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Investment and Asset Growth of Asian Firms: Evidence for Financial Resilience in the Recent Financial Crisis

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Abstract

Many recent studies have pointed out that firms with cash stocks or strong cash flow are financially resilient, enabling them to continue to invest and grow even when they experience economic shocks. In this paper we ask whether Asian firms were resilient to the recent financial crisis. Using firm level data for eight Asian countries from 2001–2009, we explore the relationship between asset growth, investment, and cash flow and find that firms use all available internal funds to channel towards asset growth even during the financial crisis. We conclude that firms in Asia were resilient to the financial crisis because they continued to use internal funds to invest and grow as they had done prior to the crisis.

Keywords: Internal Finance, Cash Flow, Investment, Growth, Financial Constraints

JEL Classification: C23, D92, E44, G32, L25, O16

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1. Introduction

A number of papers published recently have identified that mainland Chinese firms rely on significant additional *internal* funds at their disposal to generate investment and growth, rather than on additional *external* finance. Guariglia et al. (2011) notes that foreign, private, and collective firms in China have a cash flow to tangible fixed assets ratio in excess of 30%. This figure is very high compared to corresponding figures registered for the US or Europe. For instance, Bond et al. (2003) report cash flow to capital ratios of 13.4% for the UK; 17.8% for Belgium; 11.9%, for France; and 16%, for Germany. Similarly, Cummins et al. (2006) reported a ratio of 19% for US firms. Guariglia et al. (2011) argue that this feature enabled firms that were financially constrained within China to continue to grow and to invest, despite the financial constraints imposed on them by Chinese banks.[1] There are obvious reasons to link these findings to the financial constraints that many growing firms face in China, but it is also an argument that suggests firms can continue to grow because they use internal rather than external funds to finance investment and growth.

We ask whether this same internal financial dependence is found in other parts of Asia where there is less reason to think the firms are financially constrained.[2] In recent evidence, Campello et al. (2010) show that US and European firms that were unconstrained held approximately 14% of assets in cash in 2007Q4 and this hardly changed a year later, while Asian unconstrained firms had roughly double this amount of cash (27%). The same paper shows that while constrained firms in the US, Europe, and Asia had similar dependence on lines of credit (as a proportion of total assets), unconstrained firms in Asia had figures of just 17% compared to the US and Europe, where unconstrained firms had figures of 19% and 21% respectively. Their greater stocks of internal finance may have given these firms greater financial resilience prior to and during the recent financial crisis, and less need to rely on lines of credit.

It is noticeable that while Asian output growth experienced a decline during 2007-8, with greater reductions in the newly industrialized countries (Hong Kong; Republic of Korea; Singapore; and Taiwan) than in the ASEAN-4 countries (Indonesia, Malaysia, Philippines, and Thailand) and mainland China, the recovery in 2008-10 was swift. This was driven to a large extent by growth in fixed investment, which propelled output growth rates in 2010 back to pre-crisis levels. We ask whether firms drew on internally generated funds to finance this growth. Credit availability has been widely cited as a constraint to expansion in Western countries during the recent crisis, but the habitual dependence on internal funds by Asian firms would explain in part why they were able to invest and grow if the crisis has created opportunities for firms with the ability to invest (Mitton, 2002; and Byoun

[1] Song et al. (2011) note that the reason for high dependence on internal funds is not due entirely to ownership (state v. privately owned firms) or size (larger v. smaller firms), but also due, in part, to the information asymmetries associated with accounting and legal standards, nonperforming loans, and property rights.

[2] The preference for internal finance in China and other parts of Asia may stem from different institutional characteristics.

and Xu, 2011)[3]. Campello et al. (2010) state that among constrained firms, CFOs report that investment was more likely to be cancelled than funded from cash stocks or cash flow in the US and Europe, while in Asia the likelihood of cancellation was about equal to the likelihood of funding through cash or cash flow. For unconstrained firms, the CFOs report that in Asia the likelihood of cancellation was very low (half that reported for the US and Europe) and much more likely to be financed through cash or cash flow.

This paper will investigate the relationship between asset growth and investment on the one hand, and dependence on internal finance, on the other. By estimating panel regressions for asset growth and fixed investment, we will assess how these are related to investment opportunities and constrained by access to external funds. Traditionally, lack of access to external finds has been evidenced by excess sensitivity to internal sources of finance, measured by cash flow. Yet, evidence of dependence on internal funds, which is what the excess sensitivity shows, can also be seen as an explanation for continued growth when credit is constrained externally, provided that firms continue to generate retained earnings. There is ample evidence following the Asian crisis that firms increased cash stocks (Almeida et al., 2004; Lee and Song, 2011; and Arslan et al., 2012), suggesting a strong precautionary motive for cash (see Kim et al., 1998; Opler et al., 1999). Lee and Song (2011) report the median cash to asset ratio for Asian firms in Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand, rose from 6.6% in 1996 to 12.2% in 2005. These cash stocks and newly generated internal funds may have enabled firms to continue to invest and to grow as needed, prior to and during the crisis.

We find that the coefficient on cash flow in asset growth equations is close to unity (in some cases marginally larger than one) implying that firms use all available internal funds to channel towards asset growth even during the financial crisis. We continue to find these effects for separate countries, and for firms from countries with high (low) growth, and high (low) cash stocks, does not alter our conclusions. We examine whether firms with positive (negative) cash flow and positive (negative) working capital behave differently, and find that there is not substantial evidence to suggest they do. We conclude therefore that firms in Asia are more inclined to use internal funds to promote growth. They do so in crisis episodes as well as other periods, suggesting that these firms show financial resilience.

We contribute to the literature in two important ways. First, the previous literature on Asian firms comprises mostly of studies on Chinese firms – for example Chow and Fung (1998, 2000), Héricourt and Poncet (2009), Poncet et al. (2010), Guariglia et al. (2011), and Lin and Bo (2012) refer to firms exclusively on the mainland. This is innovative, but ignores the wider Asian region. We might expect some similarities between the entrepreneurial activities of SE Asia and mainland China, especially where the overseas Chinese comprise a large segment of the business population. Our first task is to

[3] Our analysis considers how Asian firms' investment and asset growth were affected by the availability of funds with which to invest. We do not analyse the extent to which the size or composition of the shocks to Western or Asian firms were directly comparable.

explore the similarities across different countries of Asia compared to private firms on the mainland. Studies that do extend to SE Asia such as Lee and Song (2011) and Arslan et al. (2012) have tended to stop short of the recent financial crisis, ending their samples before 2007. These studies also tend to drop mainland China. We use a new dataset, compiled from the Thomson Primark database for eight countries – China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand – over the period 2001-2009, to explore the characteristics of investment and asset growth.

Second, for the first time in the wider Asian context, we investigate whether investment and asset growth of firms in various countries that can be grouped by their characteristics show significantly different responses to internal finance when evaluated prior to and during the financial crisis. We consider in particular whether the use of internal finance made firms more resilient to changes in credit conditions externally, especially during the global financial crisis. This contributes to the recent literature on the value of financial flexibility during a crisis, examined by Gamba and Triantis, (2008), Byoun (2008, 2011), and Arslan et al. (2012). The study by Arslan et al. (2012) referring to the earlier Asian crisis, shows that flexible firms had greater capacity to pursue growth opportunities if they experienced shocks to retained earnings, and this provided additional support against uncertainty to prevent financial distress or even bankruptcy. They also show that firms with greater financial flexibility tended to have higher investment expenditures and better performance in crisis periods compared to less flexible firms.

The policy implications of this research are significant. Evidence that firms rely more heavily at the margin on internal finance in Asia generally contributes to the literature that has found this to be true in mainland China. If true, it would provide reasons for underlying internal financial dependence that are not connected to the nature of bank-firm relationships (as in China, where state owned banks favour state owned enterprises). Our paper tests different potential reasons for cash flow sensitivity based on the location of firms in countries with certain characteristics, or based on firm characteristics. Only firms in low-growth countries experience no cash flow sensitivity, all others fully utilise cash flow for asset growth, and there are no differences in the responses before and during the crisis. Therefore, while limited access to external finance has been regarded as a negative influence on investment and growth prospects in normal times, this research emphasises the positive effects of internal finance during a financial crisis. Firms that never relied on significant amounts of external finance are more likely to be resilient to a financial crises and continue to grow. This may explain in part the difference in the experience of the financial crisis for Asian firms compared to their Western counterparts.

