

EQUITY MARKET LIBERALIZATION, INDUSTRY GROWTH AND THE COST OF CAPITAL

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This paper examines whether equity market liberalization facilitates economic growth at the industry level. It also explores whether equity market liberalization reduces the cost of capital by scrutinizing a particular mechanism: that liberalization reduces the wedge between the costs of external and internal capital to firms. Using industry-level data on 19 emerging markets and 18 developed countries for the period between 1980-2000, we find a uniform increase in the growth rate of real value added across industries following liberalization in emerging markets. Industries highly dependent on external finance grow faster in liberalized regimes. No additional growth effects are found for industries dependent more on equity finance in emerging markets.

Keywords: Equity Market Liberalization, Growth, Cost of Capital, External Finance Dependence

JEL classification: F3, G15, G28

1. INTRODUCTION

Equity market liberalization is a policy in which a country's government gives foreign investors the opportunity to purchase shares in that country's equity market and domestic investors the right to transact in foreign shares. The 1980s and 1990s have witnessed many developing countries to liberalize their stock markets. Though the recent literature on the benefits and costs of financial globalization for developing countries provides little robust evidence of the growth benefits of broad capital liberalization (Kose *et al.*, 2009), a number of recent papers report that equity market liberalizations boost growth at the aggregate level (Bekaert *et al.*, 2001, 2005, Li, 2004); yet it has proven difficult to find a causal effect of financial integration on growth. Authors of thus macro-level research often tackle potential endogeneity with Instrumental Variables (IV) and dynamic GMM methodologies, etc. We should note,

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nevertheless, that potential endogeneity between financial liberalization and growth remains a problematic issue, and the problem may ultimately be intractable if we solely rely on macro-level data. Looking at more disaggregated data may be one way out, by focusing on the details of theoretical mechanisms through which financial factors affect economic growth, and documenting their working by applying micro-level data. In this paper we examine the empirical relevance of several theoretical channels linking equity market liberalization to economic growth, and use industry-level data to get a handle on the growth-enhancing effects of equity market liberalization.

Recent research provides evidence consistent with the predictions of international asset pricing models that equity market liberalization reduces the cost of capital (e.g., Kim and Singal, 2000). To finance investment projects, firms may raise funds from external sources or use internally generated cash flows. External funds are generally thought to be costlier because of financial market imperfections. Developed financial markets help firms overcome problems of moral hazard and adverse selection, thus reducing firms' cost of raising money from outsiders. If we believe equity market liberalization is a policy leading to more financial development, we have good reasons to expect the cost of external capital to go down after the policy change. Therefore, if equity market liberalization does lower the cost of external capital, it would disproportionately help industries typically dependent on external finance for their growth, and we ought to observe such industries to grow faster after liberalization.

We may predict a reduction in the cost of equity financing in particular. In segmented capital markets, the cost of equity capital is related to the local volatility of the particular market. In integrated capital markets, the cost of equity capital is related to the covariance with world market returns. Since local market volatility tends to be large, the cost of capital should decrease after equity market liberalization. Nevertheless, such theoretical predictions on the reduced cost of equity capital may only apply to emerging markets since stock markets in developed countries tend to be more abreast with the world market. Reduction in the cost of equity capital can also be related to the increased stock prices after equity market liberalization (e.g., Chari and Henry, 2004, and Henry, 2000, 2003). The price of a stock depends on the expected future dividends to be paid by that stock and the discount rate shareholders apply to those expected future dividends. The discount rate has two components, the interest rate and the equity premium. Equity market liberalization helps lower interest rates and equity premium through the inflow of foreign funds. Again, such theoretical predictions may only apply to emerging markets. For developed countries, interest rates tend to be low if they do not have to keep high interest rates to sustain pegged exchange rates, and equity premium may also be low if it is less risky to invest in developed countries. In any case, equity market liberalization is more likely to lower cost of equity capital for emerging markets.

Thus, we are testing the following hypotheses in this research. First, equity market liberalization increases industrial growth in general. Second, equity market liberalization disproportionately helps industries that are more heavily dependent on external funding for their growth. Third, industries in emerging markets that are highly dependent on

equity finance should grow disproportionately faster following liberalization. Using panel data on a large sample of both developed countries and emerging markets, we find evidence of a uniform increase in the growth rate of real value added across industries after equity market liberalization but the growth effects of equity market liberalization are largely driven by emerging markets. No industrial growth effects of equity market liberalization are found for developed countries. Industries highly dependent on external funding appear to grow faster after liberalization, in both developed countries and emerging markets. Nevertheless, little evidence is found that industries more dependent on equity funding grow disproportionately faster after liberalization in emerging markets.

