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Corporate Investments in Asian Emerging Markets: Financial Conditions, Financial Development, and Financial Constraints

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ADB Economics Working Paper Series



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Jianxin Wang, Maria Socorro Gochoco-Bautista, and Noli Sotocinal
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ABSTRACT

Motivated by the literature on the finance–growth nexus, this paper explores the mechanisms through which finance affects corporate investments and capital accumulation. We separate the effects of financial conditions from those of financial development. Based on a sample of firms from five Asian emerging economies, we find that (1) financial conditions and financial development affect corporate investments through different channels. Financial conditions affect firms' growth opportunities and investment demand. Financial development primarily affects firms' external financing constraints. (2) Large firms benefit more from improved financial conditions, while small firms benefit more from financial development. (3) The effects of financial conditions and the level of financial development are asymmetric: they are stronger when the global financial crisis was unfolding and weaker during the subsequent rebound.

Keywords: corporate investments, investment sensitivity to cash flows, financial condition index, financial development index, financial constraints.

JEL Classification: E2, E3, G1, G3

I. INTRODUCTION

Following seminal papers by King and Levine (1993a, 1993b), there has been a large body of evidence showing a causal effect from financial development to economic growth.¹ Countries with well-developed financial systems, e.g., large banks and active financial markets, have higher future growth.

The theoretical underpinning of the finance–growth nexus can be traced to Schumpeter (1912), who argues that banks play an important role in the adoption of new technologies. Levine (1997) provides a comprehensive discussion in which financial systems promote economic growth through facilitating capital accumulation and technological innovation. Subsequent studies have explored the empirical link from financial systems to capital accumulation and technological innovation. Rajan and Zingales (1998) provide evidence that industries that are more reliant on external finance grow faster in countries with more developed financial markets. Demirgüç-Kunt and Maksimovic (1998) document a similar effect at the firm level. Fisman and Love (2003) show that trade credit is a substitute for bank credit: industries with heavy reliance on trade credit grow faster in countries with weaker financial institutions. Love (2003) finds that financial development reduces the reliance of corporate investments on internal funds, thus promoting capital accumulation and growth. Several studies, e.g., Claessens and Laeven (2005) and Love and Peria (2012), have explored the impact of bank competition on firms' financing constraint.

This study is in the same spirit as Love (2003) in examining the link between financial development at the country level and financial constraints at the firm level. We aim to explore the economic mechanisms through which financial development affects capital accumulation and economic growth. Of particular interest is the role of financial development via external financing constraints on the investment behavior of the firm. We differ from Love (2003) in several important aspects. First, we separate the effects of financial conditions and financial development. Measures of financial development, e.g., stock market capitalization to gross domestic product (GDP), the ratio of credit to the private sector to GDP, are intended to reflect a structural feature of the economy, namely, its level of financial sector development, but the usual measures are often partially driven by fluctuations in the macroeconomic and financial conditions. Separating the two effects is important for isolating the impact of financial development. Our measure for financial conditions is different from and richer than the GDP growth rate used by Love (2003) to measure business cycles.

Second, we measure the effects of annual changes in financial conditions and development on financial constraints, while the financial development measure in Love (2003) is fixed at the start of her sample.

Third, we explore two different channels through which financial conditions and development affect corporate investments: a direct impact on the level of corporate investments and an indirect impact through alleviating external financing constraints. Economically, the direct impact reflects their effect on firms' growth opportunities and investment demand. The indirect impact captures their effect on firms' financing choice. Econometrically controlling the direct impact is necessary for the proper estimation of the indirect impact. As discussed in Section III, without including the direct effect, the empirical model in studies such as Love (2003) may suffer a missing-variable bias and the effect of financial development on financial constraints may be overestimated.

¹ See surveys by Levine (2005) and Ang (2008) and the references therein.

Lastly, we focus on five Asian developing economies using firm-level data from 2005 to 2011, while the sample firms in Love (2003) are mostly from industrialized economies (over 80%) during 1991–1995. Compared to economies in Europe and North America, the financial systems in Asian emerging economies are underdeveloped, usually with a high dependence on bank finance and possibly, significant government influence or control. Capital markets in emerging Asia tend to have weak regulatory oversight and enforcement, and weak investor protection, resulting in a higher cost of capital (e.g., Chan, Wang, and Wei 2004). Governments have a strong influence on banks and play an important role in allocating financial resources (Allen, Qian, and Qian 2005). Consequently, firms in emerging Asia tend to have poor access to external capital, debt or equity. Competing for external financial resources often involves non-price mechanisms such as building relationships with bankers and government officials. Taken together, corporate investments in emerging Asia are likely to face greater external financing constraints and be more sensitive to changes in financial development and external financial conditions.

Evidence of an external financing constraint is first documented by Fazzari, Hubbard, and Petersen (1988). They measure a firm's financial constraint by the sensitivity of its investments to its internal cash flows. Using dividend payout as a proxy for the degree of financial constraints, they show that non-dividend paying firms tend to have higher investment sensitivity to cash flows (ISCF). While the methodology has been challenged by several studies over the years, a large body of literature has emerged showing internal cash flow to be a significant determinant of corporate investments, and supporting the ISCF as a measure of external financing constraints.² To overcome the measurement error and identification issues in estimating ISCF, studies have used natural experiments, e.g., oil price shocks (Lamont, 1997), corporate pension plans (Rauh, 2006), and voluntary asset sales (Hovakimian and Titman, 2006), to show the presence of external financing constraints.

This study estimates the empirical relationship between firm-level investments and country-level financial development and financial conditions. We build on the results of prior research by Debuque-Gonzales and Gochoco-Bautista (2013) on the development of financial conditions indexes (FCIs) for Asian economies. These FCIs were constructed using principal component analysis (PCA) for selected Asian economies, and an extensive set of financial indicators that include interest rates and rate spreads, asset prices, credit quantities and liquidity measures, credit surveys where available, banking conditions, and various macro financial risk indicators. Each of these financial indicators was first purged of macroeconomic cyclical influences to remove the effects of real side sources of variation before applying PCA methodology.