The paper proceeds as follows: Section 2 reviews the literature on finance and growth for Western firms and then for Chinese firms. Section 3 describes our dataset and presents some descriptive statistics. Section 4 illustrates our baseline specification and estimation methodology. Section 5 describes our main empirical findings and the results of some robustness tests and extensions. Section 6 concludes.

2. Literature on Asset and Investment Growth

2.1 Western Firms

The financial constraints debate, which linked cash flow sensitivity to the existence of financial constraints was initiated by Fazzari, Hubbard, and Petersen's (FHP hereafter) (1988) paper. Firms with low-dividend payout ratios are more likely to display a high sensitivity of investment to cash flow. Similarly, firms that are small, risky and highly indebted are also likely to be credit constrained. Size was employed as a criterion by Bougheas et al. (2006) and is the key proxy for capital market access by manufacturing firms in Gertler and Gilchrist (1994) because small firms are more vulnerable to capital market imperfections and thus more likely to be financially constrained. Firms that are more indebted (based on the leverage ratio) are more likely to pay a higher external finance premium on bonds since they have a greater probability of bankruptcy (Bougheas et al. (2006)), which can raise the cost of borrowing, and negatively affect the availability of credit. Finally, the coverage ratio, measured as earnings before interest and taxes over total debt, can be used as a financial sample separation criterion because it measures project quality. Interest coverage was used by Gertler and Gilchrist (1994) and Guariglia (1999) as an indicator of the extent to which financial constraints drive differences in inventory investment.

A significant challenge to FHP's (1988) work came from Kaplan and Zingales (hereafter KZ, 1997), who reclassified FHP's low-dividend sub-sample of firms on the basis of information contained in the firms' annual reports as well as managements' statements on liquidity. They found that investment by firms that appeared less financially constrained by these criteria was more, rather than less, sensitive to cash flow than investment at other firms. They therefore concluded that higher sensitivities of investment to cash flow cannot be interpreted as evidence that firms are more financially constrained. The ensuing debate by among others Cleary, (1999), FHP, (2000), KZ, (2000), Allayannis and Mozumdar, (2004), and Cleary et al., (2007) supports FHP (1988) because the proxy measures they use indicate the extent to which firms are susceptible to the effects of information asymmetries, and the subsequent difficulties in obtaining external funds, or they identify firms that can signal good long-term prospects from those with poor long term prospects (Bhattacharya, 1979; John and Williams, 1985; Miller and Rock, 1985). Studies that support KZ (1997), classified firms or observations on the basis of indicators related to the level of internally generated funds available to them, which can be seen as a proxy for the degree of internal financial constraints that they face. In particular, KZ (1997) and Cleary (1999) based their sample separation criteria essentially on variables related to firms' liquidity (which is obviously strongly correlated with the level of internal funds available to firms). Guariglia (2008) distinguishes between internal and external constraints, and combines the internal with the external financial constraints, showing dependence of investment on cash flow is strongest for those externally financially constrained firms that have a relatively high level of internal funds.

A strong dependence of assets growth on cash flow, or investment on cash flow, can be seen as an indicator that a firm is financially constrained. The argument is simple: following a decline in its

internal funds, if a firm is forced to reduce its growth it can be inferred that the firm finds it difficult to access external finance (see Carpenter and Petersen, 2002). Therefore in an investment equation the ratio of cash flow to total assets would have a coefficient above one for financially constrained firms because at the margin a firm that is constrained would prefer to use the cheaper internal finance rather than resort to external finance. In addition, if cash flow is treated as collateral, firms with higher cash flow will be able to borrow more easily using the collateral it provides. Thus, in the presence of an increase in cash flow, firms more likely to face financing constraints may be able to increase their total assets slightly more than one-for-one, due to this collateral effect. On the other hand, for financially healthy firms that can access external finance at a lower cost, we would tend not to observe changes in their internal finance have any effect on their growth.

Recent surveys of firms' activities during the financial crisis suggest that credit constrained firms have been significantly affected by the financial crisis. For example, Campello et al. (2010) evaluate a survey of 1,050 CFOs in the US, Europe, and Asia to directly assess whether their firms were credit constrained during the global financial crisis of 2008. As expected, constrained firms reduced spending on employment, R&D and capital spending; they also used more cash, and withdrew credit from existing arrangements with banks to finance current activity. Campello et al. (2011) studied how firms undertook liquidity management during this period. Access to existing credit facilities was not severely limited, but credit constrained firms did rely to a greater extent on existing facilities and found renewal of credit more problematic during the crisis.

Recent results reported by Kharamov (2012) uses quarterly data for U.S. firms from 1990 to 2011 from COMPUSTAT to estimate changes in investment-cash flow sensitivities. He finds empirical evidence in favour of asymmetric effects of the crisis on these sensitivities in US industries. In particular, those US firms that were financially constrained experienced a doubling of cash flow sensitivity in the crisis period. In addition, the mean value of cash flow for firms in his dataset fell from a peak of $149.1m in 2006 to a low of $86.2m in 2009.

2.2 Chinese Firms

A number of previous studies consider the relationship between sources of external finance, firm-level growth and investment in fixed capital (which is a significant component of firm growth). Investigations by Ayyagari et al. (2008) and Cull et al. (2009) are somewhat inconclusive about the sources of funds for economic growth. Ayyagari et al. (2008) note that in spite of a poorly developed financial system, firms in China have experienced strong growth. Using the World Bank Investment Climate Survey dataset for 2400 Chinese firms in 18 cities, they document that few firms had access to formal bank finance and relied instead on internal sources of funds such as retained earnings or informal finance. Yet, their study was unable to provide a strong link between informal finance and firm-level growth, perhaps because their sample covered only three years (2000-2003). Similarly, Cull et al. (2009) hypothesize that credit from suppliers may have replaced formal credit, but once again the link was not firmly established.

Two papers by Chow and Fung (1998, 2000) study the relationship between investment and cash flow using a panel of 5825 manufacturing firms operating in Shanghai over an earlier three year period (1989-1992). While they conclude that corporate investment was constrained by cash flow, and that the sensitivity of investment to cash flow was particularly high for private firms that did not have the access to state owned banks or foreign sources of funds, small firms had lower sensitivities of investment to cash flow than large firms. They explain these findings by noting that small firms are dominated by private, high growth enterprises, which may use working capital to smooth their fixed investment. Héricourt and Poncet (2009) and Poncet et al. (2010) prove that, contrary to SOEs, which do not face financial pressures if supported by state owned banks, corporate investment by private firms is more sensitive to financial constraints using data for 1300 firms in 18 cities. Focusing on listed companies, Lin and Bo (2012) find a significant degree of financing constraints on firms' fixed investment. In addition, they document that those listed firms with the state as the largest shareholder or with higher state shareholding do not face fewer liquidity constraints. These studies suggest that as cash flow plays an important role in determining firm investment, it is also likely to affect firm growth[4].

Guariglia et al. (2011) draws these studies together by assessing the extent to which firms' assets growth is affected by the availability of internal finance (proxied by cash flow). Drawing on firm-level data from the Chinese National Bureau of Statistics (NBS) covering nearly half a million firm-year observations on enterprises of all types, in a sample of over the period 2000-2007, this study compares the relationship between investment, assets growth and cash flow as an indicator of the importance of financing constraints. Like Héricourt and Poncet (2009) and Poncet et al. (2010), they find state owned enterprises are not affected by financial constraints, and nor are collectives, because they have access to loans from state owned banks; but private firms are much more sensitive to cash flow, indicating that they are financially constrained. These firms are also found to have higher sensitivity of asset growth to cash flow compared to other types of firms. Yet, private firms are typically to be found in the high growth sectors of the Chinese economy. This puzzle can be resolved by noting that internal funds generated from retained profits relax financial constraints, and allow high growth firms to invest even though they have only limited access to external finance.