The remainder of the paper is organized as follows. Section 2 discusses related works. Section 3 describes data sources and measurements. Section 4 develops main tests and discusses empirical result. Multiple robustness tests are conducted in Section 5. We conclude and propose future work in Section 6.

2. RELATED LITERATURE

There are a strand of empirical work based on microeconomic (firm-or industry-level) data that show some benefits of financial integration. For example, Bekaert and Harvey (2000) suggested that dividend yields are a reasonable way to examine the impact on the cost of capital and showed that across a range of specifications, the cost of capital always decreases after capital market liberalization. Edison and Warnock (2003) also found a decrease in the dividend yields after a complete liberalization. Our research takes one step further by investigating the growth effects of equity market liberalization through the microeconomic channel of reduced cost of external funding.

Rajan and Zingales (1998) proposed criterion to determine the level of dependence of different industries on external finance and found that industries relatively more in need of external finance develop disproportionately faster in countries with more developed financial markets. Using the Rajan and Zingales' criterion, Gupta and Yuan (2003) used panel data for 19 emerging markets that liberalized stock markets between 1986 and 1995, and found no evidence of a uniform shift across all industrial sectors in average growth following liberalization. Nevertheless, it appears that industries dependent more on external finance experience significantly higher growth following liberalization. Using industry-level panel data of 31 emerging markets 1981-98, Gupta and Yuan (2005) found that following equity market liberalization, industries that are technologically more dependent on external finance experienced higher growth, and liberalizations had a larger impact on the growth of industries facing better growth opportunities. When the liberalization decision is assumed to be endogenous, however, only the former result survives, suggesting that countries may time the liberalization decision to coincide with high growth in certain industries. Hammel (2006) found that

industries more dependent on external finance grow faster in countries with relatively higher stock market capitalization rates. Vlachos and Waldenstrom (2005) used panel data for 42 countries, both developed countries and emerging markets, 1980-1990. They found industries highly dependent on external finance do not experience higher growth in value added in countries with liberalized financial markets. Liberalization does increase the growth rates of both production and firm creation among externally dependent industries - given that countries have reached a relatively high level of financial development. Similar to these studies, our research also adopts Rajan and Zingales' criterion of external finance dependence. Using panel data on a large sample of industries in both emerging markets and developed countries, we provide empirical evidence of a uniform growth benefits across industries following liberalization in emerging markets, and find that industries more dependent on external finance experience faster growth in real value added in liberalized regimes.

3. DATA SOURCES AND MEASUREMENTS

The time period covered is from 1980 to 2000, spanning the equity market liberalization dates for emerging markets. The sample includes 22 industries in 37 countries, among which are 19 emerging markets and 18 developed countries. Details on data description, sources and selection are as follows.

3.1. Measuring External Finance Dependence

An industry's dependence on external finance is defined as the fraction of capital expenditure that is not financed by cash flows generated from operations, adopted from Rajan and Zingales (1998) where they used Compustat data on listed U.S. firms in 1980s to calculate an industry's dependence on external finance. Under the assumption that capital markets in the U.S. for the large listed firms are relatively frictionless, such a measurement captures the differences in the technological demand for external finance among industries. Equity finance dependence is defined as the fraction of capital expenditure financed with net equity issues of U.S. firms in the 1980s, and data are obtained from the 1996 working paper version of Rajan and Zingales (1998). The use of external finance or equity finance by U.S. firms in an industry serves as a proxy for external finance or equity dependence in the same industry in other countries. It does not necessarily mean the same industrial sectors in different countries are required to have the same amount of demand for external funding. The results shall remain valid as long as the rank of order of external dependence across industries is similar across countries.

3.2. Measuring Industry Growth

The main hypothesis to test is that equity market liberalization benefits industries more dependent on external finance and/or equity finance. The availability of cheap external funding affects not only investment but also the ability to finance operations and sales through working capital. Therefore, the most appropriate measure of an industry being better off is the growth in real value added for that industry, an equivalent to real GDP growth at industry level. Data on value added are obtained from the Industrial Statistics Database 2002 compiled by the United National Industrial Development Organization (UNIDO), where data are arranged by the International Standard Industrial Classification (ISIC) of All Economic Activities at the 3-digit level, available for 29 industries in the manufacturing sector.

