Is China Different?
A Meta-Analysis of China's Financial Sector Development

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Abstract:

We examine whether China has benefited more than other countries from financial sector development by performing a meta-analysis of the relevant literature covering a large number of countries at different stages of development. Although the results for China are inconclusive, they indicate the absence of a direct link between financial development and economic growth.

1. Introduction

The question of whether financial sector development has the ability to spur economic growth has stirred intensive debate. This debate began a century ago, when Joseph Schumpeter argued that financial intermediaries play a crucial role in economic development (see Schumpeter, 1934). Schumpeter's claim was followed by a series of research papers that investigated the issue. For example, Goldsmith (1969) provided the first cross-country empirical study documenting the existence of a strong positive link between the functioning of the financial system and economic growth. The understanding of the role played by financial development was further enhanced by the endogenous growth literature, which demonstrated that financial development is a major determinant of economic growth. By reducing information and transactions and by monitoring costs, well-developed financial systems perform several critical functions that enhance intermediation efficiency and spur economic growth (Beck et al., 2000; McKinnon, 1973; King and Levine, 1994; Easterly and Levine, 1999; Levine et al., 2000; Bandiera et al., 2000; Beck et al., 2000). Despite theoretical support, the empirical literature on the link between financial development and economic growth is mixed (Maswana, 2008). In particular, research on China has led to contrasting results: some authors have documented a positive relationship, others have found a negative relationship, and still others have found no relationship at all (Guariglia and Poncet, 2008; Lardy, 1998; Liang and Teng, 2006; Podpeira, 2006).

Our study extends the literature in several ways by conducting a meta-analysis of the relevant literature on a large number of countries at different stages of development. This meta-analysis allows us to evaluate the impact of financial sector development on growth while isolating the impact of factors such as the kind of data used, the econometric method applied and other study-design factors that may affect the results. We use this analysis to investigate whether China differs significantly from other countries in terms of the influence of financial sector development on economic growth.

Although the results for China are inconclusive, they point to either the absence of a direct link or a negative direct link between financial sector development and economic growth. This result contrasts with the documented and relatively significant growth-enhancing effects that China has experienced as a result of foreign direct investment

(FDI) and exports. The paper is organized as follows. Section 2 discusses the model, data, and variables. Section 3 presents the results, and section 4 concludes.

2. Model specification, data and variables

Following Card and Krueger (1995) and Görg and Strobl (2001), we perform a meta-analysis on a sample of 35 country-specific studies that explore the link between financial development and economic growth. Most meta-analyses in economics focus on publication bias (Stanley et al., 2008; Stanley, 2008). In contrast, we ask whether the relationship between financial development and growth is more significant in China than in other countries.

Meta-regression errors are likely to be heteroskedastic. Therefore, a common practice in meta-regression analysis is to weigh each effect by some measure of the precision (Stdv) of the estimated effect. As our left-hand variable, we apply the *t*-statistic of the financial development variable, which yields a dimensionless dependent variable. The *t*-statistic variable is then regressed on a number of study characteristics that are meta-independent and presumed to influence the outcome of the study. Browsing the relevant literature, one may note that weighting by the inverse standard deviation (which is the fundamental approach to analyzing publication bias) is not always performed.[1] Thus, observations measured with different precision are assigned the same weight.

Our default mode is to apply standard error weighting. As a robustness test, we also estimate un-weighted models. The standard meta-regression model is therefore specified as follows:

$$B_i / Se_i = t_i = \alpha_0 + \sum_{k=1}^{K} \alpha_k X_{ik} / Se_i + \varepsilon_i; \quad i = 1, \ldots, N \quad \varepsilon \sim iid \ N(0, \sigma), \tag{1}$$

where B is the reported coefficient, Se is the associated standard error, t is the t-value statistic and X contains a set of meta-independent variables that capture the characteristics of the empirical studies in the sample. To explain the variation in the Y_i across studies, α are the set of coefficients to estimate, and ε is the error term.

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[1] See, e.g., Stanley et al. (2008), Card and Krueger (1995) and Cipollina and Salvatici (2010).

Our data consist of observations that often include more than one study for each country and several observations from a single author. Hence, the results may co-vary within studies and countries, a property that makes our data well designed for a multi-level approach (see Raudenbush, 1993). To improve the precision in the analysis and to address interdependence, we extend (eq. 1) and estimate multi-level models. Examples of studies using multi-level modeling in meta-analysis include Ljungwall and Tingvall (2010, 2012) and an analysis on math performance and coaching by Kalaian and Raudenbush (1996).

