



# Financial Markets Development and Financing Choice of Firms: New Evidence from Asia

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## Abstract

This paper investigates the effects of financial markets development on the financing choice of firms in developing and developed Asian market economies. The panel data regression models were used for a mean total of 6506 non-financial listed companies during 1995–2016 for 12 Asian economics. The estimated econometric models included short-term, long-term and total debt-equity ratios as dependent variables which were regressed on financial markets development variables (such as banking sector development and stock market development indicators) along with macroeconomic variables (such as inflation, GDP growth, FDI and firm-specific variables (such as ratio of total assets to GDP, ratio of dividends to total assets and ratio of net sales to net fixed assets) as control variables. Also, financing choice of firms in developed and developing stock markets was estimated by splitting the sample into subsamples of developing and developed stock markets. The financial development indicators such as domestic credit to private sector by banks and stock market capitalization exhibited contrasting differences between the selected developing and developed Asian economies. The econometric results indicated that the banking sector and stock market development indicators significantly have opposite effects on the financing choice of the selected firms: banking variable is associated with a rise in the debt-equity ratio whereas stock market variable is associated with a fall in leverage ratio. The econometric effects of stock market development on firms financing choices in developing and developed stock markets showed a remarkable divergence. The evidence indicated that the estimated coefficient of the banking sector indicator in the developed stock market subsample was consistently negative for all the three leverage ratios whereas the coefficient in the developing stock market subsample was positive and significant. The important conclusion of the study is that though banking sector and stock market play different roles are however, complementary to each other suggesting that the policymakers should aim to develop banking sector and stock market simultaneously which will help firms to design their optimal financing choices.

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**Keywords** Financial development · Financing choice · Leverage ratio · Panel data · Asia

## 1 Background

Over the decades, economic and financial theorists have empirically tested the validity of Modigliani and Miller's (1958) seminal proposition which stated that a corporate firm's value is independent of its mix of debt–equity and sought conditions under which financial structure of firms would matter. Evidence on capital structure decisions of firms suggests that numerous factors influence the mix of debt–equity. Some of the prominent factors are asymmetric information, differential taxation of income from various sources, bankruptcy costs and risks, agency problem and issues of control and dilution (Agarwal and Mohtadi 2004). Elaborate discussion on various factors effecting capital structure choice of firms can be found in two notable surveys viz., Harris and Raviv (1991) and Hart (2001). In a world of imperfect capital market setting, the financing choice of firms becomes critical as it affects the cost of capital which in turn affects the value of the firm (Boyd and Smith 1998; Hovakimian et al. 2001; Pagano 1993).

In nutshell, modern research in corporate finance has recognized that informational asymmetries and imperfections of capital markets affect both the corporate firm's capability to raise and invest funds. Though evidence from industrialized and developing economies suggests that asymmetric information and imperfections in capital markets affect the firm's investment and financial decisions significantly, relatively there has been little research on the effect of the level of financial markets development on the firm's financing choice or decisions especially for industrial and emerging economies of Asia. The relationship between financial markets development and the financing choice of firms assumes importance because the interactions in the financial markets where firms source their capital can have remarkable effects for the existing choice of financing thereby having significant implications for managers (Bokpin 2009).

According to Goldsmith (1969) and Gurley and Shaw (1955), the level of development of financial market helps the emergence and expansion of debt-oriented finance to the realization of stock markets which substitutes the use of debt with increasing use of equity capital as an additional financing instrument. However, in general since debt financing and equity financing are not perfect substitutes both the financial intermediation and the stock market play a significant role in meeting the financing needs of corporate firms.

Development of financial markets takes place through various distinct stages as it is a multi-faceted process. For example, financial intermediation particularly leads to a greater quality of information, a larger pooling of risks, a smaller cost of transactions and a smaller cost of monitoring (Bencivenga and Smith 1991; Blackburn and Hung 1998; Bose and Cothren 1997; Cooley and Smith 1998; Greenwood and Jovanovic 1990; King and Levine 1993; Sussman 1993; Zilibotti, 1994). Similarly, development of stock market plays a key role in mitigating the agency problem that may arise between various stakeholders of a corporate firm. Stock markets not only

**Table 1** Country-wise number of average firms *Source:* Authors calculations based on COMPUSTAT global database

Economy	Average no. of firms	Percentage share (%)
China	1907	29.31
Hong-Kong	62	0.95
India	1146	17.61
Pakistan	94	1.45
Philippines	37	0.57
Indonesia	50	0.76
Israel	46	0.71
Japan	1991	30.61
South Korea	588	9.04
Malaysia	305	4.68
Singapore	176	2.70
Thailand	104	1.59

provide entrepreneurs with liquidity but also provide with opportunities to diversify their portfolios (Demirguc-Kunt and Maksimovic 1996). Further, stock trading diffuses information about the firm's performance and future prospects to potential investors and creditors (Demirguc-Kunt and Maksimovic 1996).

In this context, though the differences in financial markets have been observed in the empirical literature, there have been little attempts to investigate and examine the effects of development of financial markets on firms' capitals structure decisions. Modelling this process has so far escaped the attention of most researchers especially (as noted before) for industrialized and emerging economies of Asia. Further, given the fact that different economies have different institutional and legal environment and macro factors existing empirical literature suggests that not many studies have attempted to formally model the effect of financial market development on corporate firm's capital structure decisions.

Few notable studies are Demirguc-Kunt and Maksimovic's (1996) study which empirically examined the effects of stock market development on firms' financing choices using data from 30 developing and industrial countries from 1980 to 1991. Their results observed a high debt-equity ratio during the initial developments in the functioning of a developing stock market. The stock markets that are already developed, further development leads to a substitution of equity for debt financing. Later, Boyd and Smith's (1996, 1998) analysis of debt financing versus equity financing for capital investments noted that as the economy grows, corporate firm's equity financing also raises which results in fall of debt-equity ratio. Similarly, Agarwal and Mohtadi (2004) investigated the role of financial market development

in the financing choice of firms in 21 developing countries from 1980 to 1997 using a dynamic panel approach with aggregate firm-level data. Their results suggest that banking sector development favors debt financing over equity financing while stock market development favors equity financing over debt financing. Further, Blackburn et al. (2005) based on their analysis provide a theory of the joint determination of real and financial development, with the ability to explain both the endogenous development of equity markets and the complementarity between equity and debt finance.

Noting, the above discussion, this study empirically investigates the effect of financial market development on the financing choices of firms for a group of Asian economies. This relationship is investigated by examining the evidence on the relationship between the capital structure decisions of Asian firms and the level of financial market development using comprehensive firm-level data from 12<sup>1</sup> Asian economies that vary in financial market structure and development. Specifically, the paper re-investigates the extent to which the variation in the aggregate debt-equity ratios for a mean total of 6506 (Table 1) non-financial listed companies comprising of industries such as manufacturing, mining, electricity, services, construction and real estate for a period of 22 years (1995–2016) can be examined by the level of Asia's development of financial markets, macroeconomic and firm specific variables. Also, financing choice of firms in developed and developing markets is investigated to gauge the effect of level of stock market development on firms' capital structure decisions.