Following King and Levine (1993a), we employ a bank-based measure of financial development. Our primary financial development indicator (FDI) is the aggregate bank credit to private sectors divided by GDP. As most emerging Asian economies historically and currently still have predominantly bank-based financial systems, firms are still heavily dependent on bank credit for investments and growth.

While FCI and FDI are not mutually independent, they capture different aspects of the financial status of a country. By construction, the cyclical influences of real side macroeconomic variables on the FCIs were removed such that they only capture short-term fluctuations in the

² Studies challenging Fazzari, Hubbard, and Petersen (1988) include, among others, Kaplan and Zingales (1997), Cleary (1999, 2006), Altı (2003), Moyen (2004), and Chen and Chen (2012). For supporting evidence, see Hubbard (1998), Hovakimian (2009), Lewellen and Lewellen (2012), and references therein.

financial environment. The metric for financial development, FDI, on the other hand, is intended to reflect the state of development of the financial sector. The analyses cover five Asian economies: Indonesia, Malaysia, the Philippines, Singapore, and Thailand. With the exception of Singapore, these countries are middle-income countries. We quantify corporate investment responses to changes in country-level financial development and financial conditions. The analyses are based on a dynamic panel data model estimated via Generalized Method of Moments (GMM). Instrumental variables are used to address the potential measurement error in Tobin's Q. Our key findings are the following:

- The FCI at the country level has a strong impact on corporate investment demand. The finding holds for large and small firms, and during the global financial crisis (GFC) and after. On average, a one-standard deviation improvement in FCI leads to an increase in investment by \$9.78 million per firm per year. The effect of FCI is stronger for large firms than it is for small firms. This finding suggests that firm-level variables, e.g., Tobin's Q, sales, and cash flow; do not fully capture firms' growth opportunities. Studies of corporate investments should include variables reflecting country-level financial conditions.
- Our FDI shows a strong impact on firms of external financing constraints. The effect is significant for large firms but is particularly strong for small firms. Across all firms, a one-standard deviation improvement in FDI reduces the ISCF by 35%. For small firms, FDI affects both the level of investments and ISCF. A one-standard deviation improvement in FDI leads to an increase in investments by \$4.3 million per small firm per year. It reduces ISCF by 59%. Improvements in financial development, particularly bank credit expansion to private sectors, have a disproportionately large effect on small firms in Asia.
- The effects of FCI and FDI are asymmetric with respect to economic and financial conditions. They were particularly strong during 2007–2009 when the worst of the GFC was unfolding and relatively weak during the subsequent rebound. During the crisis period, a one-standard deviation change in FCI leads to a change of investments by \$14.7 million per firm, compared to \$9.78 million for the full sample. Similarly, a one-standard deviation change in FDI leads to a change of investments by \$37.3 million per firm. This asymmetric effect points to the need for better management of investment risk at the firm level and stronger policy responses at country level.

II. DATA AND SAMPLE STATISTICS

We select non-financial firms (SIC < 6000) from the Oriana database³ from 2005 to 2011. We only select firms that are listed on the local stock exchange with a minimum market capitalization of at least \$10 million. Table 1 provides firm and sample statistics within and across countries.

³ Oriana is a database of firm-level data covering registered firms in 43 countries, in Asia and the Middle East, from 2004 onwards. It is owned by Bureau van Dijk (BvD), a global provider of corporate information and business intelligence.

Table 1: Firm and Sample Statistics**Panel A: Within-country Mean Values** (in \$ million)

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|-----------------------|-----------|----------|-------------|-----------|----------|
| Investments | 75 | 55 | 90 | 63 | 76 |
| Fixed Assets | 353 | 320 | 429 | 329 | 408 |
| Total Assets | 560 | 494 | 630 | 595 | 613 |
| Market Cap | 746 | 363 | 572 | 490 | 486 |
| Cash Flow | 72 | 42 | 75 | 58 | 73 |
| Cash and Equivalent | 67 | 68 | 89 | 91 | 62 |
| Current Liability | 151 | 119 | 155 | 197 | 157 |
| Non-Current Liability | 181 | 156 | 229 | 128 | 180 |
| Sales | 449 | 293 | 377 | 521 | 672 |
| Number of Firms | 198 | 435 | 92 | 362 | 258 |
| Firm-years | 1,136 | 2,810 | 538 | 2,278 | 1,571 |

Panel B: Cross-country Mean and Median Values (in \$ million)

| | Full Sample | | Large Firms | | Small Firms | |
|-----------------------|-------------|--------|-------------|--------|-------------|--------|
| | Mean | Median | Mean | Median | Mean | Median |
| Investments | 66 | 5.7 | 122 | 19 | 5.4 | 2.4 |
| Fixed Assets | 351 | 44 | 647 | 144 | 30 | 19 |
| Total Assets | 562 | 103 | 1020 | 275 | 64 | 49 |
| Market Cap | 487 | 50 | 912 | 162 | 25 | 20 |
| Cash Flow | 58 | 7.5 | 108 | 23 | 3.8 | 3.2 |
| Cash and Equivalent | 74 | 11 | 136 | 31 | 7.3 | 4.3 |
| Current Liability | 154 | 29 | 272 | 71 | 26 | 13 |
| Non-Current Liability | 161 | 8 | 301 | 34 | 8.8 | 2.7 |
| Sales | 453 | 83 | 813 | 204 | 63 | 40 |
| Number of Firms | 1,345 | | 705 | | 640 | |
| Firm-years | 8,333 | | 4,337 | | 3,996 | |

Panel A shows that Malaysia and Singapore account for over half of the firms and firm-years in the sample. Within our sample, firms in the Philippines and Thailand have the highest average fixed and total assets, while those in Indonesia have the largest average market capitalization at \$746 million. Firms in Singapore have the most cash (\$91 million). They also have the highest short-term and lowest long-term debt at \$197 million and \$128 million, respectively. Thai firms have the highest average sales at \$672 million.