As indicated above, we project two sources for interdependency: country-specific effects (results from different studies on the same country that may be interrelated) and study-specific effects. A common method for unilaterally handling such group effects is to allow for either country-specific random intercepts v_j or random study effects ζ_l, where foot index j and l indicate country and study of origin, respectively. To simultaneously control for these effects, we further extend (eq. 1) to create a two-level model with random intercepts by country and study. First, we assume studies to be nested under the country level and represented by the random intercept $\zeta_{[j]l}$. Subsequently, we relax this assumption of nested data. Thus, the multi-level framework enables us to handle heterogeneity more adequately than would have been possible under a dummy variable framework by attributing components of heterogeneity to different levels.[2]

2.1. Data and variables

The data used in this analysis are drawn from 35 studies on financial development and growth, which yield a total of 437 observations.[3] In comparison with samples of other economic meta-analyses, our sample size is relatively large. For example, Görg and Strobl (2001) examined 21 studies that yielded 25 observations, Diebel and Wooster (2006) gathered 32 studies and obtained 137 observations, Meyer and Sinani (2009) included 66 studies that resulted in 121 observations, and Ljungwall and Tingvall (2010, 2012) included 67 and 68 studies that resulted in 125 and 263 observations, respectively.

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[2] For further reading on multi-level models, see, e.g., Hox (2002) and Verbeke and Molenberghs (2000).
[3] See http://ratio.se/sv/medarbetare/forskare/patrik-tingvall.aspx for a listing of the studies that are included in this study.

[Table 1 about here]

As shown in Table 1, the distribution of *t*-values for China is distributed around a relatively low mean value (1.0). Almost half (46 percent) of the *t*-values for China are positive and significant, 34 percent are negative and significant and the remaining 20 percent are insignificant. We also note that the average *t*-value for China is lower than the average for other countries (1.0 vs. 1.5). We analyze whether these *t*-values can be explained by data and research design factors and whether the results for China differ significantly from the average results for other countries. Our relatively large sample is not specifically constrained by problems related to inadequate degrees of freedom. The explanatory variables included are the measures of financial development, productivity, degrees of freedom, study-specific co-variates, time span, and period dummies.

3. Results

Table 1 reports the results of the meta-regression analysis. The dependent variable in all equations is the *t*-statistic for financial development. Estimations (1 through 3) are minimalistic OLS models, and model (1) differs from model (2) in that it includes outliers. In addition, estimations 1 and 2 are not weighted with the standard deviation of the associated t-value. All models from model (3) and onward are weighted models.[4] Comparing estimations 1 through 3, we see that the China dummy is negative in estimations 1 and 2, and it becomes negative and significant when the simplistic model is weighted.

In models (4) and (5), a set of meta-independent study characteristics are appended. Adding additional covariates does not significantly affect the estimated China dummy. The impact of financial reform is significantly lower in China than in other countries.

In estimations (6) and (7), we examine whether the results from the OLS models could be due to a lack of control for interdependence; therefore, we cluster the standard errors by country (estimation 6) and study (estimation 7). Although the estimated coefficient for China is not significantly affected when clustering the standard errors, the significance of the China dummy vanishes.

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[4] We identify 6 outliers (12<t-val<-10) and follow Görg and Strobl (2001) in estimating model 2 with the outliers excluded. As indicated in estimations 1 and 2, this does not alter the results.

In estimation (8), we extend the analysis to a two-level model with mixed random intercepts at the country and study level, where we first assume study effects to be nested under the country level. In model (9), we further increase the generality of the interdependence and estimate a two-way model with mixed, non-nested, crossed random effects by country and study specific effects.[5] That is, in estimation (9), no hierarchical structure is imposed, and a general interdependence structure is allowed. When possible interdependence driven by study- or country-specific interdependence is accounted for, the significance of the China dummy vanishes, suggesting that the impact of financial reform in China does not deviate from that of other economies. The fact that the average t-value for financial reform in China was 1.0 and the average for other countries was 1.5 (that is, on average, the impact is insignificant) indicates that the direct link between growth and financial reform in China is vague. The absence of a direct link between financial development and economic growth for China is discussed by Aziz and Duenwald (2002), Boyreau-Debray (2003), Allen et al. (2005), Liang and Teng (2006), Ayyagari et al. (2007), and Guargiglia and Poncet (2008), among others.

[Table 2 about here]

3.1. Interpreting the results

Although the results are inconclusive, they stimulate an interesting debate. A tentative explanation for high growth in China despite a relatively poorly performing financial sector is that private firms have been able to utilize other instruments or mechanisms, such as retained earnings, non-bank financial intermediaries, and formal and informal coalitions of investors and local governments.

Government policies have been extensively used to attract investments from abroad, with a primary focus on export manufacturing industries. Huang (2003) and Luo (2007) show that financial sector distortions may force private Chinese firms to look for foreign

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[5] No hierarchical structure is imposed, and a general interdependence structure is allowed.

investors as a means to circumvent problems related to financing obstacles.[6] These results are supported by Guargiglia and Poncet (2008), who note that the FDI may be used to alleviate the costs associated with China's inefficient banking sector.