The present paper contributes to the existing literature by providing evidence through a systematic cross-country investigation of the interactions between financial market development and different leverage ratios with recent firm-level datasets that include a large number of firms covering many emerging and developed Asian economies with varying level of financial development.

## 2 Framework for Empirical Analysis

### 2.1 Sample, Data and Variables Measurement

The data on firm specific variables for 12,001 unique non-financial listed and active firms from 1995 to 2016 for 12 industrial and emerging Asian economies are collected from Standard and Poor (S&P) COMPUSTAT Global database. However, in case of five Asian economies [such as China (2003–2016); Hong-Kong (1998–2016); India (2003–2016); Pakistan (1996–2016); Philippines (1996–2016)] the data on some of the firm specific variables is not available since 1995 whereas

<sup>1</sup> The 12 Asian economies (China; Hong-Kong; India; Pakistan; Philippines; Indonesia; Israel; Japan; South Korea; Malaysia; Singapore and Thailand) are mainly selected based on the availability of data required for the study. These economies either have a well-developed or emerging financial market and the data on firm specific variables for non-financial listed firms is available for a sufficiently large number of companies from 1995.

**Table 2** Economic and financial development indicators: select Asian economies *Source:* Authors calculations based on the data collected from WDI, World Bank

Economy	GDP per capita, 2010 (Constant, U.S. \$)	Average annual growth in GDP Per capita 1995–2016 (%)	Average annual growth in GDP, 1995–2016 (%)	Average annual inflation, 1995– 2016 (%)	Domestic credit to private sector by banks to GDP (annual average)	Stock market capitalization to GDP (annual average)
Japan	43,817.44	0.88	0.56	-0.16	115.40	66.08
Singapore	40,232.70	3.01	5.39	1.77	106.21	213.14
Israel	28,741.75	1.63	3.65	1.73	69.09	75.76
Hong-Kong	28,327.81	2.46	3.51	1.50	171.86	792.43
South Korea	18,812.30	3.89	3.71	2.38	128.91	79.24
Malaysia	8283.33	2.99	5.05	2.45	117.72	141.97
Thailand	4444.66	2.75	3.57	2.45	107.20	70.54
China	3409.10	8.63	9.30	2.75	127.15	54.58
Indonesia	2777.00	3.07	4.46	11.21	29.28	26.51
Philippines	1940.12	2.91	5.09	4.48	35.18	57.33
India	1095.11	5.38	7.76	7.47	47.48	78.17
Pakistan	966.03	1.81	3.54	9.67	22.50	19.79
Average	15,237.28	3.28	4.63	3.97	89.83	139.63

for rest of the seven countries [such as Indonesia (1995–2016); Israel (1995–2016); Japan (1995–2016); South Korea (1995–2016); Malaysia (1995–2016); Singapore (1995–2016) and Thailand (1995–2016)] the complete data is available from 1995 giving us an unbalanced panel set. Country-wise average number of firms included in the study is given in Table 1.

Country-wise time series macroeconomic variables are culled from the World Development Indicators (WDI) of the World Bank. Table 2 reports, some of the important economic and financial development indicators of the selected Asian economies ranked from highest to lowest in order of 2010 GDP per capita. From the table it is observed, that the sample of selected economies exhibits a wide range of economic and financial development. For instance, the GDP per capita for the sample economies for 2010 ranged from \$966.03 (Pakistan) to \$43817.44 (Japan). The GDP per capita of economies such as Singapore; Israel; Hong-Kong and South Korea including Japan is higher than the sample average GDP per capita (\$15237.28) of the selected economies. Rest of the sample economy's (Malaysia, Thailand, China, Indonesia, Philippines, India and Pakistan) GDP per capita for 2010 is lower than the sample average. Economies such as China (8.63%); India (5.38%) and South Korea (3.89%) registered higher annual average growth in GDP per capita compared to the sample average (3.28%) during the study period relative to other economies. Further, with respect to average annual growth in GDP during 1995–2016 economies such as China (9.30%); India (7.76%); Singapore (5.39%); Philippines (5.09%) and Malaysia (5.05%) experienced growth higher than the sample average (4.63%). Some sample economies, especially Indonesia; Pakistan and India experienced relatively high rates of inflation during 1995–2016 compared to other sample Asian economies.

The financial development indicators such as domestic credit to private sector by banks (banking sector development indicator) and stock market capitalization (stock market development indicator) also exhibit contrasting differences between the selected sample Asian economies. For example, the annual average ratio of domestic credit to private sector by banks to GDP which measures the size of the banking sector is higher for economies like Hong-Kong (171.86); South Korea (128.91); China (127.15); Malaysia (117.72); Japan (115.40); Thailand (107.20) and Singapore (106.21) compared to the sample average (89.83) demonstrating a fairly developed banking system. The annual average ratio of stock market capitalization to GDP which measures the stock market's ability to allocate capital to investment projects and provide significant opportunities for risk diversification for investors (Demirgiic-Kunt and Maksimovic 1994) is found to be high in case of economies such as Hong-Kong (792.43); Singapore (213.14) and Malaysia (141.97) compared to the sample average (139.63) indicating a fairly developed stock market. Since Hong-Kong,

Singapore and Malaysia have higher annual average ratio of stock market capitalization to GDP compared to sample average the stock market of these economies can be regarded as developed whereas others can be considered as developing.

Based on the literature, the present study uses two empirical indicators to measure the significance of the banking sector development and two empirical indicators to measure the significance of the stock market development for each of the economies in our sample. Similarly, short-term debt-equity, long-term debt-equity ratio and total debt-equity ratio are used distinctly instead of combining them. This helps one to understand and examine whether firms differentiate between various financing instruments like banks versus stock market to finance short-term, as compared to long-term needs (Agarwal and Mohtadi 2004).

Finally, along with the financial market development indicators, other control firm-specific and macroeconomic variables that affect the firms financing choice are also used in the econometric analysis. The following is the list and measurement<sup>2</sup> of variables used in the analysis:

- (1) *Banking sector development indicators* Following literature, two measures are used viz., broad money (BM) and domestic credit to private sector by banks<sup>3</sup> (DCP) to measure the banking sector development. Broad money (BM) divided GDP is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper. DCP is measured as domestic credit to private sector by banks divided by GDP. BM is an indicator of the size of the banking sector in relation to the economy as a whole. Past studies have used this indicator to study the effect of the financial sector on the growth of the economy (King and Levine 1993; Levine and Renelt 1992). DCP is also an indicator of the size of the banking sector.
- (2) *Stock market development indicators* Based on literature, two measures are used viz., market capitalization ratio (MCR) and turnover ratio (TOR) to measure the stock market development. MCR is measured as the value of listed shares divided by GDP. The assumption behind this measure is that overall market size is positively correlated with the ability to mobilize capital and diversify risk on an economy wide basis (Agarwal and Mohtadi 2004). TOR is measured as the ratio of total value of shares traded to GDP. High turnover is often used as an indicator of low transaction costs. The TOR compliments the MCR. A large but inactive market will have a large MCR but a small TOR (Agarwal and Mohtadi 2004). As noted before, MCR mainly measures the stock market's ability to

<sup>2</sup> The definition/measurement of macroeconomic and firm-specific variables is directly taken from the respective source of database.