Panel B reports the mean and median values across countries and shows the sharp differences between the two. Clearly, the distribution of firms is highly skewed and the mean values are dominated by a few, very large firms. This motivates us to separate the sample into large and small firms using the median market capitalization (\$50 million) as the threshold. Large firms are those with average market capitalization above or equal to \$50 million, and small firms as those with average market capitalization below \$50 million. For most variables, the mean values of large firms are almost twice that of all firms, and the median values for large firms are often three times higher. The mean values for small firms are often less than 10% of those of the full sample. The median values are around one-third to one-half of the full sample.⁴ This distinction allows us to address the effects of financial conditions and development on small firms in Asia.

⁴ The results are similar if the size classification is based on the initial market capitalization.

From the company data, we construct the following relevant variables:

- $(I/K)_{i,j,t}$ = (capital investment by firm j , in country i , in period t)/(fixed assets at the end of period $t-1$); Capital investment for each firm is measured as the change in plant property and equipment less the depreciation in the current year relative to the previous year's
- $Q_{i,j,t}$ = (market value of equity+book value of debt)/ (book value of total assets) at the beginning of each period
- $(CF/K)_{i,j,t}$ = (cash flow in period t)/(fixed assets at the end of period $t-1$)
- $(S/K)_{i,j,t}$ = (sales in period t)/(fixed assets at the end of period $t-1$)

We remove firm-years with $I/K > 2.5$, $Q < 0$ or $Q > 10$, $CF/K > 1$ or $CF/K < -1$, or $S/K > 20$, and winsorize the sample at 1%.⁵ These filters have been used in many previous studies, e.g., Gilchrist and Himmelberg (1999), Love (2003), and Ratti, Lee, and Seol (2008).

Since Asia has predominantly bank-based financial systems, we use bank credit to the private sector divided by GDP as a country's FDI. An FCI is constructed for each country by selecting an extensive set of financial indicators, ensuring that each one is trend stationary.⁶ These indicators are subsequently normalized to prevent volatility and differences in measurement units from influencing the estimation of common factors.⁷ The transformed financial indicators are then regressed against current and lagged values of macroeconomic variables to isolate the effects of business cycles from those of short-term shocks emanating from the prevailing financial environment. Lastly, the residuals of the regression are used in a PCA methodology to capture the common variations in the set of financial indicators for each country. The procedure for constructing the FCIs essentially removes the influence of GDP and other real side variables on the financial indicators included in an individual country FCI. In addition, each of the transformed financial indicators is trend stationary and the FCIs capture short-term deviations from average financial market conditions. An index value of zero implies that the country's financial conditions are stable and approximates the average. Relative to the average, positive FCI values signal improving financial conditions and negative values imply deterioration.

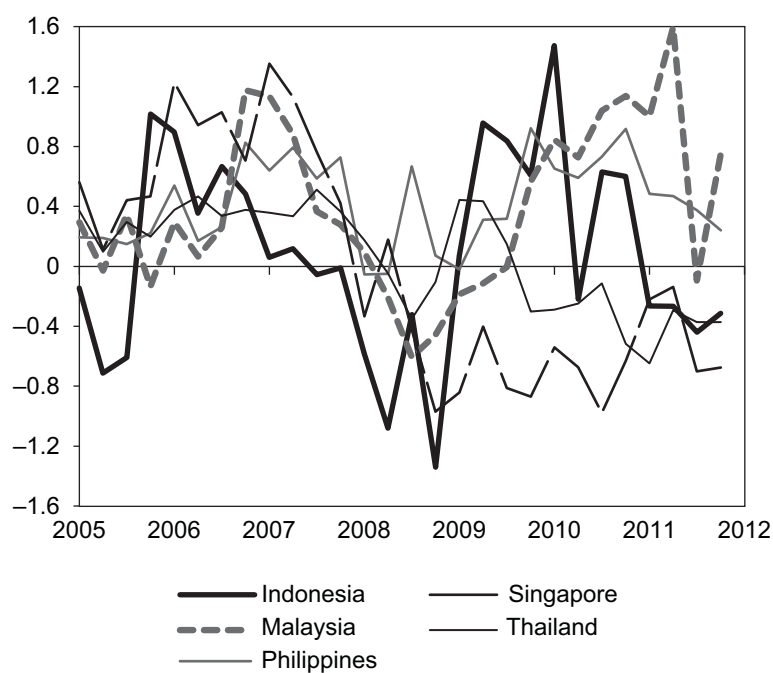
⁵ This is an established process of removing outliers in a set of data by replacing extreme values of a variable's distribution by adjacent observations that are within a predetermined confidence level from the mean value. The procedure removes the distortionary effects of outliers.

⁶ Testing for unit roots and taking first differences when necessary.

⁷ This involves subtracting each observed value from the indicator's sample mean, and dividing them by their sample standard deviations.

Figure 1 shows the quarterly FCIs of individual countries over the sample period. There is a clear drop across all FCIs during the 2007–2009 GFC. The post-crisis FCIs are much more diverse. Malaysia exhibited the strongest rebound until 2011. The Philippines had the best performance during the crisis and continued to enjoy good financial conditions until 2011. Indonesia had a strong rebound in 2009, but has experienced a significant deterioration since. Singapore had the best financial conditions before 2007, suffered rapid deterioration during 2007–2009, and continued to be hampered by the European debt crisis in 2010–2011. Thailand suffered relatively little during the global crisis in 2007–2009 but its financial conditions have continued to deteriorate since mid-2009. The top panel of Table 2 reports the summary statistics of annual FCIs for each country and the full sample, taking the sum of quarterly values as the annual FCI. Singapore has the lowest mean and median and the highest volatility. Malaysia and the Philippines have the highest mean and median FCI. The Philippines has the lowest volatility of FCI.