We would expect firms in countries of SE Asia excluding China to be more comparable to private firms in China than to the state owned and collectives enterprises. We may find some similarities with Western firms, but generally speaking we would expect entrepreneurs in SE Asia to rely more heavily on internal finance for investment due to financial constraints or due to the Asian business culture that tends to look to finance growth from internal sources.[5] While institutional and financial arrangements in SE Asian countries will differ compared to those for private firms in China, the institutional and financial structure characterizing SE Asian countries is in fact likely to be more similar to the Chinese than the Western structure (Adams, 2008; Shimada and Yang, 2010). With reference to the financial

[4] Héricourt and Poncet (2009) and Poncet et al. (2010) use an Euler equation framework, and include the leverage ratio and the coverage ratio as their main financial variables.

[5] There are few studies of Chinese attitudes to credit, but a recent paper by Wang et al. (2011) suggests that positive attitudes to credit are driven by power/prestige, distrust, precaution ("save first, spend later"), and anxiety. These attitudes are rooted in traditional views about appropriate behaviour, but are subject to change.

system, for example, just like China, SE Asian economies are mainly bank-dependent. Moreover, although equity markets have grown, secondary markets are still illiquid, and bond markets have developed very slowly.

3. Data and Summary Statistics

3.1 Data

We record firm-specific characteristics from the balance sheet and profit and loss accounts taken from Thomson Financial. The data cover firms from a much wider set of emerging and developed Asian economies than previous studies, since they include China, but also Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. The data span the time period 2001 – 2009, which allows us to analyse the period before the global financial crisis and the early part of crisis itself. We dropped observations with negative sales; as well as observations with negative total assets minus total fixed assets; total assets minus liquid assets; and accumulated depreciation minus current depreciation. Firms that did not have complete records on our main regression variables were also dropped. To control for the potential influence of outliers, we excluded observations in the one percent tails of each of the regression variables. Finally, we dropped all firms with less than 5 years of consecutive observations. Our final panel covers nearly 20,000 firm-year observations. It is unbalanced, with number of observations ranging from a maximum of 3217 in 2004 and a minimum of 251 in 2009.

In our empirical analysis, we focus on firm-level growth of total assets and fixed investment in separate regressions. Total assets include tangible fixed assets, intangible fixed assets, other fixed assets, accounts receivable, inventories; and other current assets (the main component of which is cash and equivalents). We record asset growth using total assets (*assetgr*) and using total assets minus cash and cash equivalents (*assetgr1*). Fixed investment (*capexk*) is defined as the growth in firm level fixed capital expenditure. We record the cash flow as a ratio of total assets (*cfa*) and as a ratio of capital (*cfk*). The level of cash to total assets and capital is recorded as (*casha*) and (*cashk*). The market-to-book measure (*tobq*) can be calculated for the firms because they are all listed.

3.2 Summary Statistics

Table 1 shows the proportion of observations from each country. The largest groups, with about 3,000 firm-year observations, are China, Korea, Malaysia and Taiwan, China; the next group with approximately half as many firm-year observations are Hong Kong, SAR, Indonesia, Singapore and Thailand; and the Philippines has less than half as many firm-year observations as the middle group. In total there are 19,918 firm year observations. The sample period runs from 2001 – 2009, but the number of observations in 2001 and 2009 is smaller than the years 2002-2008. The panel includes observations from firms in 37 different industries and services, including real estate and insurance, but excluding financials and banks.

Table 2a – 2c presents sample median values of key variables for each of our countries first for the whole sample, then for the pre-crisis period, and lastly for the crisis period. Looking at the full sample we find that firms in Hong Kong have the highest growth in assets, followed by Taiwan, Korea and China; meanwhile Indonesia and the Philippines have negative asset growth over the period. The percentage change in capital expenditure (fixed investment growth) shows China exceeds all other countries, followed by Taiwan, Korea and Hong Kong. Cash flow to total asset ratio and the cash flow to capital ratio are above average in China, Hong Kong and Singapore, and below average in Malaysia, Korea and the Philippines. Tobin's Q exceeds one for all countries in our sample.

Comparing these variables in the pre-crisis (2001-2006) and crisis (2007-2009) periods we find asset growth fell in China, Hong Kong, Singapore, Taiwan, and Thailand after the onset of the crisis, but it rose in Indonesia, Korea and the Philippines. Malaysia did not see a noticeable change. Investment was different in that all countries saw higher investment levels after 2007 than before, with the exception of Taiwan and Thailand. Cash flow to total assets was higher in most instances, and cash flow to capital was higher except for Hong Kong, Malaysia and Thailand.

In the sections that follow, we explain how we estimate firm-level dynamic assets growth and fixed investment equations that incorporate cash flow to formally assess the extent to which the growth of firms and fixed investment is affected by the availability of internal finance.

4. Empirical Specifications and Estimation Methodology

We initially estimate the following two simple dynamic equations for assets growth and for investment:[6]

$$\textit{Asset growth}_{it} = a_0\textit{Asset growth}_{i(t-1)} + a_1\textit{Tobin's } Q_{it}$$

$$+ a_2\textit{Cash flow/total assets}_{it} + a_3\textit{CrisisDum} + v_i + v_t + u_{it}, \quad (1)$$

$$\textit{Investment}_{it} = b_0\textit{Investment}_{i(t-1)} + b_1\textit{Tobin's } Q_{it}$$

$$+ b_2\textit{Cash flow/capital}_{it} + a_3\textit{CrisisDum} + v_i + v_t + u_{it}, \quad (2)$$

where the subscript *i* identifies firms, and the subscript *t*, time. The error term in each equation comprises a firm-specific time-invariant component (v_i), encompassing all time-invariant firm characteristics likely to influence growth, as well as the time-invariant component of the measurement error affecting any of the regression variables; a time-specific component accounting for possible

[6] This specification differs from that estimated by Carpenter and Petersen (2002) in two main respects. First, we estimate a dynamic model, while they estimate a static one. We chose a dynamic model, as the static model was clearly rejected by our specification tests. Second, as Carpenter and Petersen's (2002) sample is made up of listed US firm, they include Tobin's *Q* as an additional regressor.

business cycle effects (v_t); and an idiosyncratic error term, (u_{it}). We control for the firm-specific time-invariant component of the error term by estimating our equation in first-differences, and for the time-specific component by including time dummies in all our specifications.

In equation (1) the dependent variable is measured as assets growth or asset growth net of cash following Carpenter and Petersen, (2002), while in equation (2) the dependent variable is fixed investment. Estimation is by the first-difference Generalized Method of Moments (GMM) approach (Arellano and Bond, 1991), which makes use of lagged values of the regressors as instruments to control for endogeneity, and first-differencing removes firm-specific and time invariant effects. We discuss the estimation method in more detail below.

Tobin's Q accounts for investment opportunities, without which there could be bias in the cash flow coefficient, as cash flow could be accounting for the omitted investment opportunities (Cummins et al., 2006; Carpenter and Guariglia, 2008). Tobin's Q is defined as the market value of the firm over the replacement value of its total assets.

We then estimate the following equation, which is aimed at assessing whether the effect of changes in cash flow on assets growth differ in the pre-crisis and crisis period:

$$\textit{Asset growth}_{it} = a_0\textit{Asset growth}_{i(t-1)} + a_1\textit{Tobin's } Q_{it} + a_2\textit{Cash flow/total assets}_{it}\textit{(Crisis)}$$

$$+ a_3\textit{Cash flow/total assets}_{it}\textit{(1- Crisis)} + v_i + v_t + u_{it}, \qquad (3)$$

To this end, we test for equality of the coefficients a_2 and a_3 using an F-test.

To explore the characteristics of the asset growth equation further we test whether there is a difference in the relationship when we estimate equation (1) for separate countries. We then consider firms in countries where there is high-growth versus low-growth, or high-cash holdings versus low-cash holdings. Finally, to ensure our results are robust we explore the asset growth regressions for firms that have positive or negative working capital and those that have positive or negative cash flow separately.