<sup>3</sup> Domestic credit to private sector by banks refers to financial resources provided to the private sector by other depository corporations (deposit taking corporations except central banks), such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment.

allocate capital to investment projects and to provide momentous opportunities for risk diversification for investors. TOR is also an indicator of market liquidity. It measures the ability to trade economically significant positions on the stock market (Demirgiic-Kunt and Maksimovic 1996).

- (3) *Leverage of firms* As noted before, three alternate measures of firm leverage are used. First, short-term debt-equity ratio (SDER) which signifies the short-term financing needs of firms is calculated by dividing the debt in current liabilities (Item G132) by common equity-total (Item G227). It is presented in ratio form. Debt in current liabilities (Item G132) represents the total amount of short-term notes and the current portion of long-term debt that is due in 1 year. It includes several items like bank acceptances and overdrafts, brokerage companies' drafts payable commercial paper, construction loans, current portion of long-term debt, debt in default, debt due on demand, due to factor if "interest bearing", instalments on a loan, line of credit, loans payable to officers of the company, loans payable to parents, and consolidated or unconsolidated subsidiaries, loans payable to stockholders, notes payable to banks and others, notes payable that are included in accounts payable, unless specifically trade notes payable, sinking fund payments. This item may include mortgage indebtedness for banks (included in current liabilities –other, if identifiable). The common equity-total (Item G227) represent the common shareholders' interest in the company. It includes common stock (including effects of common treasury stock), capital surplus, retained earnings, and treasury stock adjustments for both common and nonredeemable preferred stock.

Second, long-term debt equity ratio (LDER) which indicates the long-term financing needs of firms is derived by dividing the long-term debt-total (Item G135) by common equity-total (Item G227). It is presented in ratio form. The long-term debt total of a firm refers to the debt obligations due more than 1 year from the company's balance Sheet date or due after the current operating cycle. It includes debt obligations like bonds, loans, mortgages, advances from other firms, instalment obligations, line of credit (when reclassified as a non-current liability), loans on insurance policies and long-term lease obligations (capitalized lease obligations).

Third, total debt equity ratio (DER) which measures the firm's total capital structure is defined as the sum of long-term debt (Item G135) and debt in current liabilities (Item G132), divided by Common equity-total (Item G227). It is presented in ratio form.

- (4) *Control variables* As mentioned before, to isolate the contribution of financial market development to the firms' choice of financial structure, this study controls for other variables using both firm-specific and macroeconomic variables that may affect the firm's financing choice. *Firm specific variables are as follows:* (1) ratio of total assets to GDP (TAGDP). Assets-total (Item G107) represents current assets plus net property, plant, and equipment plus other noncurrent assets (including intangible assets, deferred charges, and investments and advances).



- (2) ratio of dividends to total Assets (DIVTA). Dividends represents the amount of dividends-total (Item G425) (other than stock dividends) declared on all equity capital of the company, based on the current year's net income. (3) ratio of net sales to net property, plant, and equipment (NSNFA). Net sales (Item G608) represents gross sales reduced by cash discounts, trade discounts, returned sales, excise taxes, and value-added taxes and allowances for which credit is given to customers while net property, plant, and equipment (Item G85) represents the net cost or valuation of tangible fixed property used in the production of revenue.
- (2) *Macro variables are as follows* (1) foreign direct investment, net inflows as percentage of GDP (FDIP), which is defined as the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP. (2) inflation, consumer prices (annual %) (PRICE) 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 is fixed or changed at specified intervals, such as yearly. The Laspeyres formula is used. (3) GDP growth (annual %) (GDPG) is the annual percentage growth rate of GDP at market prices based on constant local currency. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

## 2.2 Econometric Modeling

Using the following financial structure econometric model (1), the impact of financial market development on capital structure choices of firms is estimated:

$$DER_{it} = \alpha_i + \beta' X_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \quad (1)$$

where DER is debt-equity ratio,  $X$  is a vector of explanatory variables which include the banking sector development variable, the stock market development variable, macroeconomic variables and firm specific variables.  $\lambda$ ,  $\gamma$ ,  $\varepsilon$  respectively represent country-specific effects, time-specific effects, and the stochastic error term in the econometric equation. The subscript  $i$  and  $t$  represent the country and time, respectively. A positive estimate of coefficient for the banking sector variable indicates that firm leverage increases with a marginal development in banking sector, leading firms to borrow more debt. In case of stock market development variable, a negative estimate of coefficient indicates that firm leverage decreases with development in stock market, implying firms substitute equity for debt. However, if the estimate coefficient of banking sector variable is negative and stock market variable is positive it implies complementarities between debt and equity finance.

Also, to test whether firms try to maintain a specified debt-equity ratio (target debt level) as proposed by Rajan and Zingales (1998), a lagged value of dependent variable is added to model (1). It is important to note that if debt level is above a target level firms tend to issue equity whereas if debt level is below a target level firms tend to issue debt. According to Agarwal and Mohtadi (2004) with no flotation costs, such adjustments can be instantaneous and continuous. However, in real world since flotation costs do exist it is imperative that the firm's debt-equity ratio fluctuates around its debt target level. As the debt target level is unobserved directly, its past behavior can be examined by including the one lagged term of the dependent (debt-equity ratio) variable under the framework of dynamic panel modeling. The dynamic panel model is specified below:

$$DER_{it} = \alpha_i + \psi DER_{it-1} + \beta' X_{it} + \lambda_i + \gamma_t + \varepsilon_{it} \quad (2)$$

where  $DER_{it-1}$  is one lagged value of debt-equity ratio. The leverage ratio will be stable and convergent over time, if the estimated coefficient of the lagged dependent variable is below unity suggesting that firms would not tend to alter the debt-equity ratio. But the leverage ratio will be unstable and divergent over time, if the estimated coefficient of the lagged dependent variable is above unity suggesting that firms will choose different debt-equity ratios depending on the stage of development of the economy and do not aim at maintaining a fixed debt-equity ratio over time (Demirguc-Kunt and Maksimovic's 1996).