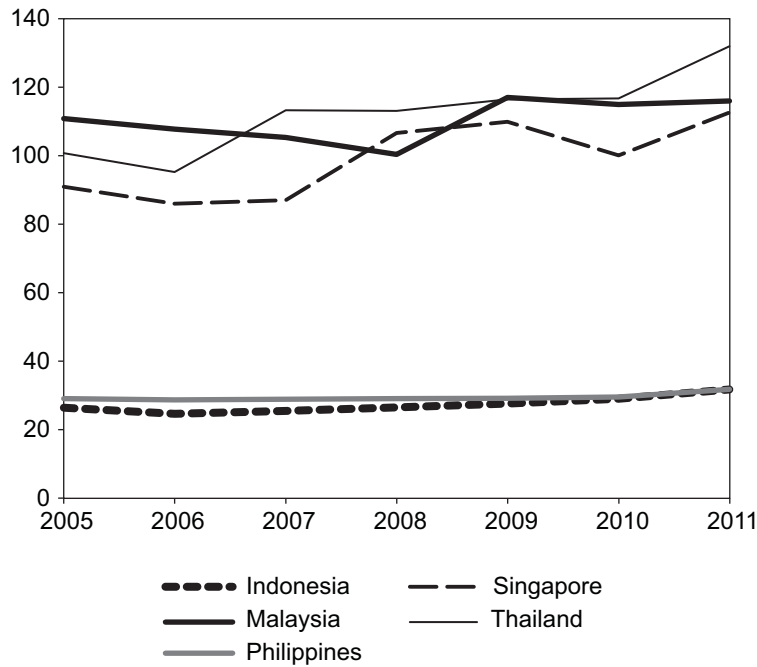
Figure 1: Financial Condition Indexes for Various Asian Countries



Source: Debuque-Gonzales and Gochoco-Bautista (2013)

Figure 2 shows the annual FDIs calculated as the ratio of bank credit to the private sector credit to GDP. As expected, the FDIs are much more stable than the FCIs. More importantly, changes in the FDIs do not appear to be significantly correlated with changes in the FCIs depicted in Figure 1.

Figure 2: Financial Development Indicators



Source: Authors' calculations using IMF International Financial Statistics

The lower panel of Table 2 reports the summary statistics for FDIs. Indonesia and the Philippines have much lower and the most stable FDIs, while Malaysia, Singapore, and Thailand have similar private credit to GDP ratios. Over the sample period, the FDI increased significantly in Thailand (31%), Singapore (24%), and Indonesia (20%), and moderately in Philippines (9.3%) and Malaysia (4.6%).

Table 2: Summary Statistics for FCI and FDI

| | Indonesia | Malaysia | Philippines | Singapore | Thailand | Full Sample |
|----------|-----------|----------|-------------|-----------|----------|-------------|
| FCI | | | | | | |
| Mean | 0.34 | 1.57 | 1.70 | 0.02 | 0.23 | 0.77 |
| Median | 0.11 | 1.79 | 1.57 | -1.55 | 0.72 | 0.96 |
| St. Dev. | 2.24 | 1.79 | 0.88 | 2.98 | 1.31 | 1.99 |
| FDI | | | | | | |
| Mean | 0.27 | 1.10 | 0.29 | 0.99 | 1.12 | 0.76 |
| Median | 0.27 | 1.11 | 0.29 | 1.00 | 1.13 | 0.95 |
| St. Dev. | 0.02 | 0.06 | 0.01 | 0.11 | 0.12 | 0.40 |

Table 3 provides summary statistics of the variables for investment analysis. Panel A reports the within-country average values. The ratios of investments to fixed assets are similar across countries at around 20%. Tobin's Q, representing investment opportunities, is not directly observable and is commonly approximated by the market-to-book value. It is relatively low in Malaysia (0.95) and high in Indonesia (1.32) and the Philippines (1.31). Cash flow-to-fixed assets are also similar across countries at around 20%. Sales-to-fixed assets are highest in Indonesia and lowest in the Philippines. As discussed above, Malaysia and the Philippines had favorable financial conditions during the sample period. Bank credit to the private sector is relatively high in Malaysia and Thailand.

Panel B of Table 3 shows cross-country statistics. Relative to their mean values, investment (I/K) and cash flow (CF/K) are more volatile than Tobin's Q and sales (S/K). As expected, the correlation between cash flow and sales is relatively high. High growth firms, i.e., those with high Q, tend to have low cash, inventory, and receivables. It is somewhat surprising that sales have a low correlation with Q. Separating firms into large and small based on their average market capitalization, we observe that large firms have slightly higher I/K and CF/K , possibly because of better access to external funding. Small firms have much lower fixed assets and book values (Table 1B) and they have higher S/K and asset tangibility.

Table 3: Summary Statistics of Regression Variables

Panel A: Within-country Mean Values

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|--------|-----------|----------|-------------|-----------|----------|
| I/K | 0.25 | 0.18 | 0.22 | 0.21 | 0.18 |
| Q | 1.32 | 0.95 | 1.31 | 1.05 | 1.08 |
| CF/K | 0.21 | 0.17 | 0.21 | 0.21 | 0.22 |
| S/K | 2.55 | 1.97 | 1.46 | 2.47 | 2.53 |

Panel B: Cross-country statistics

| | I/K | Q | CF/K | S/K |
|---|-------|-------|--------|-------|
| Full Sample | | | | |
| Mean | 0.2 | 1.06 | 0.2 | 2.24 |
| Median | 0.15 | 0.89 | 0.18 | 1.74 |
| St. Dev. | 0.2 | 0.61 | 0.16 | 1.75 |
| Correlations | | | | |
| Q | 0.31 | | | |
| CF/K | 0.29 | 0.34 | | |
| Sales/K | 0.18 | -0.02 | 0.43 | |
| Firms with Average Market Cap \geq \$50 million | | | | |
| Mean | 0.21 | 1.27 | 0.21 | 2.02 |
| Median | 0.16 | 1.09 | 0.19 | 1.47 |
| St. Dev. | 0.2 | 0.67 | 0.16 | 1.67 |
| Firms with Average Market Cap $<$ \$50 million | | | | |
| Mean | 0.19 | 0.82 | 0.18 | 2.49 |
| Median | 0.13 | 0.72 | 0.17 | 1.99 |
| St. Dev. | 0.21 | 0.41 | 0.16 | 1.82 |

CF/K = (cash flow in period t)/(fixed assets at the end of period $t-1$)

I/K = (capital investment by firm j , in country i , in period t)/(fixed assets at the end of period $t-1$)

Q = (market value of equity plus book value of debt)/(book value of total assets) at the beginning of each period)