An industry's annual growth rate of real value added is calculated as the change in the log of real value added in that industry. Since we are comparing within-country between-industry difference in growth of real value added across temporal shocks of equity market liberalization and across industries with different degrees of external dependence of finance, we select the value added series in local currencies from the UNIDO database. Real value added is calculated by deflating nominal value added. The Producer Price Index (PPI) is the prime deflator, and the Wholesale Price Index (WPI) is the alternative if the PPI is not available - both are under Line 63 in the International Financial Statistics (IFS) published by the International Monetary Fund (IMF).

3.3. Dating Equity Market Liberalization

When dating equity market liberalization, 0/1 liberalization indicators based on official equity market liberalization dates are often used (e.g., Bekaert *et al.*, 2003, 2005, and Henry, 2000, 2003). Researchers also construct measures of the intensity of equity market liberalization (e.g., Edison and Warnock, 2003). We choose to use the dichotomous measure since it is more extensively available.

Official equity market liberalization date is defined as a date of formal regulatory change after which foreign investors officially have the opportunity to invest in domestic equity securities, and domestic investors have the right to transact in foreign equity securities abroad. Data on official equity market liberalization dates for emerging markets are from Bekaert *et al.* (2003). Data for developed countries are from Bekaert *et al.* (2003) and Kaminsky and Schmukler (2003). Data for countries that have never been liberalized are from Bekaert *et al.* (2005).

3.4. Sample Selection

The goal is to include in the sample as many industries and countries as possible. The binding constraint is data availability. The industries appearing in both the UNIDO database and Rajan and Zingales (1998) are selected. From the 29 industries in the

UNIDO database we exclude total manufacturing (ISIC 300). We also drop textiles (ISIC 321), paper and products (ISIC 341), industrial chemicals (ISIC 351), machinery except electrical (ISIC 382), machinery electric (ISIC 383), and transport equipment (ISIC 384) for missing data on external dependence. 22 industries remain in sample. Reported in Table 1A are the data of external finance dependence and equity dependence for ISIC industries during the 1980s. The simple correlation coefficient between external finance dependence and equity dependence in the 1980s is 0.75, significant at the 1% level.

Table 1A. Industry Dependence on External Finance and Equity Finance

ISIC code	Industrial Sectors	External Dependence in 1980s (extdep)	Equity Dependence in 1980s (equdep)
311	Food	0.137	0.002
313	Beverages	0.077	0.000
314	Tobacco	-0.451	-0.083
322	Wearing apparel	0.029	0.000
323	Leather	-0.140	0.000
324	Footwear	-0.078	0.036
331	Wood	0.284	0.035
332	Furniture	0.236	0.009
342	Printing & publishing	0.204	0.033
352	Other chemicals	0.219	0.019
353	Petroleum refineries	0.042	0.000
354	Misc. petroleum & coal	0.334	0.057
355	Rubber	0.226	0.107
356	Plastic products	1.140	0.262
361	Pottery/china/earthenware	-0.146	0.110
362	Glass	0.528	0.023
369	Other non-metallic mineral	0.062	0.010
371	Iron & steel	0.087	0.010
372	Nonferrous metals	0.005	0.021
381	Fabricated metal	0.237	0.025
385	Professional & scientific	0.961	0.619
390	Other manufactured	0.470	0.164

Concerning country selection, we begin with the 95 countries included in Bekaert *et al.* (2005) and keep a country in sample if all relevant data are available. 44 countries are excluded due to missing data on the PPI or the WPI. 6 countries are dropped for missing data on value added. We further drop 7 countries that never have open equity markets. We drop Singapore because it is neither an emerging market nor a developed country.