The panel data regression models are estimated using the fixed effects or least-squares dummy variable (LSDV) approach and the random effects approach using OLS. For choosing between fixed effects and the random effects model the assumption one makes about the likely correlation between the cross-section specific error component ( $\varepsilon_i$ ) and the X regressors is important. If it is assumed that error component and the X's are uncorrelated, random effects model may be appropriate. However, if  $\varepsilon_i$  and the X's are correlated, fixed effects models may be appropriate. The formal test developed by Hausman (1978) is conducted to choose between fixed effects and the random effects approach. In order to reduce the effects of heteroskedasticity on inferences a heteroskedasticity-consistent standard error estimator of OLS parameter estimates (White 1980; MacKinnon and White 1985; Long and Ervin 2000) is employed. This approach employs an alternative method of estimating the standard errors that does not assume homoscedasticity. Estimating model (1) generally results in potential endogeneity of explanatory variables which should be controlled to avoid potential biases induced by simultaneity (Hao 2006). Therefore, Hausman test of endogeneity was conducted to examine the problem of endogeneity among the selected variables. The tests result (for brevity endogeneity test results are not reported) indicated that none of the variables chosen for the study suffer from the issue of endogeneity.

**Table 3** Summary statistics: regression variables for the period 1995–2016 *Source:* Authors calculations based on COMPUSTAT global database and World Bank Database

	N	Mean	SD	Median	Min	Max	Skewness	Kurtosis	Q1	Q3
DER	118,354	0.688	0.895	0.384	0	4.931	2.387	9.803	0.084	0.929
SDER	118,354	0.388	0.526	0.199	0	2.912	2.423	9.956	0.036	0.52
LDER	118,354	0.293	0.485	0.093	0	2.762	2.826	12.243	0	0.368
DCP	118,354	1.072	0.386	1.022	0.217	1.909	-0.055	2.925	0.941	1.309
MCR	118,354	0.77	0.463	0.654	0.152	3.036	2.543	11.392	0.54	0.932
PRICE	118,354	0.024	0.031	0.015	-0.014	0.12	1.318	4.315	-0.003	0.038
GDPG	118,354	12.301	1.305	12.972	9.027	13.929	-0.953	2.845	11.684	13.321
FDI	118,354	0.023	0.04	0.01	-0.001	0.25	4.091	21.202	0.002	0.028
TAGDP	118,354	140.813	629.887	4.308	0.037	5200.657	6.704	50.348	0.796	25.193
DIVTA	118,354	1.266	1.967	0.658	0	12.427	3.39	16.718	0.197	1.412
NSNFA	118,354	99.81	59.536	88.102	10.222	335.441	1.424	5.738	59.882	124.952

**Table 4** Correlations of leverage with financial indicators and control variables *Source:* Authors calculations based on COMPUSTAT global database and World Bank Database

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) DER	1.000										
(2) SDER	0.866*	1.000									
(3) LDER	0.834*	0.469*	1.000								
(4) DCP	0.065*	0.021*	0.113*	1.000							
(5) MCR	-0.066*	-0.084*	-0.029*	0.111*	1.000						
(6) PRICE	0.083*	0.068*	0.070*	-0.521*	-0.031*	1.000					
(7) GDPG	-0.051*	-0.031*	-0.055*	0.313*	-0.470*	-0.349*	1.000				
(8) FDI	-0.066*	-0.053*	-0.066*	0.064*	0.703*	0.120*	-0.429*	1.000			
(9) TAGDP	0.145*	0.097*	0.161*	-0.025*	-0.047*	0.081*	-0.158*	-0.051*	1.000		
(10) DIVTA	-0.213*	-0.219*	-0.151*	-0.157*	0.152*	0.110*	-0.284*	0.151*	-0.034*	1.000	
(11) NSNFA	0.023*	0.084*	-0.047*	-0.130*	-0.040*	-0.021*	0.010*	-0.111*	-0.025*	0.083*	1.000

I. \* shows significance at the 0.05 level

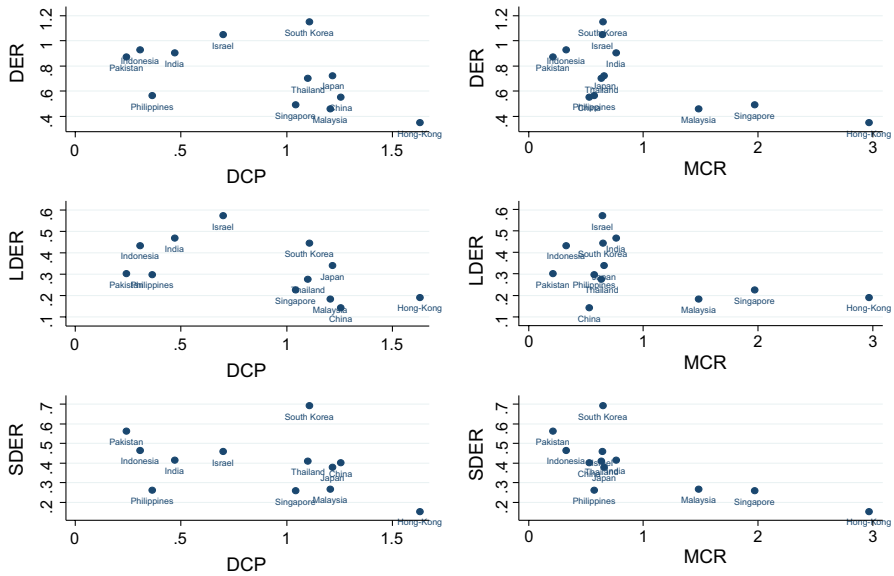


Fig. 1 Country-wise plot between leverage and banking and stock market indicators

### 3 Results and Discussion

#### 3.1 Summary Statistics and Correlation Results

Table 3 gives the descriptive statistics of the dependent and explanatory variables used in the study. The sample covers about 12 Asian developing and developed economies over a 22-year period, 1995–2016. As mentioned before, financial leverage of firms is measured by the debt to equity ratio. Total debt to equity (DER) has the highest mean (0.688) and largest variation (0.895) compared to short-term and long-term leverage ratios. Among the financial market development indicators banking sector variable (DCP) has a higher mean of 1.072 but a lower deviation of 0.386 compared to stock market variable which has a mean of 0.77 and standard deviation of 0.463. Similarly, growth of GDP has a higher mean (12.30) as well as variation (1.31) compared to other macroeconomic variables (PRICE and FDI) for the sample period. Finally, firm’s size relative to the economy (TAGDP) firm specific variable has a higher mean (140.81) and largest variation given by standard deviation (629.89) compared to ratio of dividends to total assets (DIVTA) and the ratio of firm’s net sales to net fixed assets (NSNFA) employed in the study.