S/K = (sales in period t)/(fixed assets at the end of period $t-1$)

III. MODEL SPECIFICATIONS AND HYPOTHESES

Our empirical model is an extension of the standard investment equation commonly used for the study of financial constraints:

$$(I/K)_{i,j,t} = \text{constant} + \rho(I/K)_{i,j,t-1} + \alpha_0 Q_{i,j,t} + \alpha_1 Q_{i,j,t-1} + \alpha_2 (S/K)_{i,j,t} + \beta_0 (CF/K)_{i,j,t} + \beta_1 (CF/K)_{i,j,t-1} + \lambda_0 FCI_{i,t} + \lambda_1 FCI_{i,t} (CF/K)_{i,j,t} + \delta_0 FDI_{i,t} + \delta_1 FDI_{i,t} (CF/K)_{i,j,t} + \varphi Z_{i,j,t} + v_{i,j,t} \quad (1)$$

We allow for persistence in investment decisions by including the lagged values of I/K , Q , and CF/K . Tobin's Q is not observable and is approximated by the market-to-book value proxy which has potential measurement error in capturing firms' growth opportunities. We include S/K as an additional measure for growth opportunities (Ratti, Lee, and Seol 2008). FCI and FDI may affect the level of investments, as well as firms' dependence on their internal cash flows for investments. The effects of FCI and FDI on firms' ISCF are captured through their interactions with CF/K . It is important to allow the impact of FCI and FDI on investments in order to isolate their impact on ISCF.⁸ The control variable Z includes dummies for country, year, and industry (1-digit SIC) to capture the relevant fixed effects. All firm variables are de-meaned to remove any firm fixed effect.⁹

Under this specification, the direct effects from FCI and FDI on firm investments are captured by λ_0 and δ_0 . Financial constraints are measured by investment–cash flow sensitivity and are captured in equation (1) by $\beta_0 + \lambda_1 FCI_{i,t} + \delta_1 FDI_{i,t}$. If changes in country financial conditions provide additional information on changes in growth opportunities beyond what is captured by Tobin's Q , company sales to fixed asset ratio S/K , and country financial development (FDI), one would expect the coefficient of FCI $\lambda_0 > 0$, i.e., better financial conditions lead to more investments. Alternatively, if FCI does not provide additional information on growth, one would expect $\lambda_0 = 0$. Similarly, if better financial conditions reduce firm borrowing constraints, one would expect higher FCI to reduce investment dependence on internal cash flow, i.e., $\lambda_1 < 0$. The alternative hypothesis is no such effect, i.e. $\lambda_1 = 0$. We do not see any situation where better financial conditions reduce investments ($\lambda_0 < 0$) or increase firm financial constraints ($\lambda_1 > 0$).

Numerous studies have documented a significant effect from financial development to economic growth. If bank lending to the private sector, our measure of financial development, contains growth information beyond that reflected in Tobin's Q , company sales S/K , and country financial conditions (FCI), one would expect that higher FDI leads to greater investments, i.e., $\delta_0 > 0$. The alternative hypothesis is that FDI does not provide additional information and has no effect on investments, i.e., $\delta_0 = 0$. In theory, more bank lending to the private sector should reduce firm dependence on internal cash flow, i.e., $\delta_1 < 0$. However, if ISCF is a poor measure of firm financial constraints, e.g., Chen and Chen (2012), one would expect $\delta_1 = 0$. Again, we do not see any situation where financial development reduces investments ($\delta_0 < 0$) or increases firm financial constraints ($\delta_1 > 0$).

⁸ If the true λ_0 is not zero but we do not include $FCI_{i,t}$ in (1), the estimated λ_1 is biased: $E(\hat{\lambda}_1) - \lambda_1 = \lambda_0 \phi$ and ϕ is a function of the correlation between $FCI_{i,t}$ and $FCI_{i,t}(CF/K)_{i,j,t}$; see Greene, (2003, p. 148). Since both λ_0 and ϕ are likely to be positive, the coefficient of the interaction term λ_1 is overestimated: $E(\hat{\lambda}_1) > \lambda_1$. We see this as a potential problem in Love (2003) where only the interaction term of financial development and cash flows is included in the investment equation.

⁹ The procedure involves the subtraction of the sample mean from actual values

Several studies have documented that financial development tends to benefit small firms more than it does large firms through better access to credit and stock market financing, e.g., Beck et al. (2008), Brown, Martinsson, and Petersen (2013). We explore this issue in Asian economies that have heavily bank-centered financial systems.

Let δ_1^S and δ_1^L be the impact of FDI on financial constraints for small and large firms respectively. If Asian small firms benefit more from credit expansion, FDI should reduce the financial constraints of small firms more than it does large firms, i.e. $\delta_1^S < \delta_1^L$. If credit expansion targets mostly large firms, one would expect $\delta_1^S \geq \delta_1^L$ in Asia. The hypotheses discussed above are summarized in Table 4.

Table 4: Hypothesized Impact of Financial Conditions and Financial Development

| | Null | Alternative |
|---|---------------------------|------------------------------|
| Financial conditions and investment | $\lambda_0 > 0$ | $\lambda_0 = 0$ |
| Financial conditions and financial constraints | $\lambda_1 < 0$ | $\lambda_1 = 0$ |
| Financial development and investment | $\delta_0 > 0$ | $\delta_0 = 0$ |
| Financial development and financial constraints | $\delta_1 < 0$ | $\delta_1 = 0$ |
| Financial development and firm size | $\delta_1^S < \delta_1^L$ | $\delta_1^S \geq \delta_1^L$ |

IV. EMPIRICAL FINDINGS

This section discusses the empirical findings from estimating the dynamic investment equation in (1). The model is estimated using the GMM with lagged values of all the variables in the regression, number of years after listing in the local stock market, and country dummy variables as instruments.

Note that the variables are constructed using the value of fixed assets at the end of the previous year. Therefore, we lose one year of data due to variable construction. In addition, another year's observations are lost due to the use of lagged variables in the specification. As a result, the model is estimated over a five-year period from 2007 to 2011. We discuss the full-sample results on the impact of financial conditions and financial development, and compare the results for small and large firms. We also explore the investment dynamics under different market conditions.