Table 1B. Country Classification, Equity Market Liberalization Date and Sample Range

No.	Country	Official Liberalization Date	Sample Period
Emerging Markets			
1	Chile	1992	1980-2000
2	Colombia	1991	1980-2000
3	Egypt	1992	1980-1998
4	Greece	1987	1980, 1984-2000
5	India	1992	1980-2000
6	Indonesia	1989	1980-1996, 1999-2000
7	Israel	1993	1980-1996
8	Jordan	1995	1980-1997
9	Korea	1992	1980-2000
10	Malaysia	1988	1985-2000
11	Mexico	1989	1980-2000
12	Pakistan	1991	1980-1991
13	Peru	1992	1981-1992, 1995-1996
14	Philippines	1991	1980-1997
15	South Africa	1996	1980-2000
16	Sri Lanka	1991	1980-1983, 1988-1998
17	Tunisia	1995	1980-1981, 1990-1999
18	Turkey	1989	1982-2000
19	Venezuela	1990	1980-1998
Developed Countries			
1	Australia	1973	1980-1992
2	Austria	1973	1980-2000
3	Belgium	1973	1981-1997
4	Canada	1973	1980-2000
5	Denmark	1973	1980-1991
6	Finland	1973	1980-2000
7	France	1973	1980-1990
8	Germany	1973	1980-1993
9	Ireland	1973	1980-2000
10	Italy	1973	1982-2000
11	Japan	1983	1980-2000
12	Netherlands	1973	1980-2000
13	New Zealand	1987	1980-1996
14	Norway	1973	1980-2000
15	Spain	1985	1980-2000
16	Sweden	1973	1980-2000
17	U.K.	1973	1980-2000
18	U.S.	1973	1980-1995, 1997-2000

Eventually 37 countries remain in sample, among which are 19 emerging markets and 18 developed countries, as identified by the International Finance Corporation (IFC). Table 1B lists the country classification, official dates of equity market liberalization and data range for each sample country.

4. EFFECTS OF EQUITY MARKET LIBERALIZATION ON INDUSTRIAL GROWTH

4.1. The Benchmark Model

Two hypotheses to be tested here are: there is a uniform increase in the growth rate of real value added across industries, and industries depending more on external and/or equity financing have relatively higher growth rates after equity market liberalization. Equation (1) is the baseline model.

$$y_{jit} = \beta_0 + \beta_1 * share_{jit-1} + \beta_2 * Lib_{it} + \beta_3 * (dep_j * Lib_{it}) + \lambda_j + \eta_i + \delta_t + \varepsilon_{jit}, \quad (1)$$

where y_{jit} is the annual real growth rate of value added in industry j in country i . $share_{jit-1}$ is the one-year lag of industry j 's share in country i of total value added in manufacturing, computed by dividing the value added of the industry by the total value added in manufacturing (ISIC 300). Lib_{it} is the equity market liberalization indicator which takes a value of one when the equity market is liberalized in year t in country i and zero otherwise. dep_j is the Rajan-Zingales measure of an industry j 's finance dependence, taking either the value of $extdep_j$ or $equdep_j$, representing the measure of external finance dependence or equity dependence in industry j , as listed in Table 1A. λ_j is a set of industry dummies (leaving out one industry). η_i is a set of country dummies (leaving out one country). δ_t is a set of year dummies (leaving out one year). ε_{jit} is the error term.

Equation (1) is similar to a difference in difference approach with a control group in each year that includes those countries having not yet liberalized. Industry dummies are included to control for the worldwide growth rate of each industry. Country dummies are included to correct for country fixed effects. Year dummies are used to control for world business cycles and common shocks. After correcting for all these fixed effects, only variables that vary with at least two of the three dummies need to be included in the model. $share_{jit-1}$ is a variable of such kind where it is included to account for industry-specific convergence.

β_2 and β_3 are coefficients of interest. The former provides a test on the

hypothesis that liberalization increases industry growth by reducing the overall cost of capital; the latter conducts a test on the hypothesis that liberalization facilitates industry growth by reducing the incremental cost of external capital.

4.2. Estimation Results of the Benchmark Model

When reporting estimates, we leave out the estimates for the dummies and report only the coefficient on the lagged industry's share of total value added (β_1), the coefficient on the liberalization indicator (β_2), and the coefficient on the interaction between external dependence and liberalization (β_3). Throughout the paper, the reported t-statistics are robust to heteroskedasticity.