Table 4 presents simple correlations between leverage, financial market development indicators and control variables used in the study. The principal focus is to examine the effect of financial market development indicators on the use of debt and equity financing. As observed from Table 4, the ratio of long-term debt to total equity (LDER)

**Table 5** Panel FEM estimates: financial market development on debt-equity ratios *Source:* Authors estimations based on COMPUSTAT global database and World Bank Database

	SDER Static	SDER Dynamic	LDER Static	LDER Dynamic	DER Static	DER Dynamic
L.DEP	–	0.616*** (0.003)	–	0.600*** (0.003)	–	0.669*** (0.002)
DCP	0.060*** (0.010)	0.056*** (0.004)	0.063*** (0.009)	0.033*** (0.003)	0.125*** (0.017)	0.076*** (0.005)
MCR	–0.054*** (0.009)	–0.046*** (0.004)	–0.034*** (0.009)	–0.017*** (0.003)	–0.090*** (0.016)	–0.065*** (0.005)
PRICE	0.623*** (0.110)	0.630*** (0.052)	0.390*** (0.100)	0.026 (0.044)	0.302 (0.185)	0.618*** (0.076)
GDPG	–0.030*** (0.008)	–0.026*** (0.003)	–0.081*** (0.007)	–0.022*** (0.002)	–0.106*** (0.014)	–0.038*** (0.004)
FDI	–0.994*** (0.113)	–0.143* (0.064)	–0.439*** (0.103)	–0.050 (0.055)	–1.513*** (0.191)	–0.136 (0.094)
CONS	0.061 (0.103)	0.485*** (0.033)	–0.719*** (0.094)	0.456*** (0.028)	–0.590*** (0.174)	0.798*** (0.048)
N	118,354	100,815	118,354	100,815	118,354	100,815
F	604.082	6370.021	776.448	6075.290	668.882	8696.020
Hausman	548.85	10,531.99	591.15	11,218.91	738.69	9878.56

1. Short-term debt-equity ratio (SDER), Long-term debt-equity ratio LDER and Total-debt-equity ratio (DER) are the dependent variables. 2. Firm specific control variables such as firm's size relative to the economy (TAGDP), the ratio of dividends to total assets (DIVTA), the firm's net sales to net fixed assets (NSNFA) were included in the regression models the results of which are not reported. 3. All the regressions include country-effects and time-effects. 4. Heteroscedasticity-consistent robust standard errors are reported in parentheses. 5. Hausman specification test was conducted for appropriate model selection. 6. \* and \*\*\* sign indicates significance level at 5% and 0.01% respectively

is positively correlated with the size of the banking sector (DCP) whereas negatively correlated with the size of the stock market (MCR). The results for short-term debt to total equity (SDER) and total debt to total equity (DER) are similar. Therefore, a large stock market in an economy is associated with reductions in both short-term and long-term debt financing of firms.

Figure 1 plots the country-wise leverage and banking as well as stock market development indicators. It is clearly evident that the firms of developed stock market economies such as Hong Kong, Singapore, Malaysia (also noted in Table 1) have a lower short-term, long-term and total debt-equity ratio (Fig. 1) compared to firms of other selected developing stock market economies which relatively have higher leverage ratios. Among the developing stock market economies mainly South Korea and Pakistan have higher short-term debt-equity ratios whereas Israel has the highest long-term debt equity ratio. Firms of developing stock market economies such as South Korea, Israel, India, Indonesia and Pakistan have higher total debt equity ratios (Fig. 1). Exceptional to all the cases, the firms of Philippines have lower leverage ratios given their smaller size of banking and stock markets (Fig. 1). Country-wise time series

plots of SDER, LDER and DER; SDER with DCP and MCR; LDER with DCP and MCR and DER with DCP and MCR is also reported in “Appendix” Figs. 2, 3, 4 and 5 respectively.

### 3.2 Econometric Results

The panel fixed effects approach OLS estimates is reported in Table 5. In total six (three static and three dynamic) models were estimated maintaining the variations between the stock market and banking sector development indicators with different leverage ratios of firms as dependent variables. As mentioned before, the Hausman specification test was conducted for appropriate model selection. For all the cases, the Hausman test  $p$  values were small enough to point to a fixed effects model. Meaningful econometric results were not obtained when broad money (BM) and turnover ratio (TOR) were included in the regression models. Therefore, the results of these two variables are not reported.

The panel estimates indicate that the banking sector development (DCP) and stock market development (MCR) variables significantly have opposite effects on the financing choice of the firms: banking variable is associated with a rise in the debt-equity ratio, while stock market variable is generally associated with a fall in that ratio. This is consistently true for all the estimated models (both for static and dynamic) with SDER, LDER and DER as dependent variables. The results, therefore, suggests that firms substitute debt for equity in the presence of an increase in banking sector activity (holding stock market variable constant) and equity for debt associated with an increase in stock market activity (holding banking variable constant).

The coefficients of the lagged dependent variable in the panel dynamic results of are found to be statistically significant and less than unity implying that the debt-equity mix remains stable. Inflation as control variable is employed because if inflation is expected to be high the real value of tax deductions on debt will be higher (Taggart 1985). Thus, according to the tradeoff theory leverage will be positively associated with expected inflation. Market timing in debt markets may also result in a positive association between leverage and expected inflation if managers issue debt when expected inflation is high relative to current interest rates (Frank and Goyal 2009). All the estimated regression models indicate that an increase in inflation significantly increases the short-term, long-term and total debt-equity ratios of selected firms.

Following, Demirguc-Kunt and Maksimovic (1996) GDP growth is included as a proxy measure of the growth opportunities available to firms in an economy. Finance theory suggests that growth opportunities available to firms should not be financed by debt suggesting debt financing to be inversely related to GDP growth (Demirguc-Kunt and Maksimovic 1996). This is because the boost in the economy and consequently growth in GDP tend to increase the profits of firms. Pecking order theory suggests that firms prefer internal sources such as retained earnings than debt. Also, agency problems will be less severe so less debt is preferred. All the estimated panel regression models indicate that an increase in GDP growth significantly

**Table 6** Tests of differences in means: leverage ratios and financial markets variables  
*Source:* Authors calculations based on COMPUSTAT global database and World Bank Database

Variables	Developing stock market economies (1)	Developed stock market economies (2)	Difference in mean (1–2)
DER	0.715	0.449	0.266***
SDER	0.403	0.247	0.156***
LDER	0.303	0.196	0.108***
DCP	1.060	1.186	–0.126***
MCR	0.655	1.811	–1.156***

1. Hong-Kong, Singapore and Malaysia have been classified as developed stock markets whereas Japan, Israel, South Korea, Thailand, China, Indonesia, Philippines, India, Pakistan are classified as developing stock markets. The split between developing and developed stock markets is based on economy's annual mean ratio of stock market capitalization to GDP. 2. \*\*\* sign indicates significance level at 0.01%

lowers the short-term, long-term and total debt-equity ratios of selected firms. However, in LDER static and DER dynamic model the effect is found to be insignificant. FDI is used as one of the control variable based on the proposition that more open economies are more likely to substitute equity for debt (Razin et al., 1998). Thus, debt financing is expected to be inversely related to FDI. Panel estimates indicate that an increase in FDI favors a choice towards equity and away from debt financing (lowering debt–equity ratio) for all the leverage ratios. However, for the dynamic models with LDER and DER as dependent variables FDI though negative is found to be insignificant.