A. Impact of Financial Conditions and Financial Development

The results for the full sample are reported in Table 5. We find evidence of reversals: higher investment in the previous year is followed by lower investment in the current year. Both Q_t and Q_{t-1} are significant, indicating growth opportunities extend to more than one year. Sales also have strong explanatory power for investments, suggesting that Tobin's Q does not capture all growth opportunities. The coefficient of FCI is 0.014 and has a robust t-statistic 2.53 and a p-value of 0.012. Therefore, we fail to reject the null of $\lambda_0 > 0$. To assess its economic significance, we note that the average K of \$351 million from Panel B of Table 1, and the standard deviation of FCI is 1.99. Therefore, a one-standard deviation increase in FCI leads to an average increase in investment by $0.014 \times 1.99 \times 351 = \9.78 million per firm per year, or \$13.15 billion for 1,345 firms in the five sample countries.

Table 5: Investment Sensitivity to Cash Flow

| | Full Sample | | Large Firms | | Small Firms | |
|---|-------------|--------|-------------|--------|-------------|--------|
| | Coeffs | t-stat | Coeffs | t-stat | Coeffs | t-stat |
| CONST | 0.062 | 1.69 | -0.006 | -0.25 | -0.047 | -1.01 |
| (I/K) _{t-1} | -0.202** | -2.36 | -0.182 | -1.01 | -0.257 | -2.67 |
| Q _t | 0.093*** | 6.32 | 0.081*** | 5.35 | 0.117*** | 4.61 |
| Q _{t-1} | 0.069** | 2.03 | 0.049 | 1.04 | -0.027 | -1.00 |
| S/K | 0.091*** | 3.78 | 0.036*** | 3.81 | 0.162*** | 4.39 |
| (CF/K) _t | 0.370** | 2.52 | 0.402** | 2.20 | 0.433*** | 2.69 |
| (CF/K) _{t-1} | 0.069 | 1.16 | 0.018 | 0.18 | 0.173** | 2.54 |
| FCI _t | 0.014** | 2.53 | 0.014*** | 4.97 | 0.011* | 1.92 |
| (CF/K) _t ×(FCI) _t | -0.017 | -0.72 | 0.026 | 1.30 | 0.010 | 0.58 |
| FDI _t | -0.153 | -1.08 | 0.059 | 0.64 | 0.358* | 1.93 |
| (CF/K) _t ×(FDI) _t | -0.324** | -2.50 | -0.320** | -2.07 | -0.636*** | -3.89 |
| MY | 0.044 | 0.35 | -0.078 | -1.01 | -0.293* | -1.89 |
| PH | -0.015 | -0.26 | -0.026*** | -3.43 | -0.242*** | -2.89 |
| SG | 0.102 | 1.02 | -0.026 | -0.37 | -0.241* | -1.75 |
| TH | 0.142 | 1.08 | -0.055 | -0.66 | -0.263 | -1.55 |
| Y08 | 0.003 | 0.17 | -0.009 | -0.45 | -0.009 | -0.38 |
| Y09 | 0.041* | 1.75 | 0.011 | 0.77 | -0.064** | -2.23 |
| Y10 | 0.020 | 1.25 | 0.012 | 1.04 | -0.042* | -1.87 |
| Y11 | -0.006 | -0.26 | -0.044** | -2.37 | -0.078*** | -2.63 |
| I2 | -0.006 | -0.70 | -0.009** | -2.21 | -0.034** | -2.02 |
| I3 | 0.001 | 0.16 | -0.007 | -1.54 | -0.037** | -2.18 |
| I4 | -0.009* | -1.82 | -0.004 | -0.97 | -0.010 | -0.55 |
| I5 | -0.006 | -0.70 | -0.004 | -0.75 | -0.038** | -2.18 |
| p-value of Wald Test for Joint Significance | | | | | | |
| FCI _t and (CF/K) _t (FCI) _t | 0.037 | | 0.000 | | 0.052 | |
| FDI _t and (CF/K) _t (FDI) _t | 0.028 | | 0.087 | | 0.000 | |
| Model Specification Tests | | | | | | |
| Sargan Test | 30.7 | | 26.9 | | 26.0 | |
| p-value | 0.24 | | 0.173 | | 0.355 | |
| H ₀ : AR(1)=0 | -1.523 | | -1.555 | | -1.278 | |
| p-value | 0.128 | | 0.120 | | 0.201 | |

* = significant at 0.10, ** = significant at 0.05, *** = significant at 0.01.

The interaction of CF/K and FCI is not significant. The null of $\lambda_1 < 0$ is rejected in favor of the alternative $\lambda_1 = 0$. The Wald test shows that the joint effect of FCI_t and $(CF/K)_t \times (FCI)_t$ remains significant at 5%. The coefficient of FDI is not significant, rejecting the null of $\delta_0 > 0$. The coefficient of the interaction term of CF/K and FDI is negative and significant. Although FDI_t is not significant, the joint effect of FDI_t and $(CF/K)_t (FDI)_t$ remains significant at 5%. Given the standard deviation of 0.40 for FDI in Table 2, a one-standard deviation increase in FDI reduces $ISCF$ by $0.324 \times 0.4 = 0.13$ or by $0.13/0.370 = 35\%$. The average of FDI is 0.76, which reduces the average $ISCF$ by $0.324 \times 0.76 = 0.246$. The Wald test shows a significant joint effect of CF/K and $(CF/K)_t (FDI)_t$, which leads to a net $ISCF$ of $0.37 - 0.246 = 0.124$. This net $ISCF$ is lower than the range (0.20–0.70) estimated by Fazzari, Hubbard, and Petersen (1988), but is in line with more recent estimates by Baker, Coval, and Stein (2004) at 0.05–0.15 and by Rauh (2006) at 0.11. The standard deviation of CF/K is 0.16 (Panel B of Table 3). Given the average K of \$351 million, a one-standard deviation increase in CF/K is associated with an average increase in investment by $0.124 \times 0.16 \times 351 = \6.95 million per firm per year, or \$9.35 billion for 1,345 firms in the five sample countries. The Sargan test fails to reject the null of instrument validity at the 5% significance level. The instruments are not correlated with residuals. The Wald test fails to reject the null of no first order serial correlation in residuals.

