VI. Conclusion

In the past 40 years, the world has witnessed a wave of financial liberalization, but what are the results of these reforms? This paper studies the growth effects of liberalization policies on economic growth. I use a new comprehensive database of financial liberalization, and conduct both country-level and industry-level regressions. At the country-level, I apply both fixed effects and GMM panel techniques, and find that financial liberalization has a positive and significant impact on the long run economic growth rates. At the industry-level, the aggregate effect of liberalization is again significant on the growth of value added and level of investment. Further disaggregation of the growth effects reveals that it is more prominent in industries with a higher level of external capital dependence and higher R&D intensity. According to economic theory, the findings suggest that liberalization reduces the information barriers and transaction costs in the financial system.

For future research, I suggest that we use firm-level data to study the growth effects of financial liberalization, if detailed data become available. The problem of industry-level study is that it relies on several restrictive assumptions on industrial characteristics. Firm-level data would allow us to look directly into the impacts of financial liberalization on the financial constraints and cost of capital faced by individual firms, and help us disaggregate the effects based on firm-level differences. This would give us a better understanding of the underlying mechanism.

Moreover, future studies should focus on the impacts of institutions and the issue of reform complementarity. Although I have demonstrated that financial liberalization has a positive growth effect in general, there are certainly special circumstances where the reforms fail to deliver desirable outcomes. Under what circumstances can financial

liberalization benefit economic growth? To answer this highly policy relevant question, we need to carefully analyze the institutional features of different countries and industries. We should use both cross country regressions with institutional variables and country-level case studies.

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