The firm's leverage also depended on several firm specific characteristics. As noted before, firm's size relative to the economy (TAGDP) is included as a control variable for measuring the firm's access to the financial markets (Demirgiic-Kunt and Maksimovic 1994). The ratio of dividends to total assets (DIVTA) is included as control variable because cash-constrained firms are unlikely to pay out large dividends (Demirgiic-Kunt and Maksimovic 1996). Also, the firm's optimal financing mix depends on the composition of the firm's assets.

According to Demirgiic-Kunt and Maksimovic (1994) firms with low ratio of net sales to fixed assets is predicted to have high long-term as well as short-term leverage. The asset composition is controlled by measuring the firm's net sales to net fixed assets (NSNFA). The regression estimates of all the firm specific variables were found to be significant determinants of firm's short-term, long-term and total debt-equity ratio. Specifically, the estimated coefficient of firm's size relative to the economy was found to be positive, the ratio of dividends to total assets was found to be negative and the ratio of firm's net sales to net fixed assets was found to be positive.



**Table 7** FEM estimates: financing choice in developed and developing stock markets *Source:* Authors estimations based on COMPUSTAT global database and World Bank Database

	SDER		LDER		DER	
	Static	Dynamic	Static	Dynamic	Static	Dynamic
<i>Panel A developed stock markets</i>						
L.DEP	–	0.604*** (0.010)	–	0.585*** (0.009)	–	0.665*** (0.009)
DCP	–0.009 (0.018)	–0.024 (0.016)	–0.003 (0.016)	–0.023 (0.014)	–0.004 (0.028)	–0.001 (0.023)
MCR	–0.003 (0.008)	–0.015* (0.007)	–0.027*** (0.007)	–0.013* (0.006)	–0.033** (0.012)	–0.030** (0.010)
PRICE	0.464** (0.168)	0.477*** (0.142)	0.338* (0.150)	0.003 (0.129)	0.151 (0.260)	0.531** (0.202)
GDPG	–0.031*** (0.007)	–0.011 (0.006)	–0.018** (0.006)	–0.007 (0.006)	–0.018 (0.011)	–0.004 (0.009)
FDI	–0.032 (0.080)	–0.063 (0.070)	–0.025 (0.072)	–0.053 (0.063)	–0.109 (0.124)	–0.050 (0.099)
CONS	0.578*** (0.071)	0.297*** (0.062)	0.208*** (0.063)	0.098 (0.056)	0.832*** (0.109)	0.362*** (0.089)
N	11,745	9346	11,745	9346	11,745	9346
F	27.890	477.996	52.339	529.098	39.585	718.436
Hausman	85.21	822.71	20.05	1447.45	42.85	998.89
<i>Panel B developing stock markets</i>						
L.DEP	–	0.615*** (0.003)	–	0.599*** (0.003)	–	0.667*** (0.003)
DCP	0.166*** (0.005)	0.060*** (0.004)	0.102*** (0.004)	0.033*** (0.003)	0.271*** (0.007)	0.079*** (0.005)
MCR	–0.066*** (0.005)	–0.056*** (0.004)	–0.009* (0.004)	–0.020*** (0.003)	–0.076*** (0.008)	–0.077*** (0.006)
PRICE	1.151*** (0.071)	0.674*** (0.057)	0.539*** (0.060)	0.078 (0.049)	1.740*** (0.112)	0.692*** (0.085)
GDPG	–0.105*** (0.003)	–0.033*** (0.003)	–0.076*** (0.003)	–0.032*** (0.003)	–0.182*** (0.005)	–0.052*** (0.005)
FDI	–0.119 (0.207)	–0.251 (0.177)	–0.869*** (0.174)	–0.763*** (0.152)	–0.617 (0.324)	–0.765** (0.261)
CONS	1.636*** (0.045)	0.599*** (0.040)	1.314*** (0.037)	0.612*** (0.034)	2.975*** (0.070)	1.024*** (0.059)
N	106,609	91,469	106,609	91,469	106,609	91,469
F	579.440	6567.057	632.943	6219.649	813.997	8909.634
Hausman	666.73	9358.00	2486.81	10,628.48	1427.72	8731.33

1. Note 1 same as Table 6 and notes 1 to 5 same as Table 5. \*, \*\*, \*\*\* sign indicates significance level at 5%, 10% and 0.01% respectively

### 3.3 Financing Choice of Firms in Developed and Developing Stock Markets

Well developed and developing stock markets may play different roles in financing firms (Pagano 1993). Therefore, the developed and developing stock markets may have different effects on firms financing choices. To examine the effect of stock market development on financing choices of firms separately the sample of the study is divided into subsamples. The split between developing and developed stock markets is based on economy's annual mean ratio of stock market capitalization to GDP. Accordingly, Hong-Kong, Singapore and Malaysia (as noted in Table 1 and Fig. 1) have been classified as developed stock markets whereas Japan, Israel, South Korea, Thailand, China, Indonesia, Philippines, India, Pakistan are classified as developing stock markets (as noted in Table 1, Fig. 1).

The difference between the two groups is evident from Table 6 that shows the results of tests of differences in means of variables of importance. The univariate statistics indicate that the means of short-term, long-term and total debt to equity ratios are significantly higher in developing stock market economies than in developed market economies (Table 6). However, the means of banking sector development as well as stock market development indicators are significantly higher in developed stock market economies compared to their counterparts (Table 6).

Table 7 reports the panel estimates of the stock market development variable in the specified econometric model explaining firms' choice of short-term, long-term, and total debt to equity in the two subsamples. The results show a remarkable divergence between the developing and developed stock markets subsamples. The estimated coefficient of the banking sector indicator (DCP) in the developed stock market subsample is consistently negative for all the leverage ratios (Table 7, panel A) whereas the coefficient in the developing stock market subsample is positive and significant for all the leverage ratios (Table 7, panel B). The results from the developed stock market subsample suggest that further development of the stock market in economies which have more developed stock markets leads to a substitution of equity financing for debt financing. For economies whose stock markets are developing, further development of the market leads to opportunities for risk sharing and for aggregation of information that allow firms to increase their borrowing (Demirgiic-Kunt and Maksimovic 1996). This happens because at early stage of stock market development improvements in information quality, monitoring, and corporate control may be large enough to induce creditors to lend more.

## 4 Conclusion and Policy Implications

This paper has investigated the effects of financial market development on the financing choice of firms in 12 developing and developed Asian market economies for a mean total of 6506 non-financial listed companies during 1995–2016. Also, financing choice of firms in developed and developing stock markets was investigated to gauge the effect of level of stock market development on firms' financing choice. The econometric models included short-term, long-term and total debt-equity ratios

as dependent variables which were regressed on financial markets development variables such as banking sector development indicators (BM, DCP) and stock market development (MCR, TOR) indicators. Macroeconomic variables such as inflation, GDPG, FDI and firm-specific variables such as ratio of total assets to GDP (TAGDP); ratio of dividends to total Assets (DIVTA) and ratio of net sales to net property, plant, and equipment (NSNFA) were also employed as control variables.