B. Small versus Large Firms

It is well known that small firms tend to face greater financial constraints than large firms. Measures of financial constraints all have negative loadings on firm size, e.g., Whited and Wu (2006), Hadlock and Pierce (2010). This is consistent with the finding that small firms benefit more from financial development than large firms, e.g. Love (2003), Beck, Demirgüç-Kunt, and Maksimovic (2005), Beck et al. (2008), Brown, Martinsson, and Petersen (2013). A key feature of this study is the separation of financial conditions from financial development. With fewer financial constraints, large firms are in a better position than small firms to take full advantage of improved financial conditions. On the other hand, small firms may benefit more from bank credit expansion, as large firms tend to have established banking relationships and readily available credit lines.

Table 5 reports the estimated coefficients for large firms, defined as having market capitalization greater than \$50 million and small firms, defined as those with market capitalization less than \$50 million. Small firms have larger Q coefficient than large firms, 0.117 versus 0.081, suggesting that greater growth opportunities for small firms. However, the difference has a z -stat of 1.23, and is, therefore, not statistically significant. The coefficient of sales is larger for small firms (0.162) than it is for large firms (0.036). The difference is highly significant with a z -stat of 3.30. It suggests that sales can better capture growth opportunities for small firms than it does for large firms. The coefficients for $(CF/K)_t$ are similar for small and large firms, 0.402 versus 0.433. However lagged cash flows $(CF/K)_{t-1}$ is highly significant for small firms, suggesting that small firms face greater financial constraints than large firms.

The impact of FCI and FDI on corporate investments is the primary interest of this study. Our findings can be summarized as follows:

- The coefficients of FCI for small and large firms are roughly similar at 0.011 and 0.014, respectively. Estimated coefficient for large firms has a smaller standard error, thus its higher t -statistic. This is somewhat surprising, as we expect large firms to have fewer financial constraints and be more capable of taking advantage of better financial conditions. The evidence suggests that the additional information represented by FCI, beyond that embedded in Q and S/K , has similar effects on investment decisions made by small and large firms. The average value of fixed assets for large and small firms is \$647 million and \$30 million, respectively. A one-standard deviation increase in FCI leads to an increase in investments of $0.014 \times 1.99 \times 647 = \18 million or 2.8% of the average fixed assets per year per large firm, and of $0.011 \times 1.99 \times 30 = \0.66 million or 2.2% of average fixed assets per small firm per year.
- As in the full sample, the interaction of FCI and CF/K is not significant. Therefore changing financial conditions does not alleviate financial constraints for small and large firms. Wald tests show that the overall effect of FCI is stronger for large firms (p -value 0.000) than it is for small firms (p -value 0.052).
- The coefficient of FDI, while not significant for the full sample and for large firms, is statistically significant at 10% for small firms. The standard deviation of FDI is 0.40 (Table 2). A one-standard deviation increase in FDI is associated with an increase in investments by $0.358 \times 0.4 \times 30 = \4.3 million per small firm per year. The finding supports the view that small firms have better growth opportunities

than large firms, but small firms are severely financially constrained to be able to take advantage of these opportunities.

- As in the full sample, the interaction of CF/K and FDI is significant for both small and large firms. The coefficient for small firms is numerically larger and statistically stronger. The z-stat for the difference in coefficients, -0.320 for large and -0.636 for small firms, is 1.66 and significant at 10% level. Overall we do see FDI having a greater effect on small firms, and fail to reject the null hypothesis that $\delta_1^S < \delta_1^L$ in model (1). Given the standard deviation of 0.40 for FDI, a one-standard deviation increase in FDI reduces ISCF by $0.320 \times 0.4 / 0.402 = 32\%$ for large firms and by $0.676 \times 0.4 / 0.433 = 59\%$ for small firms. Given the average FDI of 0.76 , the average ISCF is reduced by $0.320 \times 0.76 = 0.243$ for large firms and $0.636 \times 0.76 = 0.48$ for small firms. The net ISCF is $0.402 - 0.243 = 0.159$ for large firms and is $0.433 + 0.173 - 0.48 = 0.126$ for small firms. After controlling the effects of financial development, small firms have slightly lower financial constraints due to the larger benefits from financial development. The magnitude of interaction effects of FDI and cash flow on small and large firms suggests that financial development significantly benefits small firms, presumably due to improved access to financial services.
- Wald tests show that the impact of FDI, directly or through CF/K, is stronger for larger firms than it is for small firms. On the other hand, the impact of FDI, directly or through CF/K, is stronger for small firms than it is for large firms. The larger impact of FDI on large firms suggests that their investment behavior is more sensitive to information implied by short-term fluctuations in the finance sector of the economy. This is most likely due to the confluence of reduced dependence of larger firms on banks for external financing, their greater access to market-based sources of external finance, and the improved scope for managing their liquid asset positions. Smaller firms, on the other hand, tend to have limited access to market-based sources of external finance, which would limit their sensitivity to changes in financial conditions.
- The control variables in Table 5 indicate that I/K in Philippine firms is significantly smaller than Indonesia's. Singaporean and Malaysian small firms also have significantly lower I/K. I/K is also typically lower for small firms during 2009-2011, and for large firms in 2011. This supports the notion of asymmetric impacts of crises on small and large firms.
- I/K in small manufacturing and wholesale/retail trade companies tend to be lower than that in small agriculture and mining firms. Large firms engaging in basic manufacturing also tend to have smaller I/K relative to their agriculture and mining counterparts.
- For both small and large firms, model diagnostic tests show that the instruments used are valid and there is no first-order serial correlation in residuals.