Table 2. Effects of Equity Market Liberalization on Industrial Growth (22 industries, 37 countries, including 18 developed countries and 19 emerging markets, 1980-2000)

	Growth in Real Value Added	
Industry Share	-0.626*** (-6.08)	-0.616*** (-6.01)
Liberalization	0.004 (0.37)	0.006 (0.70)
Extdep* Liberalization	0.035** (2.15)	—
Equdep* Liberalization	—	0.065 (1.43)
Constant	-0.073 (-3.36)	-0.071 (-3.27)
N	13691	13691
R^2	0.039	0.038

Notes: Reported are the OLS estimates for Equation (1). The dependent variable is the annual real growth rate of value added of industries. Estimated t-ratios based on robust standard errors are in parentheses. Industry, country and year dummies are also included but not reported. *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

Table 2 reports the results. The coefficient on lagged industry share is statistically significant and negative, indicating that the next period growth rate in real value added is significantly lower for industries with relatively high market shares. This suggests some pattern of industry-specific convergence. The coefficient on the liberalization indicator is not statistically significant though correctly signed. When the liberalization indicator is interacted with the measure of external finance dependence, the coefficient is statistically significant and positive, indicating industries more dependent on external

capital are likely to grow faster after liberalization. Nevertheless, when the liberalization indicator is interacted with the measure of equity dependence, the coefficient is no longer statistically significant. This suggests that liberalization reduces capital market imperfections that drive the wedge between internal and external sources of finance, but there is no evidence that liberalization reduces the incremental cost of equity borrowing.

We can use the figures in Table 2 to infer how much higher the real growth rate of value added can be for some industries. Of the 22 sample industries, the industry at the 20th percentile of dependence on external finance (low dependence) is Leather (ISIC 323). The industry at the 80th percentile (high dependence) is Glass (ISIC 362). The external finance dependence level is -0.14 and 0.528 for the two industries, respectively. Using the estimated coefficient of the interaction between the liberalization indicator and external finance dependence in Table 2 (0.035), the annual growth of real value added for Leather actually drops by 0.49 percent following liberalization. The annual growth rate of real value added for Glass increases by 1.85 percent after liberalization. Thus, in a liberalized regime, on average, Glass should grow 2.34 percent faster than Leather in real value added. Comparing to the average annual growth rate in real value added of 2.80 percent across sample industries in all sample countries 1980-2000, a difference of 2.34 percent is large.

In the benchmark model, the liberalization indicator is constrained to have the same coefficient across countries. This greatly enhances the power of the tests, but it is doubtful that equity market liberalization has the same impact on emerging markets as on developed countries. By allowing heterogeneous parameters for developed countries and emerging markets in the following, we explore the possibility of systematic differences in the liberalization effects on industrial growth across the two groups of countries.

4.3. Testing Systematic Differences between Developed Countries and Emerging Markets

In this test, we split the sample countries by the stage of development, having one group of 18 developed countries and the other of 19 emerging markets, and test for parameter heterogeneity.

The estimation results for the two sub-samples are reported in Table 3 and 4. Different results appear. In Table 3, neither the coefficient on the liberalization indicator nor that on the interaction term generates significant results for developed countries. In Table 4 by contrast, the coefficient estimate on the liberalization indicator is statistically significant and positive across both specifications, suggesting that liberalization has a uniform effect on industrial growth for emerging markets. However in Table 4, the coefficient on the interaction between external finance dependence and liberalization fails to generate significant results for emerging markets. Therefore, Table 4 provides little evidence that industries depending more on equity financing grow faster in emerging markets after liberalization.

Table 3. Liberalization's Effect on Industrial Growth
(22 industries, 18 developed countries, 1980-2000)

	Growth in Real Value Added	
	Industry share	-0.198* (-1.72)
Liberalization	-0.015 (-0.87)	-0.016 (-1.01)
Extdep*liberalization	-0.000 (-0.01)	—
Equdep*liberalization	—	0.022 (0.32)
Constant	-0.044 (-2.58)	-0.046 (-2.67)
N	6572	6572
R ²	0.0709	0.071

Notes: Reported are the OLS estimates for Equation (1) using data for 18 developed countries in sample. The dependent variable is the annual real growth rate of value added of industries. Estimated t-ratios based on robust standard errors are in parentheses. Industry, country and year dummies are also included but not reported. *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

Table 4. Liberalization's Effect on Industrial Growth
(22 industries, 19 emerging markets, 1980-2000)

	Growth in Real Value Added	
	Industry share	-0.947*** (-7.11)
Liberalization	0.047*** (2.79)	0.050*** (3.18)
Extdep*liberalization	0.038 (1.56)	—
Equdep*liberalization	—	0.063 (0.84)
Constant	-0.077 (-2.42)	-0.075 (-2.36)
N	7119	7119
R ²	0.040	0.040