Nevertheless, China's financial system has experienced fundamental changes since the onset of economic reform, when the financial system consisted of a single bank, the People's Bank of China (PBC), which served as both the central bank and a commercial bank.[7] Financial distortions have declined over time, particularly after the major banking reforms in 1994 and China's WTO accession in 2001. The development of more market-driven financing has been followed by new links between the financial system and economic growth. Nevertheless, economic growth in China has been high, both before and after the most significant reforms in the Chinese banking system.

4. Concluding remarks

This multi-level meta-analysis of a sample of 35 studies, which yielded a total of 437 observations of the link between financial development and economic growth, suggests that the growth-enhancing effect of financial development in China has either been weaker than or, more likely, not significantly different from that of other countries. Considering that the average t-value for financial development on growth for China is insignificant (approximately 1.0), it is unlikely that financial development has been successful as a key contributing factor to economic growth in China.

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[6] By establishing cross-border relationships with foreign firms, private domestic firms can bypass both the financial and legal obstacles that they face at home. In fact, FDI can be seen as a form of equity financing (Harrison et al., 2004).

[7] See, for example, Lardy (1998) and Podpiera (2006) for an in-depth analysis of the transformation of China's banking system.

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Appendix

Table 1. Description, t-values

	Mean	Share t-val < 0	Share t-val negative and significant	Share t-val positive and significant	Share insignificant t-values
t-val. all obs.	1.45	29%	19%	47%	34%
t-val. China	1.03	36%	34%	46%	20%
t-val. non-China	1.58	27%	14%	47%	39%

Note: * indicates significance at the 10 percent level

Table 2. Meta regression models. Dependent variable, t-value, financial development and growth studies

	1. OLS [a]	2. OLS [a] [c]	3. OLS [b] [c]	4. OLS [b] [c]	5. OLS [b] [c]	6. OLS [b] [c] [d]	7. OLS [b] [c] [e]	8. Mixed model [b] [c] [f]	9. Mixed model [b] [c] [g]
China dummy	-0.5459	-0.3563	-0.0008	-0.0008	-0.0088	-0.0088	-0.0088	-0.0051	-0.0051
	(0.4322)	(0.3540)	(0.0004)*	(0.0004)**	(0.0043)**	(0.0815)	(0.0107)	(0.0033)	(0.0040)
Industry-level data				0.0549	0.0610	0.0610	0.0610	0.0676	0.0525
				(0.0601)	(0.0588)	(0.0259)**	(0.0314)*	(0.0234)***	(0.0187)***
Firm-level data				-0.0511	-0.0287	-0.0287	-0.0287	-0.0211	-0.0203
				(0.0113)***	(0.0166)*	(0.0199)	(0.0141)**	(0.0211)	(0.0269)
DGF					3.4e-08	3.4e-08	3.4e-08	1.6e-08	9.7e-09
					(7.1e-08)	(9.2e-05)	(1.2e-05)	(1.1e-07)	(1.0e-07)
Growth analysis					0.0091	0.0091	0.0091	0.0095	0.0104
					(0.0050)*	(0.0172)	(0.0193)	(0.0045)**	(0.0070)
Level analysis					0.0089	0.0089	0.0089	0.0065	0.0069
					(0.0044)**	(0.0264)	(0.0155)	(0.0043)	(0.0049)
Capital control					-0.0044	-0.0044	-0.0044	-0.0024	-0.0021
					(0.0027)	(0.0092)	(0.0054)	(0.0041)	(0.0051)
Labor quality control					5.0e-05	5.0e-05	5.0e-05	4.7e-05	-0.0001
					(0.0004)	(0.0078)	(0.0065)	(0.0004)	(0.0007)
Openness					-0.0007	-0.0007	-0.0007	-0.0014	-0.0017
					(0.0011)	(0.0181)	(0.0074)	(0.0047)	(0.0036)
Period dummies					0.0010	0.0010	0.0010	0.0005	0.0005
					(0.0011)	(0.0151)	(0.0133)	(0.0073)	(0.0083)
No. of years					-2.9e-06	-2.9e-06	-2.9e-06	-1.9e-05	-2.6e-05
					(1.6e-05)	(0.0004)	(0.0005)	(1.7e-05)	(1.4e-05)*
Money, M1,2,3 not used					-0.0072	-0.0072	-0.0072	-0.0043	-0.0042
					(0.0043)*	(0.0037)**	(0.0070)	(0.0034)	(0.0038)
R² (model p-val)	0.00	0.00	0.01	0.08	0.12	0.12	0.15	(0.000)	(0.000)
Observations	433	427	427	427	427	427	427	427	427

Notes: Standard errors within parentheses (.). ***,**,* indicate significance at the 10, 5, and 1 percent levels, respectively.
[a] Model not weighted by 1/Se. [b] Model weighted by 1/Se. [c] Outliers excluded (12<t-val<-10). [d] Standard errors clustered by country.
[e] Standard errors clustered by study. [f] Random intercept model with studies nested under country. [g] Non-nested (two-way) random country study-effect model.