The legitimacy of our instruments is evaluated by observing the correlation between the instrument set and the error term in each equation. A Sargan test (also known as J test), tests for overidentifying restrictions: the null is that the instruments are valid, so we expect not to reject the null. We evaluate the statistic against a chi-square with degrees of freedom equal to the number of instruments less the number of parameters.

With an instrument set restricted to lags n and deeper, the instruments are valid in the absence of serial correlation of order n in the differenced residuals (Brown and Petersen, 2009; Roodman, 2006). We assess the presence of n^{th}-order serial correlation in the differenced residuals using the $m(n)$ test,

which is asymptotically distributed as a standard normal under the null of no n^{th}-order serial correlation of the differenced residuals.

If the Sargan test and/or the test for second order autocorrelation of the differenced residuals fail (which could happen, for instance, in the presence of measurement error), we omit the regressors lagged twice from the instrument set (Bond, 2002).[7] Deeper lags of the instruments are only included if they improve the specification tests.

5. Results

5.1 Asset Growth and Investment Regressions

Table 3 provides GMM estimates of the relationship between assets growth and cash flow, controlling for Tobin's Q for the full sample, using two measures of asset growth. The first measures the annualized growth in total assets, while the second takes this measure after removing cash and cash equivalents. It is possible that cash and cash equivalents could be a large part of total assets, in which case the relationship between asset growth and cash flow could be distorted by the measurement of the dependent variable (see Carpenter and Peterson, 2002). In practice, we find little difference between the reported results in Table 3 using either measure.

The estimates of equations (1) and (2) are reported in Table 3 columns 1-3, with the addition of a crisis dummy to allow for the effects of the financial crisis on asset growth and investment. Equation (2) is then estimated without a crisis dummy, but with unreported year effects, in columns 4-6. Finally, equation (3) is estimated with an interaction between cash flow and a dummy for the crisis (no crisis) and (unreported) year effects in columns 6-9.

The results for the two asset growth equations show the coefficient associated with the lagged dependent variable is positive and precisely determined, suggesting that asset growth tends to persist in a positive or negative direction. The point estimate of the coefficient associated with the cash flow to total asset ratio (*cfa*) is positive, significant, and greater than one in columns 1, 2, 4 and 5.[8] Firms' growth appears to be somewhat restricted by their ability to retain earnings. The level of cash flow to total assets reported in Table 2 is not especially high by comparison with studies of Chinese firms (Guariglia et al., 2011), but it is large relative to the same measure for US firms reported by Carpenter

[7] All Tables report the *m*1 test for first-order serial correlation of the differenced residuals. Considering that our equations are estimated in first-differences, in most cases we find evidence of significant negative first-order serial correlation in the differenced residuals. For those specifications in which the most recent instruments are dated *t*-2 (*t*-3), we report the *m2* (*m3*) test for second- (third-) serial correlation of the differenced residuals. For those specifications that make use of both instruments dated *t*-2 and *t*-3, we report both the *m2* and the *m3* tests. Note that neither the *J* test nor the test for *n*-th order serial correlation in the differenced residuals allow to discriminate between bad instruments and model specification.

[8] Although Carpenter and Petersen (2002) suggest the coefficient should equal one, the use of leverage can increase the coefficient above one.

and Peterson (2002). The important point is that the evidence shows firms in our sample fully utilise cash flow to invest and grow.

Exploring the difference in the sensitivity to cash flow in crisis and no crisis periods, we find that the estimated coefficients, reported in columns 7 and 8, are very similar. An F test reported at the foot of these columns cannot reject the null that the coefficients are equal in either of the two asset growth equations (p-values are 0.156 and 0.916 respectively). This suggests that sensitivity to cash flow does not alter in crisis periods; these listed firms fully utilise internal funds in times of expansion and during the financial crisis.

When we included a financial crisis dummy in columns 1 and 2, we found the coefficient was negative but not significant, and for the cash-adjusted asset growth measure we found the coefficient was negative and significant, indicating that the crisis lowered asset growth.

Firms in our sample appear to show a high degree of sensitivity to the Tobin's Q (*tobq*) measure of growth opportunities. Tobin's Q is not reported by Guariglia et al. (2011) because they use unlisted firms without an easily observable market value, but Carpenter and Peterson (2002) report a median value of Tobin's Q of 0.807, compared to our median value of 1.02 reported in Table 2. The coefficient associated with Tobin's Q in our results is large for the two asset growth measures.

The investment equation reported in columns 3, 6, and 9 of Table 3 . As with the asset growth equations we introduce a crisis dummy (column 3), year effects (column 6), and an interaction between crisis/no crisis and cash flow plus year effects (column 9). The results show a similar persistence in capital expenditure growth, indicated by a positive coefficient on the lagged dependent variable, as we found for asset growth regressions. We also find that cash flow is positively associated with investment, but the magnitude of the coefficient is much smaller than in the assets growth regressions. However, it is comparable to the coefficients reported by Arslan et al (2012) for the periods before, during, and after the 1997-8 Asian crisis. When we allow for interactions with the crisis/no crisis dummy, we find and insignificant cash flow sensitivity during the crisis , and a small but positive sensitivity before the crisis. The F-test rejects the null of equality of coefficients at the 5% level (p-value 0.076). When we inserted the crisis dummy in the equation (column 3), we found no significant effect on investment through the intercept term. The coefficient associated with Tobin's Q is large, positive and significant in our regression where we introduce year effects and allow for a different coefficient on the cash flow variable for crisis and non-crisis periods, but it is insignificant in the column 3.

All our equations have satisfactory diagnostics, showing instrument validity (*J*-test) and serial correlation properties (*m1* and *m3* tests).

Our results for asset growth cannot reject the null that we observe an additional unit of asset growth for each additional unit of cash flow in line with the predictions of Carpenter and Peterson (2002)

under imperfect capital markets. This result is robust to our different measures of asset growth and three different model specifications. Asset growth is diminished by the crisis, but in general we can conclude that firms use their retained earnings to grow in good time and in the crisis. This indicates that firms fully utilise their internal funds to grow even though all these firms are listed. The implication is that firms use their internal funds for business expansion and are resilient to changes in the availability of external finance, provided that they continue to generate retained profits.

With investment the results are more difficult to interpret. The coefficient on cash flow might be expected to be smaller than the estimated coefficient on asset growth equations if firms use retained earnings to invest in all types of capital (not just physical capital, Carpenter and Peterson, 2002), but the coefficient estimates we report appear to be very low indeed and somewhat implausible. Despite the increase in investment in the crisis compared to the pre-crisis period (discussed with reference to Tables 2b and 2c), firms appear to have utilised internal funds in the pre-crisis period but not in the crisis itself. In the remainder of the paper we focus on asset growth equations.

5.2 Separating Countries

Our results for individual countries are reported in Table 4. The results reveal the heterogeneity between countries that is masked in the estimates for the full sample. The coefficient on the lagged dependent variable is positive in most cases, but significant only in a few countries (Indonesia, Malaysia, the Philippines and Thailand), which are characterised by lower growth and lower income. The coefficient associated with cash flow is positive and significant in almost all cases, excepting Singapore, where the coefficient is insignificant, and Indonesia where it is negative. This indicates that firms within countries experienced some restriction on their asset growth according to their ability to retain earnings. Where the coefficient associated with Tobin's Q was significant it was large and positive, just as we found for the full sample of countries. Yet, in many cases, we find that Tobin's Q does not have a significant impact on asset growth. The financial crisis had a negative effect for most of the countries in our sample (China, Malaysia, the Philippines, Taiwan, and Thailand), but South Korea and also Indonesia experienced a positive impact from the financial crisis period. The variability in the estimated coefficients is likely to be due to country differences, but we cannot easily assess the impact of variations in the sample sizes for different countries. Therefore, to handle the diversity in our sample in a different way, we split our countries into those that experienced high or low growth, or had high or low cash levels within firms compared to the median. This allows us to consider the response of firms within larger samples.