Notes: Reported are the OLS estimates for Equation (1) using data for 19 emerging markets in sample. The dependent variable is the annual real growth rate of value added of industries. Estimated t-ratios based on robust standard errors are in parentheses. Industry, country and year dummies are also included but not reported. *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

The pattern of cost of equity finance dropping more in emerging markets can also be tested in an alternative way, that is, to introduce a dummy variable for emerging markets to the baseline model and use developing countries as references to test whether systematic differences exist in the liberalization's effect on industrial growth between emerging markets and developed countries. The equation is as follows.

$$y_{jit} = \beta_0 + \beta_1 * share_{jit-1} + \beta_2 * Lib_{it} + \beta_3 * Lib_{it} * EM + \beta_4 * (dep_j * Lib_{it}) + \beta_5 * (dep_j * Lib_{it} * EM) + \lambda_j + \eta_i + \delta_t + \varepsilon_{jit}, \quad (2)$$

where EM is the dummy variable for emerging markets. All other variables share the same explanations as in Equation (1). In Equation (2), β_3 and β_5 are the coefficients of interest.

Table 5. Testing Systematic Differences between Developed Countries and Emerging Markets (22 industries, 37 countries, 1980-2000)

	Growth in Real Value Added	
Industry share	-0.625*** (-6.07)	-0.617*** (-6.05)
Liberalization	-0.014 (-0.95)	-0.011 (-0.77)
Liberalization*EM	0.020 (1.19)	0.020 (1.25)
Extdep*Lib	0.035** (2.30)	—
Extdep*Lib*EM	-0.001 (-0.04)	—
Equdep*Lib	—	0.068 (1.63)
Equdep*Lib*EM	—	-0.009 (-0.13)
Constant	-0.075 (-3.41)	-0.073 (-3.32)
N	13691	13691
R^2	0.0386	0.0384

Notes: Reported are the OLS estimates for Equation (2). The dependent variable is the annual real growth rate of value added of industries. Estimated t-ratios based on robust standard errors are in parentheses. Industry, country and year dummies are also included but not reported. *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

Table 5 reports the estimation results for Equation (2). Still, we do not find significant growth effects of liberalization for developed countries. The statistically significant and positive estimated coefficient on the term $extdep * Lib$ indicates that industries highly dependent on external financing grow faster following liberalization, consistent with Table 2. No evidence is found that industries highly dependent on equity financing grow disproportionately faster in emerging markets following liberalization.

Summarizing Table 2-5, the industrial growth effects of equity market liberalization are primarily driven by emerging markets. Industries that are more dependent on external source of finance grow disproportionately faster after liberalization. No additional growth benefits are found for industries that are highly dependent on equity financing in emerging markets.

5. ROBUSTNESS TESTS

In each of the following robustness tests, we run two sets of regression, one for the full 37-country sample and the other for the 19 emerging markets only.

Instead of reduced cost of external capital, an alternative explanation for the observed relationship between equity market liberalization and industrial growth is that the measures of external finance dependence act as proxy for relative investment intensity, thus liberalization facilitates industry growth by providing more capital rather than by decreasing the cost wedge between internal and external finance. Using data on capital expenditures from Rajan and Zingales (1998), we test whether investment intensity rather than external dependence drives the results. Investment intensity is defined as the ratio of capital expenditure to net property plant and equipment. The model for the robustness test is as follows.

$$y_{jit} = \beta_0 + \beta_1 * share_{jit-1} + \beta_2 * Lib_{it} + \beta_3 * (dep_j * Lib_{it}) + \beta_4 * (inv_j * Lib_{it}) + \lambda_j + \eta_i + \delta_t + \varepsilon_{jit}, \quad (3)$$

where inv_j is the investment intensity of industry j . All other variables share the same explanations as in Equation (1).

The estimation results of Equation (3) are in Table 6. All estimated coefficients are statistically insignificant except the coefficient on industry share which captures industry-specific convergence. This may be due to multicollinearity. The simple correlation coefficient between external finance dependence and investment intensity is 0.78, and that between equity dependence and investment intensity is 0.71, both significant at the 1% level. Column 3 and 6 are estimates for a regression where the only interaction term is between investment intensity and liberalization. Neither of the coefficient estimates on the interaction is statistically significant. There is no evidence that more investment intensive industries grow faster following liberalization.