The financial development indicators such as domestic credit to private sector by banks (banking sector development indicator) and stock market capitalization (stock market development indicator) exhibited contrasting differences between the selected developing and developed Asian economies. For example, the annual average ratio of stock market capitalization to GDP which measures the stock market's ability to allocate capital to investment projects and provide significant opportunities for risk diversification for investors was found to be higher than the sample average in case of economies such as Hong-Kong; Singapore and Malaysia categorizing them as developed stock markets.

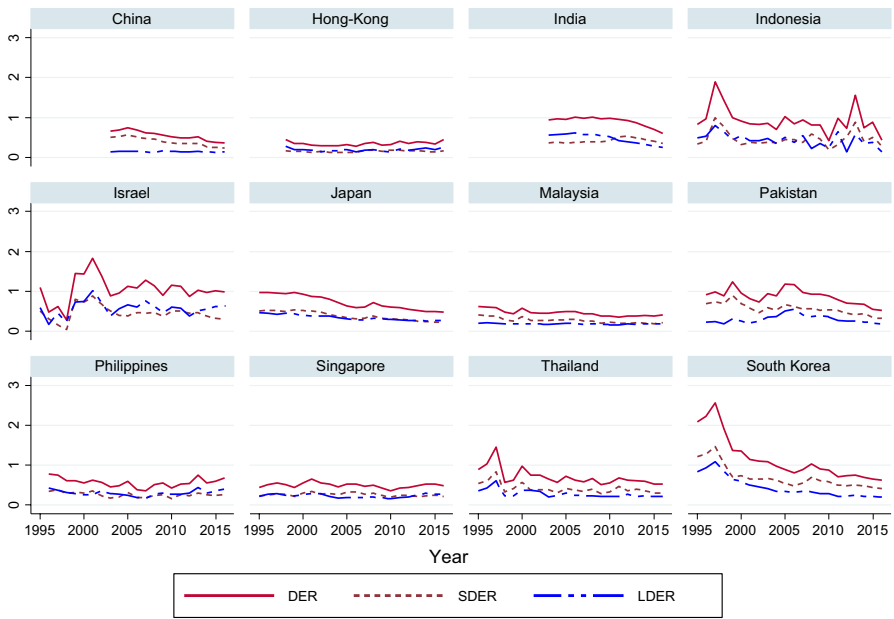
The econometric results indicate that the banking sector development and stock market development indicators significantly have opposite effects on the financing choice of the selected firms: banking variable is associated with a rise in the debt-equity ratio whereas stock market variable is associated with a fall in leverage ratio. Therefore, the evidence suggests that firms substitute equity for debt associated with an increase in stock market activity (holding banking variable constant), and debt for equity in the presence of an increase in banking sector activity (holding stock market variable constant).

The econometric effects of stock market development on firms financing choices in developing and developed stock markets showed a remarkable divergence. The evidence indicated that the estimated coefficient of the banking sector indicator in the developed stock market subsample was consistently negative for all the leverage ratios whereas the coefficient in the developing stock market subsample was positive and significant. This evidence suggests that further development of the stock market in economies which have more developed stock markets leads to a substitution of equity financing for debt financing. And for economies whose stock markets are developing, further development of the market leads to opportunities for risk sharing and for aggregation of information that allow firms to increase their borrowing levels.

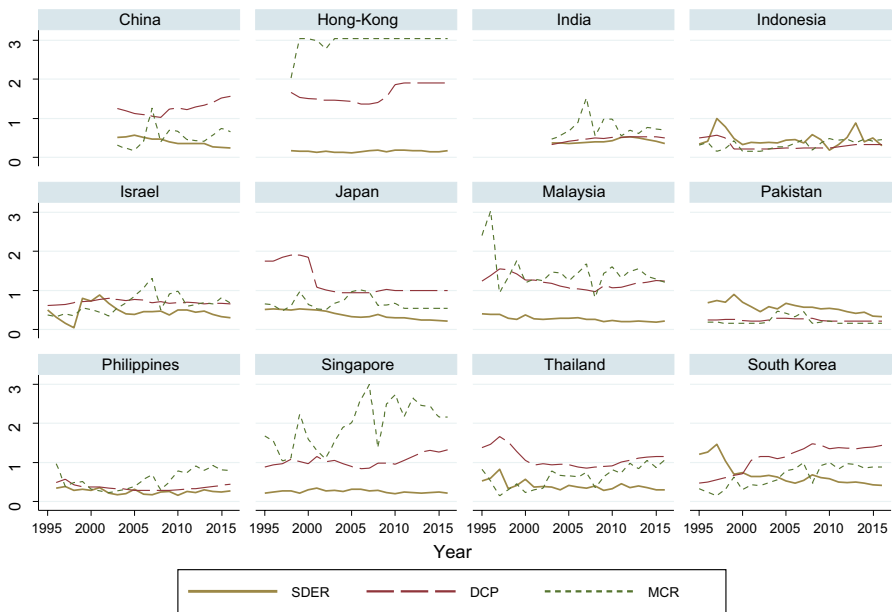
One of the important conclusions of the study is that though banking sector and stock market play different roles are however, complementary to each other. The important policy implication is that banks in developing economies need not be fearful of stock market development and should not assume that development of stock market will reduce their volume of business. Thus, the policy makers should aim to develop banking sector and stock market simultaneously which will help firms to design their optimal financing choices.

## Appendix

See Figs. 2, 3, 4 and 5.