5.3 Separating Countries by High or Low Growth Rates

The sensitivity of assets growth to cash flow in high-growth and low-growth countries is reported in Table 5. Columns 1-4 report results for low growth and high growth firms, respectively, using two different measures of asset growth. Both sets of countries show positive sensitivities to cash flow and to Tobin's Q, but there are differences between the degree of sensitivity in the two groups. For low-

growth countries, Tobin's Q has a greater impact on assets growth than the same variable in high-growth countries. The difference in the size of the coefficient is marked, with high-growth countries showing only about half the degree of sensitivity that is shown by low-growth countries.

The firms in the same high growth countries show greater sensitivity to cash flow than firms in the low-growth countries, and the coefficients for firms in low-growth countries have lower significance than the coefficients for firms in high-growth countries. The point estimate of the cash flow coefficient is greater than one for firms in high-growth countries, although it is not significantly different from one, while the coefficient estimate for low-growth countries is less than one, and has a lower level of significance. Both groups of countries show mixed responses to the crisis in columns 1-4.

Turning to the interactions between the crisis dummy and cash flow in columns 5-8, we see more distinct differences between the firms in low-growth and high-growth countries. The interactions of cash flow with crisis and no crisis dummies have positive coefficients for both asset growth measures in columns 7 and 8. The low-growth countries by contrast show no evidence that the coefficients are significant in either period. This suggests that firms in high growth countries tend to utilise internal funds for business investment while firms in low growth countries do not. Firms in high-growth countries continue to use these funds during a crisis period, and tests of equality do not reject the null that the coefficients are equal between crisis and no crisis periods. We conclude that firms in high-growth countries have greater resilience than firms in low growth countries, since they appear to be willing to use retained profits to grow in non-crisis and crisis periods.

5.4 Separating Countries by High or Low Cash

Kim et al. (1998) and Opler et al (1999) suggest that Asian firms have engaged in precautionary saving following the Asian crisis of 1997, which may allow these firms to continue to invest and grow even when external finance is more restricted. Nevertheless, firms in some countries have higher cash stocks than others. To test the hypothesis that cash stocks affect asset growth we consider firms in countries that belong to high-cash and low-cash country groups relative to the median level of cash stocks. The results are reported in Table 6. Columns 1-4 report results for firms in low-cash and high-cash countries. Both sets of countries show positive and significant sensitivities to cash flow in asset growth regressions. The point estimate of the cash flow coefficient is greater than one, although it is not significantly different from one for either group; only the high-cash countries have a positive and significant coefficient associated with Tobin's Q. The magnitude is large and positive, implying that firms in these countries are very sensitive to investment opportunities, while firms in the low cash countries are not sensitive to the investment opportunities that are presented to them. The crisis has a positive and significant effect on low cash countries and a negative and significant effect on high cash countries.

Results for interactions between crisis and no crisis with cash flow are reported in columns 5- 8. We see clear evidence of high sensitivity of asset growth to cash flow for both asset growth measures for

each of our groups. These coefficients are greater than one, and do not differ between crisis and no crisis periods. F-tests show that we cannot reject the null that these coefficients are equal. This seems to suggest that relative stocks of cash do not affect the willingness of firms to use internal funds to support business growth in crisis or non-crisis periods.

Arslan *et al*. (2012) also explore the relationship between high-cash and low-cash firms for 1,068 listed firms from Hong Kong, Indonesia, Malaysia, South Korea, and Thailand over the period 1994-2006, but with a focus on investment-cash flow relationships. They find high- and low-cash firms had similar investment levels outside of the Asian crisis, but high-cash firms had higher investment in the Asian crisis. However, they did not find significantly different cash flow sensitivities of investment in or out of Asian crisis period. They also found that high-cash firms were responsive to investment opportunities (market to book, or Tobin's Q) in the Asian crisis, while low-cash firms were not responsive. It is important to note that Arslan et al. (2012) report results for high/low cash *firms* while our results are for all firms in *countries* with high levels of cash over a different sample period. Despite these differences we find our results for asset growth are qualitatively very similar to theirs.

5.5 Separating Firms by Positive or Negative Cash Flow

Allayannis and Mozumdar (2004) show that cash flow sensitivity results reported in Kaplan and Zingales (1997) and Cleary (1999) can be explained by the existence of financially distressed firms in the sample. Firms with negative cash flow might be considered distressed firms. Islam and Mozumdar (2007) find that the distortionary effect of negative cash flow observations reported for US data by Allayannis and Mozumdar (2004) also extend to international data. Moreover, Cleary (2007) and Guariglia (2008) show that firms with negative cash flow can face very different incentives compared to a firm with positive cash flow. Since borrowing to invest involves both a revenue effect and a cost effect, the relationship between cash flow and investment can be positive or negative. The revenue effect arises because a higher level of investment generates higher revenue, while a cost effect arises because firms have higher borrowing costs with greater investment. A firm with negative cash flow may conclude the revenue effect dominates the cost effect, giving it an incentive to increase investment in order to generate greater revenue. Positive cash flow firms would see things differently, and would most likely find the cost effect dominates the revenue effect. Therefore in order to test whether our results are influenced by firms that have negative cash flow, we separate our firms into those with positive and those with negative cash flow.

Our results are reported in Table 7. Results for firms with negative cash flow are reported in columns 1-2 and 4-5, while those with positive cash flow are reported in columns 3-4 and 7-8. We find that the first four columns reporting the estimated asset growth equations for negative and positive cash flow show a positive coefficient in all cases. Firms with positive and negative cash flow have significant coefficients associated with cash flow. These coefficients are greater than one for firms with negative cash flow, and less than one for firms with positive cash flow. Other variables such as Tobin's Q and the crisis dummy are not significant.

When we explore the sensitivity of asset growth to cash flow pre-crisis and during the crisis, we find that both groups show positive sensitivity to cash flow, and we cannot reject the null that the response is the same in each period according to F-tests. Therefore we conclude that whether cash flow is positive or negative is not a significant issue for Asian firms. One explanation for this finding could be the relatively high level of cash stocks for Asian firms acts as a buffer against the usual revenue versus cost considerations discussed in Cleary (2007) and Guariglia (2008), since firms have the option to reduce these buffers rather than to invest to generate revenue.

5.6 Separating Firms by Positive or Negative Working Capital

Following Fazzari and Petersen (1993) we note that firms may choose to use working capital to attenuate the effects of financial constraints. This was found to be a factor by Ding et al. (2012) in a panel of over 120,000 Chinese firms of different ownership types over the period 2000-2007. They found that firms with positive working capital display low sensitivities of investment in fixed capital to cash flow (as well as high sensitivities of investment in working capital to cash flow).

After separating firms into positive and negative working capital, we re-estimate our asset growth equations. Our results are reported in Table 8. We find that the first four columns reporting the estimated asset growth equations show a positive coefficient in all cases. Firms with positive and negative working capital have significant coefficients greater than one. However, in columns 5-8 we find that asset growth is more sensitive to cash flow for firms with positive working capital, while for firms with negative working capital the coefficient is significant only for the measure of asset growth excluding cash and cash equivalents. A test of the equality of coefficients on the cash flow variable in the pre-crisis and crisis periods shows that we cannot reject equality according to the reported p-values from our F-tests.

Previous studies have considered a positive coefficient on cash flow in an investment equation to be an indicator that certain firms are financially constrained. Studies that allow for working capital find that positive working capital can attenuate the effects of financial constraints. In our results here we do not find this to be the case. Firms with positive working capital remain sensitive to cash flow in asset growth equations in pre-crisis and crisis periods. This suggests that a positive coefficient on cash flow may also be an indicator of the readiness of firms to use internal funds to finance growth, and to continue to do so during a financial crisis.

6. Conclusions

A number of papers published recently have identified that private sector mainland Chinese firms rely on significant additional *internal* funds at their disposal to generate investment and growth, rather than on additional external finance (see Guariglia et al., 2011), and the same is true of SE Asian firms in the period after the Asian crisis (see Lee and Song, 2011; and Arslan et al., 2012). We ask whether this makes Asian firms more resilient when a crisis occurs. Credit availability has been widely cited as

a constraint to expansion in Western countries during the recent crisis, but greater cash stocks, and habitual reliance on internal funds could explain why Asian firms continued to invest and grow through the early stages of the financial crisis.