Table 6. Robustness Test: External Dependence vs. Investment Intensity
(22 industries, 1980-2000)

	Growth in Real Value Added					
	37 Countries			19 Emerging Markets		
	1	2	3	4	5	6
Industry share	-0.627*** (-6.04)	-0.624*** (-6.01)	-0.624*** (-6.01)	-0.947*** (-7.10)	-0.945*** (-7.09)	-0.946*** (-7.10)
Liberalization	-0.001 (-0.04)	-0.017 (-0.54)	-0.026 (-1.03)	0.049 (1.08)	0.024 (0.53)	0.017 (0.45)
Extdep*Lib	0.031 (1.30)	—	—	0.040 (1.19)	—	—
Equdep*Lib	—	-0.030 (-0.47)	—	—	0.025 (0.25)	—
Inv*Lib	0.031 (0.16)	0.094 (0.83)	0.133 (1.62)	-0.012 (-0.07)	0.102 (0.65)	0.135 (1.13)
Constant	-0.073 (-3.29)	-0.074 (-3.34)	-0.075 (-3.35)	-0.077 (-2.39)	-0.077 (-2.42)	-0.078 (-2.42)
N	13691	13691	13691	7119	7119	7119
R ²	0.0385	0.0384	0.0384	0.0404	0.0403	0.0403

Notes: Reported are the OLS estimates for Equation (3). The dependent variable is the annual real growth rate of value added of industries. Estimated t-ratios based on robust standard errors are in parentheses. Industry, country and year dummies are also included but not reported. *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

Another robustness test is to include an interactive term between liberalization and some measure of financial development to the baseline model, equivalent to looking for a growth effect of equity market liberalization on top of the growth effects of financial development. This is important since a possible channel through which equity market liberalization can affect growth is by enhancing domestic financial development. We use domestic credit to private sector as a share of GDP as a measure of financial development and estimate the following equation.

$$y_{jit} = \beta_0 + \beta_1 * share_{jit-1} + \beta_2 * Lib_{it} + \beta_3 * (dep_j * Lib_{it}) + \beta_4 * (dep_j * FD_{it}) + \lambda_j + \eta_i + \delta_t + \varepsilon_{jit}, \quad (4)$$

where $FD_{i,t}$ is the level of financial development in country i in year t . Data are from Financial Structure and Economic Development Database (1999). All other variables share the same explanations as in Equation (1).

The estimation results of Equation (4) are in Table 7. The findings are consistent with Table 2 and Table 4. The industrial growth effect of equity market liberalization is

positive and statistically significant only for emerging markets. Given the level of financial development, industries heavily dependent on external finance grow faster after liberalization using the 37-country sample while industries heavily dependent on equity finance do not grow disproportionately faster following liberalization in emerging markets.

Table 7. Robustness Test: Financial Liberalization vs. Financial Development
(22 industries, 1980-2000)

	Growth in Real Value Added			
	37 countries		19 emerging markets	
Industry share	-0.819*** (-7.13)	-0.803*** (-7.04)	-1.056*** (-7.19)	-1.045*** (-7.12)
Liberalization	0.012 (1.07)	0.014 (1.36)	0.048** (2.45)	0.050*** (2.72)
Extdep*liberalization	0.031* (1.66)	—	0.037 (1.22)	—
Extdep*FD	0.016 (1.31)	—	0.025 (1.58)	—
Equdep*liberalization	—	0.062 (1.13)	—	0.076 (0.80)
Equdep*FD	—	0.022 (0.61)	—	0.027 (0.60)
Constant	-0.068 (-2.90)	-0.065 (-2.77)	-0.059 (-1.76)	-0.055 (-1.63)
N	11276	11276	5840	5840
R ²	0.0428	0.0425	0.0412	0.0409

Notes: Reported are the OLS estimates for Equation (4). The dependent variable is the annual real growth rate of value added of industries. Estimated t-ratios based on robust standard errors are in parentheses. Industry, country and year dummies are also included but not reported. *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

To reduce the impact of outliers, we constrain the regression to only including data with growth rate in real value added between -1 and +1. The estimates reported in Table 8 show that the exclusion of outliers strengthens industrial growth effects of liberalization with two highlights. First, the growth effects become statistically significant for the full sample of 37 countries. Second, the coefficient estimate for the interaction between external finance dependence and liberalization that is not statistically significant in Table 4 becomes statistically significant for emerging markets.