**Fig. 2** Country-wise time series plot of SDER, LDER and DER



**Fig. 3** Country-wise time series plot of SDER, DCP and MCR

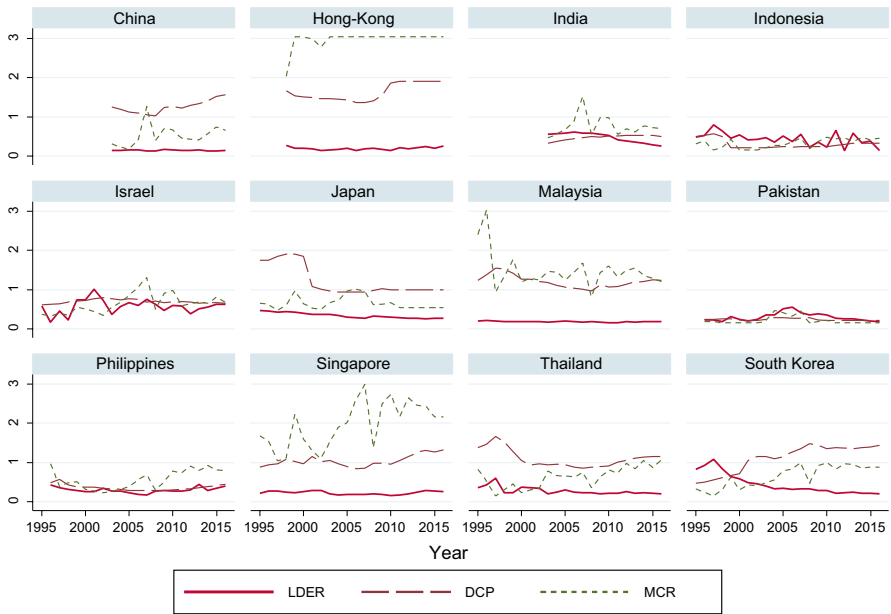


Fig. 4 Country-wise time series plot of LDER, DCP and MCR

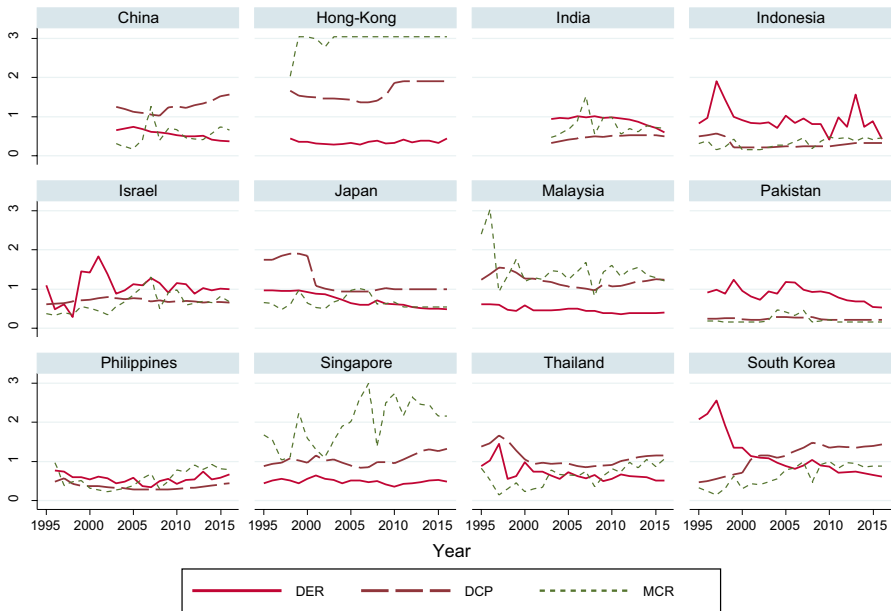


Fig. 5 Country-wise time series plot of DER, DCP and MCR

## References

- Agarwal, S., & Mohtadi, H. (2004). Financial Markets and the financing choice of firms: Evidence from developing countries. *Global Finance Journal*, 15(1), 57–70.
- Bencivenga, V. R., & Smith, B. D. (1991). Financial intermediation and endogenous growth. *Review of Economic Studies*, 58(2), 195–209.
- Blackburn, K., Bose, N., & Capasso, S. (2005). Financial development, financing choice and economic growth. *Review of Development Economics*, 9(2), 135–149.
- Blackburn, K., & Hung, V. T. Y. (1998). A theory of growth, financial development and trade. *Economica*, 65(257), 107–124.
- Bokpin, G. A. (2009). Macroeconomic development and capital structure decisions of firms: Evidence from emerging market economies. *Studies in Economics and Finance*, 26(2), 129–142.
- Bose, N., & Cothren, R. (1997). Asymmetric information and loan contracts in a neo-classical growth model. *Journal of Money, Credit and Banking*, 29(4), 423–439.
- Boyd, J., & Smith, B. (1996). The co-evolution of the real and financial sectors in the growth process. *World Bank Economic Review*, 10(2), 371–396.
- Boyd, J., & Smith, B. (1998). The evolution of debt and equity markets in economic development. *Economic Theory*, 12(3), 519–560.
- Cooley, T. F., & Smith, B. D. (1998). Financial markets, specialization and learning-by-doing. *Research in Economics*, 52, 333–361.
- Demirgüç-Kunt, A., & Maksimovic, V. (1994). Capital structures in developing countries: Evidence from ten countries policy. In *Research working paper, WPS 1320*, Washington, DC: World Bank. Accessed July 31, 1994.
- Demirgüç-Kunt, A., & Maksimovic, V. (1996). Stock market development and financing choice of firms. *World Bank Economic Review*, 10(2), 341–369.
- Frank, M. Z., & Goyal, V. K. (2009). Capital structure decisions: Which factors are reliably important? *Financial Management*, 38(1), 1–37.
- Goldsmith, R. Y. (1969). *Financial structure and development*. New Haven: Yale University Press.
- Greenwood, J., & Jovanovic, B. (1990). Financial development, growth and the distribution of income. *Journal of Political Economy*, 98(5), 1076–1107.
- Gurley, H. G., & Shaw, E. S. (1955). Financial aspects of economic development. *American Economic Review*, 45(4), 515–538.
- Harris, M., & Raviv, A. (1991). The theory of capital structure. *Journal of Finance*, 46(1), 297–355.
- Hao, C. (2006). Development of financial intermediation and economic growth: The Chinese experience. *China Economic Review*, 17(4), 347–362.
- Hart, O. (2001). Financial contracting. *Journal of Economic Literature*, 39(4), 1079–1100.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46(6), 1251–1271.
- Hovakimian, A., Opler, T., & Titman, S. (2001). The debt–equity choice. *Journal of Financial and Quantitative Analysis*, 36(1), 1–24.
- King, R. G., & Levine, R. (1993). Finance, entrepreneurship, and growth: Theory and evidence. *Journal of Monetary Economics*, 32(3), 513–542.
- Long, J. S., & Ervin, L. H. (2000). Using heteroscedasticity-consistent standard errors in the linear regression model. *The American Statistician*, 54(3), 217–224.
- MacKinnon, J. G., & White, H. (1985). Some heteroscedasticity-consistent covariance matrix estimators with improved finite sample properties. *Journal of Econometrics*, 29(3), 305–325.
- Modigliani, M., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review*, 48(3), 261–297.
- Pagano, M. (1993). The flotation of companies on the stock market: A coordination failure model. *European Economic Review*, 37(5), 1101–1125.
- Rajan, G. R., & Zingales, L. (1998). Financial dependence and growth. *American Economic Review*, 88(3), 559–586.
- Razin, A., Sadka, E., & Yuen, C., (1998). Capital flows with debt and equity financed investment: Equilibrium structure and efficient implications. In *IMF Working Paper WP/98/159*, IMF. Accessed November 1, 1998.
- Sussman, O. (1993). A theory of financial development. In A. Giovannini (Ed.), *Finance and development: Issues and experience* (pp. 29–57). Cambridge: Cambridge University Press.

- Taggart, R. A., Jr. (1985). corporate capital structures in the United States. In B. M. Friedman (Ed.), *Corporate capital structures in the United States* (pp. 13–80). New York: University of Chicago Press.
- White, H. (1980). A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica*, 48(4), 817–838.
- Zilibotti, F. (1994). Endogenous growth and intermediation in an Archipelago economy. *Economic Journal*, 104(423), 462–473.

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