We construct a panel, compiled from the Thomson Primark database for eight countries – China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand – over the period 2001-2009, to explore the characteristics of investment and asset growth sensitivity to cash flow. We find that the coefficient on cash flow in asset growth equations is close to unity implying that firms use all available internal funds to channel towards asset growth even during the financial crisis. Estimating the effects for separate countries, and for firms from countries with high (low) growth, and high (low) cash stocks, does not alter our conclusions. We examine whether firms with positive (negative) cash flow and positive (negative) working capital behave differently, and we find that there is not substantial evidence to suggest that they do. We conclude therefore that firms in Asia are more inclined to use internal funds to promote growth. They do so in crisis episodes as well as other periods, suggesting that these firms show financial resilience. This financial resilience among Asian firms may stem from different attitudes to financing business investment compared with the attitudes of their Western counterparts. It may also reflect the desire firms have for precautionary saving following the experience of Asian countries in the Asian crisis of 1997.

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Table 1.

Country	Freq.	Percent	Cum.
China (CH)	3,023	15.18	15.18
Hong Kong (HK)	1,229	6.17	21.35
Indonesia (ID)	1,573	7.90	29.24
South Korea (KR)	3,730	18.73	47.97
Malaysia (MY)	2,953	14.83	62.80
Philippines (PH)	681	3.42	66.22
Singapore (SG)	1,291	6.48	72.70
Taiwan, China (TW)	3,496	17.55	90.25
Thailand (TH)	1,942	9.75	100.00
Total	**19,918**	**100.00**	

Table 2a. (2001 – 2009 Full Sample)

Country		assetgr	assetgr1	capexk	cfa	cfk	casha	cashk	tobq
China	mean	8.08	7.78	21.32	0.95	8.45	16.59	115.27	1.24
	median	5.08	4.97	17.77	1.10	3.01	13.21	38.60	1.01
	min	-61.96	-57.37	0.08	-40.38	-272.94	0.00	0.00	0.41
	max	125.34	89.17	93.98	20.70	416.60	89.82	8562.07	5.45
	st. dev	21.97	21.46	16.94	6.73	42.69	13.21	342.78	0.70
Hong Kong	mean	11.53	11.54	17.51	0.56	10.58	18.39	203.43	1.26
	median	9.09	8.92	12.92	1.78	5.89	14.41	53.46	1.04
	min	-57.30	-57.24	0.06	-40.45	-284.78	0.20	0.25	0.41
	max	116.14	89.11	94.92	21.44	421.79	90.78	16442.26	5.43
	st. dev	20.62	22.06	17.04	9.48	70.84	14.83	785.17	0.74
Indonesia	mean	-1.32	-1.47	16.13	-1.37	1.23	8.72	49.72	1.28
	median	-4.08	-4.23	11.36	-0.69	-1.87	5.64	15.20	1.07
	min	-57.49	-57.50	0.06	-37.23	-289.66	0.00	0.00	0.41
	max	105.06	85.03	95.77	21.36	416.96	60.33	2449.24	5.19
	st. dev	19.03	19.20	15.63	8.74	42.79	8.96	129.46	0.69
Korea	mean	8.70	7.44	18.46	-0.59	3.58	6.80	43.36	1.15
	median	6.21	5.28	13.53	0.17	0.45	4.76	14.04	0.97
	min	-66.70	-58.65	0.09	-40.40	-292.47	0.00	0.00	0.40
	max	122.56	88.99	94.16	21.34	409.13	80.55	3047.02	5.41
	st. dev	20.89	19.69	16.57	8.44	52.49	7.24	133.72	0.63
Malaysia	mean	0.59	0.89	10.82	-1.68	-0.28	10.62	64.40	1.12
	median	-0.97	-1.33	7.01	0.14	0.33	6.63	17.39	0.95
	min	-77.17	-56.17	0.06	-40.57	-254.85	0.00	0.00	0.41
	max	115.57	88.89	93.75	20.41	410.65	92.58	12368.57	5.28
	st. dev	17.06	17.64	11.85	8.90	41.13	11.77	355.64	0.60
Philippines	mean	0.82	-0.04	11.77	-2.16	-1.50	5.70	24.76	1.22
	median	-1.85	-2.63	6.44	-0.27	-0.61	2.80	6.99	1.00
	min	-43.30	-58.66	0.09	-38.04	-262.68	0.01	0.01	0.41
	max	118.38	83.39	86.35	21.42	362.62	52.71	863.04	4.98
	st. dev	18.18	16.99	14.11	9.09	44.80	8.17	58.24	0.75
Singapore	mean	7.37	7.11	17.10	-0.54	9.86	13.95	114.85	1.24
	median	4.40	3.97	12.33	0.56	1.37	10.45	32.28	1.08
	min	-58.21	-58.03	0.11	-39.31	-287.18	0.03	0.03	0.41
	max	97.34	87.35	95.12	20.09	417.46	79.18	8472.73	4.97
	st. dev	20.25	21.90	16.26	9.13	61.32	11.49	333.02	0.60
Taiwan	mean	8.95	7.33	18.22	0.69	14.91	11.10	71.66	1.29
	median	6.49	5.45	14.29	1.35	4.04	8.71	27.52	1.11
	min	-58.68	-58.43	0.06	-40.26	-290.78	0.00	0.00	0.46
	max	120.26	88.09	95.40	21.36	421.90	66.33	4936.97	5.20
	st. dev	19.55	19.74	15.70	8.59	59.30	9.50	180.96	0.58
Thailand	mean	3.69	3.32	15.32	0.47	6.10	6.80	30.38	1.23
	median	1.54	1.43	11.60	1.43	3.16	4.14	10.33	1.07
	min	-58.19	-54.31	0.07	-40.01	-275.19	0.01	0.02	0.41
	max	116.93	88.97	91.90	20.90	416.70	52.10	1199.81	4.96
	st. dev	17.00	17.10	13.96	8.61	44.89	7.61	67.32	0.60
Total	mean	6.07	5.37	16.41	-0.23	6.46	10.90	75.48	1.22
	median	3.47	2.99	11.87	0.65	1.78	7.47	21.11	1.02
	min	-77.17	-58.66	0.06	-40.57	-292.47	0.00	0.00	0.40
	max	125.34	89.17	95.77	21.44	421.90	92.58	16442.26	5.45
	st. dev	20.06	19.96	15.61	8.54	51.50	11.14	307.61	0.64

Table 2b. (2001- 2006 Pre Crisis)