Table 8. Robustness Test: Excluding Outliers (22 industries, 1980-2000)

	Growth in Real Value Added			
	37 Countries		19 Emerging Markets	
Industry share	-0.414*** (-5.05)	-0.402*** (-4.92)	-0.647*** (-6.00)	-0.643*** (-5.96)
Liberalization	0.013** (1.97)	0.016** (2.54)	0.049*** (4.23)	0.052*** (4.56)
Extdep*liberalization	0.034*** (2.61)	—	0.029* (1.68)	—
Equdep*liberalization	—	0.056 (1.60)	—	0.046 (0.92)
Constant	-0.030 (-1.60)	-0.028 (-1.71)	-0.055 (-2.26)	-0.054 (-2.20)
N	13552	13552	6993	6993
R ²	0.0502	0.0506	0.0589	0.0586

Notes: Reported are the OLS estimates for Equation (1) by excluding outliers with growth rate in real value added over +1 or below -1. The dependent variable is the annual real growth rate of value added of industries. Estimated t-ratios based on robust standard errors are in parentheses. Industry, country and year dummies are also included but not reported. *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

The last test we check is policy coincidence. A plausible explanation for the observed relationship between equity market liberalization and industrial growth is that industries more dependent on external capital grow faster due to other economic reforms that often accompany equity market liberalization, for instance trade liberalization. To isolate the effects of trade development on industrial growth, we include trade in Equation (1) as an additional control variable.

$$y_{jit} = \beta_0 + \beta_1 * share_{jit-1} + \beta_2 * Lib_{it} + \beta_3 * (dep_j * Lib_{it}) + \beta_4 * Trade_{it} + \lambda_j + \eta_i + \delta_t + \varepsilon_{jit}, \quad (5)$$

where $Trade_{i,t}$ is the sum of annual exports and imports of goods and services as a share of GDP. Data are from World Bank's World Development Indicators (WDI 2001). All other variables share the same explanations as in Equation (1).

The estimation results of Equation (5) are in Table 9. Trade measure does have a separate effect on industrial growth, but including the trade measure does not change any of our major estimation results. Still, the liberalization's effect on industrial growth appears to be statistically positive for emerging markets only, and the coefficient estimate for the interaction term between external finance dependence and liberalization is statistically positive using the 37-country sample.

Table 9. Robustness Test: Financial Liberalization vs. Trade Liberalization
(22 industries, 1980-2000)

	Growth in Real Value Added			
	37 Countries		19 Emerging Markets	
Industry share	-0.614*** (-5.95)	-0.604*** (-5.89)	-0.937*** (-7.20)	-0.932*** (-6.99)
Liberalization	0.005 (0.52)	0.008 (0.86)	0.049*** (2.92)	0.052*** (3.32)
Extdep*Lib	0.035** (2.16)	—	0.038 (1.57)	—
Equdep*Lib	—	0.065 (1.44)	—	0.064 (0.85)
Trade	0.001*** (4.14)	0.001*** (4.14)	0.001** (2.40)	0.001** (2.40)
Constant	-0.134 (-5.21)	-0.133 (-5.15)	-0.125 (-3.39)	-0.132 (-3.34)
N	13691	13691	7119	7119
R ²	0.0401	0.0399	0.0412	0.0410

Notes: Reported are the OLS estimates for Equation (5) by including trade development to the baseline model. The dependent variable is the annual real growth rate of value added of industries. Estimated t-ratios based on robust standard errors are in parentheses. Industry, country and year dummies are also included but not reported. *** significant at 0.01 level; ** significant at 0.05 level; * significant at 0.10 level.

6. CONCLUSION

In this paper we analyzed the growth effects of equity market liberalization at the industry level by scrutinizing one rationale for liberalization to affect industrial growth: equity market liberalization reduces the cost of external finance to firms. Using panel data on a large sample of industries in both emerging markets and developed countries, we presented empirical evidence of a uniform increase in industrial growth following equity market liberalization in emerging markets. Additional results showed industries highly dependent on external finance tend to experience significantly higher growth in real value added in liberalized regimes. Nevertheless, little evidence was found supporting the additional growth effects on industries highly dependent on equity finance in emerging markets.

Overall this paper used industry-level data to provide empirical evidence and informative insights about the growth effects of equity market liberalization, channels through which these effects operate, and systematic difference of growth effects of liberalization between developed countries and emerging markets. Since industries' level of external finance or equity dependence may vary over time, further research could be done to update the measures for applying to more recent decades so that similar research

can be conducted to ascertain the impact of equity market liberalization on industrial growth.

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