Table 6: Investment Sensitivity to Cash Flows in Sub-Periods

| | 2007–2009 | | 2009–2011 | |
|---|-----------|--------|-----------|--------|
| | Coeffs | t-stat | Coeffs | t-stat |
| CONST | –0.045 | –1.12 | 0.050 | 0.59 |
| $(I/K)_{t-1}$ | –0.063 | –0.20 | –0.131 | –0.41 |
| Q_t | 0.096*** | 6.17 | 0.122*** | 5.42 |
| Q_{t-1} | 0.002 | 0.05 | 0.022 | 0.34 |
| S/K | 0.063*** | 3.20 | 0.065*** | 2.80 |
| $(CF/K)_t$ | 0.576*** | 2.94 | 0.415** | 2.13 |
| $(CF/K)_{t-1}$ | 0.106 | 0.58 | 0.059 | 0.33 |
| FCI_t | 0.021*** | 3.93 | 0.016*** | 2.95 |
| $(CF/K)_t \times (FCI)_t$ | 0.013 | 0.56 | 0.030 | 1.30 |
| FDI_t | 0.266** | 1.98 | –0.118 | –0.53 |
| $(CF/K)_t \times (FDI)_t$ | –0.410** | –2.10 | –0.208 | –1.10 |
| MY | –0.283** | –2.36 | 0.066 | 0.33 |
| PH | –0.045 | –1.08 | –0.067*** | –2.64 |
| SG | –0.243** | –2.17 | 0.136 | 0.78 |
| TH | –0.287** | –2.22 | 0.123 | 0.59 |
| Y08 | 0.029 | 0.92 | | |
| Y09 | 0.005 | 0.15 | | |
| Y10 | | | –0.018 | –0.72 |
| Y11 | | | –0.036 | –1.50 |
| I2 | –0.001 | –0.06 | 0.004 | 0.31 |
| I3 | 0.022* | 1.87 | –0.012 | –1.40 |
| I4 | 0.007 | 0.48 | 0.011 | 1.10 |
| I5 | 0.009 | 0.56 | 0.006 | 0.45 |
| p-value of Wald Test for Joint Significance | | | | |
| FCI_t and $(CF/K)_t \times (FCI)_t$ | 0.000 | | 0.001 | |
| FDI_t and $(CF/K)_t \times (FDI)_t$ | 0.008 | | 0.524 | |
| Model Specification Tests | | | | |
| Sargan Test | 11.1 | | 11.1 | |
| p-value | 0.438 | | 0.195 | |
| $H_0: AR(1)=0$ | –0.577 | | –0.961 | |
| p-value | 0.564 | | 0.336 | |

* = significant at 0.10, ** = significant at 0.05, *** = significant at 0.01.

C. Sub-Period Analysis

Figure 1 shows that financial conditions deteriorated in 2007–2008 as the worst of the GFC unfolded. The conditions began to improve in 2009 except for Singapore and Thailand. To understand investment dynamics under different market conditions, we estimate the model over two sub-periods, 2007–2009 as the crisis period and 2009–2011 as the rebound period. The two sub-periods have an overlapping year in 2009. It is unclear exactly when the crisis ended and the rebound began. Firms may take a transition year to adjust their investment behavior. Econometrically, the overlapping year provides additional observation in both sub-periods.

The results for the sub-periods are reported in Table 6. The differences between coefficients during crisis and rebound periods are not statistically significant, largely due to the smaller sample sizes and higher standard errors. The coefficient of Q is numerically larger in 2009–2011, suggesting more investments induced by growth opportunities during rebound. The coefficient of CF/K is larger in 2007–2009, indicating greater financial constraint during crisis. The effects of FCI and FDI are numerically larger during crisis than they are during rebound or for the full sample. A one-standard deviation change in FCI leads to a change of investments by $0.021 \times 1.99 \times 351 = \14.7 million per firm during crisis, compared to \$9.78 million for the full

sample. Similarly a one-standard deviation change in FDI leads to a change of investments by $0.266 \times 0.4 \times 351 = \37.3 million per firm during crisis, while no such effect is present in the rebound period and for the full sample. The evidence indicates that the impact of FCI and FDI is much larger during economic recession than it is during recovery or booming periods. This asymmetric effect points to the need for better management of investment risk at the firm level and stronger policy responses at country level. There are statistically-significant country-specific effects during 2007-2009 for Malaysia, Singapore and Thailand, and for the Philippines during 2009-2011, where I/K exhibits declines not attributable to declines in FCI, FDI, and their interactions with the cash flow ratio.

V. CONCLUSION

Motivated by the literature on the finance–growth nexus, this paper explores the mechanisms through which finance affects corporate investments and capital accumulation. A key feature of our study is the separation of the effects of financial conditions from those of financial development. Financial development in our paper pertains to the level of sophistication and depth of the domestic financial sector whereas financial conditions pertain to the concurrent state of the financial sector relative to its average historical state.

We show that financial conditions and financial development affect corporate investments through different channels. They have different impact on small and large firms. Their impact is asymmetric with respect to economic and financial conditions. Our results are consistent with the notion that smaller firms have inadequate access to financial services, and this inadequacy is reflected by the statistically significant interaction between indicators of financial constraints and level of financial market development. Pursuing macroeconomic policies that would promote the development of the domestic financial sector therefore promotes local investments, and disproportionately impacts on small and medium enterprises.

The underlying financial condition of the domestic financial sector relative to what is perceived as the historical norm also procyclically affects the propensity to invest, but does not interact with existing external financing constraints confronting firms. Results show that cyclical movements in the domestic financial sector impinge on the investment activity of firms, and its effects are distinct from that of the real side of the macroeconomy. We also find that while financial conditions seem to have symmetric effects on large and small firms' investment behavior, there is evidence that financial crises tend to magnify the negative effects of sub-par financial development and conditions on small firms. Crises exacerbate the financing constraints that small firms face, and fiscal and monetary safety nets targeted at smaller firms may be beneficial in cushioning the decline in investment and employment.

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Corporate Investments in Asian Emerging Markets: Financial Conditions, Financial Development, and Financial Constraints

Firm-level data on five Asian economies is used to assess the existence and severity of financing constraints between small and large firms that are listed in the local stock markets in relation to level of development of the domestic financial sector and prevailing financial environment. The impact of the recent global financial crisis on financing constraints of small and large firms are likewise examined, and there is evidence that the financial crisis has a greater exacerbating effect on financing constraints of small firms.

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