Country		assetgr	assetgr1	capexk	cfa	cfk	casha	cashk	tobq
China	mean	8.86	8.49	20.38	0.87	7.02	16.31	108.52	1.06
	median	5.43	6.01	17.49	0.98	2.63	13.01	35.95	0.94
	min	-61.96	-56.32	0.08	-40.22	-252.13	0.00	0.00	0.41
	max	125.34	83.88	93.98	20.45	416.60	89.82	5031.32	5.45
	st. dev	21.57	20.63	16.37	6.49	39.84	12.85	312.26	0.51
Hong Kong	mean	12.75	12.77	17.29	0.23	8.92	18.09	206.91	1.30
	median	10.03	9.92	12.34	1.64	5.01	14.14	47.58	1.08
	min	-57.30	-57.24	0.06	-40.45	-284.78	0.20	0.25	0.41
	max	116.14	89.11	94.92	21.44	421.79	90.78	16442.26	5.43
	st. dev	20.76	21.54	17.39	10.10	71.95	15.22	846.23	0.73
Indonesia	mean	-2.96	-2.41	15.02	-1.63	-1.20	8.25	44.83	1.23
	median	-5.35	-4.63	10.41	-0.93	-2.69	5.09	13.98	1.05
	min	-57.49	-57.50	0.06	-37.23	-258.68	0.03	0.03	0.41
	max	105.06	82.32	95.66	20.67	311.87	60.33	2449.24	5.17
	st. dev	17.18	17.80	14.89	8.74	39.42	8.92	124.62	0.64
Korea	mean	6.73	5.10	17.76	-0.28	5.08	6.61	40.39	1.14
	median	4.43	3.35	12.39	0.33	0.97	4.57	13.07	0.96
	min	-66.70	-58.65	0.09	-40.40	-292.47	0.00	0.00	0.40
	max	122.56	88.99	94.16	21.34	409.13	80.55	3047.02	5.30
	st. dev	20.76	18.91	16.84	8.48	52.46	7.18	125.11	0.63
Malaysia	mean	0.57	0.91	10.72	-1.71	-0.18	10.56	64.75	1.11
	median	-1.06	-1.29	6.93	0.07	0.15	6.54	16.90	0.95
	min	-68.95	-56.17	0.06	-40.57	-254.85	0.00	0.00	0.41
	max	115.57	88.89	93.75	20.41	410.65	92.58	12368.57	5.28
	st. dev	16.93	17.53	11.76	8.79	40.68	11.79	361.75	0.59
Philippines	mean	-0.87	-1.05	11.03	-3.25	-5.82	5.03	21.50	1.20
	median	-2.92	-3.36	5.47	-0.90	-1.68	2.28	5.93	0.97
	min	-41.88	-41.85	0.09	-38.04	-262.68	0.01	0.01	0.41
	max	118.38	75.52	86.35	20.79	340.08	49.70	863.04	4.98
	st. dev	16.26	15.78	14.31	9.17	41.34	7.56	57.78	0.77
Singapore	mean	7.65	7.32	16.96	-0.60	9.76	13.76	113.79	1.24
	median	4.70	4.08	12.20	0.47	1.16	10.42	31.69	1.08
	min	-58.21	-58.03	0.11	-39.31	-287.18	0.03	0.03	0.41
	max	97.34	87.35	95.12	20.09	417.46	71.81	8472.73	4.97
	st. dev	20.34	21.90	16.22	9.07	61.88	11.24	333.78	0.60
Taiwan	mean	10.90	9.59	18.45	0.88	14.99	10.03	64.91	1.33
	median	7.98	7.24	14.26	1.48	4.41	7.51	24.46	1.16
	min	-57.36	-58.43	0.06	-37.98	-278.30	0.00	0.00	0.49
	max	120.26	88.09	95.40	21.36	421.90	66.33	4936.97	5.20
	st. dev	19.99	19.70	16.33	8.51	58.12	8.87	180.04	0.56
Thailand	mean	4.74	4.32	15.51	0.58	6.63	6.86	31.18	1.26
	median	2.08	1.94	11.70	1.50	3.29	4.13	10.27	1.09
	min	-58.19	-54.31	0.07	-40.01	-275.19	0.01	0.02	0.44
	max	116.93	88.97	91.90	20.90	416.70	52.10	1199.81	4.77
	st. dev	17.66	17.63	14.10	8.64	46.98	7.74	72.14	0.60
Total	mean	5.87	5.26	15.80	-0.31	5.90	10.52	72.05	1.19
	median	3.27	2.82	11.04	0.61	1.62	7.08	19.57	1.02
	min	-68.95	-58.65	0.06	-40.57	-292.47	0.00	0.00	0.40
	max	125.34	89.11	95.66	21.44	421.90	92.58	16442.26	5.45
	st. dev	19.89	19.56	15.54	8.59	50.66	10.99	312.33	0.61

Table 2c. (2007 – 2009 Financial Crisis)

Country		assetgr	assetgr1	capexk	cfa	cfk	casha	cashk	tobqq
China	mean	6.73	6.55	23.45	1.11	11.53	17.19	129.99	1.54
	median	4.10	3.51	19.21	1.43	4.13	14.10	44.76	1.29
	min	-57.57	-57.37	0.12	-40.38	-272.94	0.00	0.00	0.41
	max	104.24	89.17	93.48	20.70	378.11	86.34	8562.07	5.30
	st. dev	22.59	22.82	18.01	7.21	48.12	13.94	401.07	0.86
Hong Kong	mean	9.51	9.48	17.99	1.26	14.12	19.03	196.04	1.20
	median	6.90	6.85	13.88	2.09	7.65	15.58	65.70	0.98
	min	-55.55	-49.88	0.06	-30.64	-270.82	0.37	0.45	0.41
	max	88.86	88.53	92.83	21.23	317.17	72.53	6846.58	5.40
	st. dev	20.24	22.77	16.28	7.96	68.39	13.97	637.21	0.76
Indonesia	mean	1.67	0.24	18.65	-0.76	6.79	9.81	60.94	1.36
	median	-2.25	-3.08	14.21	-0.26	-0.65	7.07	19.00	1.10
	min	-45.91	-55.14	0.06	-36.54	-289.66	0.00	0.00	0.41
	max	91.21	85.03	95.77	21.36	416.96	46.21	1504.97	5.19
	st. dev	21.71	21.45	16.94	8.73	49.24	8.96	139.42	0.77
Korea	mean	12.68	12.20	20.06	-1.34	-0.03	7.27	50.57	1.15
	median	9.99	9.36	16.16	-0.32	-0.89	5.25	16.70	0.97
	min	-56.90	-58.52	0.17	-40.33	-287.38	0.01	0.02	0.41
	max	118.21	88.75	93.44	20.09	358.22	73.13	2520.67	5.41
	st. dev	20.60	20.40	15.83	8.31	52.41	7.36	152.43	0.62
Malaysia	mean	0.96	0.46	13.65	-0.76	-2.96	12.15	54.64	1.22
	median	0.69	-2.65	9.86	1.73	6.82	8.64	26.13	0.98
	min	-77.17	-33.40	0.13	-39.45	-222.43	0.17	0.43	0.45
	max	57.02	61.79	63.47	18.68	147.41	60.54	395.22	4.23
	st. dev	19.81	20.05	14.03	11.50	52.24	11.06	73.90	0.71
Philippines	mean	4.33	2.11	13.69	0.64	9.70	7.46	33.33	1.27
	median	0.31	-1.12	9.09	1.02	3.10	3.82	11.59	1.05
	min	-43.30	-58.66	0.16	-34.90	-163.10	0.05	0.14	0.42
	max	104.60	83.39	62.43	21.42	362.62	52.71	551.82	4.98
	st. dev	21.26	19.20	13.40	8.26	51.17	9.42	58.74	0.71
Singapore	mean	2.03	2.40	20.72	1.02	12.77	18.92	143.45	1.28
	median	1.13	2.25	19.06	3.69	16.62	12.99	44.86	1.04
	min	-37.82	-40.13	0.71	-29.62	-162.45	2.54	6.64	0.44
	max	65.95	63.21	93.96	16.37	86.00	79.18	1888.94	4.04
	st. dev	17.84	21.68	17.25	10.67	43.88	16.17	313.78	0.72
Taiwan	mean	5.07	3.24	17.68	0.25	14.73	13.57	87.26	1.20
	median	3.34	2.00	14.46	1.06	3.42	11.44	34.86	1.02
	min	-58.68	-55.84	0.06	-40.26	-290.78	0.00	0.00	0.46
	max	91.02	86.67	90.10	20.83	419.07	61.02	2654.45	4.93
	st. dev	18.04	19.16	14.10	8.77	61.97	10.42	182.20	0.60
Thailand	mean	0.26	0.04	14.56	0.03	4.00	6.56	27.15	1.15
	median	-0.31	-0.87	11.11	1.15	2.43	4.32	10.48	0.96
	min	-52.30	-51.44	0.22	-35.90	-244.63	0.01	0.02	0.41
	max	48.74	50.26	82.52	19.31	242.14	38.21	268.65	4.96
	st. dev	14.14	14.81	13.39	8.51	35.25	7.07	42.68	0.58
Total	mean	6.62	5.65	18.47	0.02	8.30	12.12	86.59	1.27
	median	4.25	3.45	14.60	0.79	2.42	8.77	27.32	1.04
	min	-77.17	-58.66	0.06	-40.38	-290.78	0.00	0.00	0.41
	max	118.21	89.17	95.77	21.42	419.07	86.34	8562.07	5.41
	st. dev	20.49	20.95	15.67	8.39	54.12	11.54	291.53	0.72

Notes: assetgr indicates the growth in firms' total assets; assetgr1, the growth in firms' total assets net of cash; capexk, the ratio of fixed investment to the capital stock; cfa, the ratio of cash flow tro total assets; cfk, the ratio of cash flow to the capital stock; casha, the ratio of cash to total assets; cashk, the ratio of cash to the capital stock; tobq, Tobin's Q.

Table 3. Asset Growth, Investment and Cash Flow

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	GMM1	GMM2	GMM3	GMM4	GMM5	GMM6	GMM7	GMM8	GMM9
VARIABLES	assetsgr	assetsgr1	capexk	assetsgr	assetsgr1	capexk	assetsgr	assetsgr1	capexk
lag_assetsgr	0.0721***			0.067***			0.055***	0.068***	
	(0.0241)			(0.025)			(0.025)	(0.028)	
lag_assetsgr1		0.0741***			0.672***				
		(0.0263)			(0.027)				
lag_capexk			0.260***			0.267***			0.271***
			(0.0273)			(0.025)			(0.025)
Cfa	1.393***	1.217***		1.462***	1.074***				
	(0.251)	(0.282)		(0.302)	(0.284)				
cfa*crisis							1.961***	1.038***	
							(0.446)	(0.434)	
cfa*(1-crisis)							1.743***	1.055***	
							(0.355)	(0.332)	
tobq	6.390***	8.637***	0.0418	4.478***	7.860***	3.840***	3.878***	7.899***	4.138***
	(1.562)	(1.822)	(1.227)	(2.190)	(3.010)	(1.686)	(2.279)	(2.366)	(1.689)
crisis	-0.130	-1.035**	-0.326	-	-	-	-	-	-
	(0.479)	(0.521)	(0.329)						
cfk			0.108***			0.077***			
			(0.0305)			(0.029)			
cfk*crisis									0.019
									(0.041)
cfk*(1-crisis)									0.065**
									(0.028)
Observations	7,921	7,513	8,828	7,921	7,513	8,828	7,921	7,513	8,828
Groups	2,903	2,785	2,967	2,903	2,785	2,967	2,903	2,785	2,967
J-test (p-value)	0.000	0.009	0.004	0.004	0.019	0.030	0.011	0.014	0.043
m1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m3 (p-value)	0.814	0.132	0.763	0.993	0.105	0.621	0.672	0.109	0.818
F-test (p-value)	-	-	-	-	-	-	0.156	0.916	0.076

Notes: Crisis is a dummy variable equal to 1 in 2007-2009, and 0, otherwise. Also see Notes to Table 1. The prefix lag indicates the variable is lagged once. All specifications were estimated using a GMM first-difference specification. The figures reported in parentheses are asymptotic standard errors. Time dummies were included in all specifications. Standard errors and test statistics are asymptotically robust to heteroskedasticity. Instruments in all columns are the regressors liked three times and time dummies. The *J* statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. *m1* is a test for first-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. *m3* is a test for third-order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. F-test is a test of the hypothesis that the coefficients associated with the two interactive cash flow terms are equal. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Asset Growth and Cash Flow by Country

	(1) CH1	(2) CH2	(3) HK1	(4) HK2	(5) ID1	(6) ID2	(7) KR1	(8) KR2	(9) MY1	(10) MY2
VARIABLES	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1
lag_assetsgr	0.103		0.0854		0.0990		0.0544		0.0484	
	(0.0627)		(0.0833)		(0.0888)		(0.0501)		(0.0512)	
lag_assetsgr1		0.0412		-0.0325		0.151*		0.0821		0.132*
		(0.0705)		(0.0822)		(0.0774)		(0.0562)		(0.0693)
cfa	0.934*	1.248**	1.340*	1.634**	-1.259*	-1.352*	0.681*	0.662*	0.962***	0.886*
	(0.493)	(0.528)	(0.810)	(0.801)	(0.715)	(0.741)	(0.365)	(0.393)	(0.372)	(0.480)
tobq	7.712***	6.897***	15.54**	9.132	18.40***	17.00***	-0.372	1.340	10.55*	4.070
	(1.746)	(1.804)	(6.151)	(6.269)	(4.852)	(5.391)	(3.063)	(3.463)	(5.423)	(7.458)
crisis	-5.205***	-4.803***	-0.254	-1.772	4.614***	2.707	3.444***	3.845***	-0.00752	-3.899**
	(1.217)	(1.284)	(2.029)	(2.368)	(1.667)	(1.654)	(0.989)	(1.093)	(1.565)	(1.812)
Observations	1,420	1,381	478	456	680	672	1,474	1,361	791	758
Groups	428	418	162	156	217	211	553	499	539	523
J-test (p-value)	0.262	0.058	0.147	0.125	0.194	0.092	0.000	0.004	0.305	0.157
m1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m3 (p-value)	0.540	0.553	0.873	0.034	0.160	0.480	0.868	0.704	0.333	0.488

Table 4. (cont) Asset Growth and Cash Flow by Country

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	PH1	PH2	SG1	SG2	TW1	TW2	TH1	TH2
VARIABLES	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1
lag_assetsgr	0.382**		0.0645		-0.0167		0.0728	
	(0.165)		(0.120)		(0.0513)		(0.0456)	
lag_assetsgr1		0.477***		0.0903		-0.0310		0.0994*
		(0.159)		(0.117)		(0.0497)		(0.0543)
cfa	1.217	1.651**	0.313	0.367	1.443***	1.420***	0.807	1.160*
	(0.763)	(0.731)	(0.552)	(0.527)	(0.308)	(0.337)	(0.496)	(0.637)
tobq	5.354	6.909	6.216	4.121	9.256***	11.42***	-4.448	-2.861
	(7.803)	(7.904)	(10.10)	(10.31)	(2.663)	(3.206)	(5.597)	(5.657)
crisis	0.510	-4.623*	-2.147	-2.606	-2.621***	-2.551***	-2.054*	-1.347
	(2.681)	(2.680)	(5.016)	(4.739)	(0.767)	(0.907)	(1.203)	(1.353)
Observations	276	269	165	150	1,792	1,631	845	835
Groups	95	90	85	80	518	505	306	303
J-test (p-value)	0.686	0.716	0.347	0.571	0.000	0.311	0.094	0.012
m1 (p-value)	0.000	0.000	0.151	0.207	0.000	0.000	0.000	0.000
m3 (p-value)	0.889	0.793	0.490	0.283	0.050	0.497	0.292	0.758

Notes: Robust standard errors in parentheses. Also see Notes to Tables 1 and 3. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Asset Growth and Cash Flow in High Growth (HG) v. Low Growth (LG) Countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LG1	LG2	HG1	HG2	LG3	LG4	HG3	HG4
VARIABLES	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1
lag_assetsgr	0.110**		0.0581**		0.150***		0.00274	
	(0.0470)		(0.0274)		(0.0461)		(0.0321)	
lag_assetsgr1		0.169***		0.0526*		0.187***		0.0215
		(0.0505)		(0.0292)		(0.0511)		(0.0309)
cfa	0.980**	0.875*	1.316***	1.088***			0.00274	
	(0.462)	(0.518)	(0.265)	(0.283)				
cfa*crisis					0.482	0.106	3.299***	2.140***
					(0.500)	(0.587)	(0.640)	(0.556)
cfa*(1-crisis)					0.474	0.423	2.733***	1.845***
					(0.442)	(0.520)	(0.503)	(0.433)
tobq	14.28***	14.61***	6.058***	8.865***	-0.158	2.048	3.335	7.507***
	(3.599)	(4.271)	(1.614)	(1.831)	(4.433)	(4.861)	(2.972)	(2.799)
crisis	3.777***	1.510	-0.803	-1.521**				
	(1.170)	(1.179)	(0.535)	(0.590)				
Observations	1,747	1,699	6,174	5,814	1,747	1,699	6,174	5,814
Groups	851	824	2,052	1,961	851	824	2,052	1,961
J-test (p-value)	0.036	0.014	0.000	0.006	0.001	0.005	0.000	0.000
m1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m3 (p-value)	0.057	0.178	0.314	0.035	0.414	0.445	0.251	0.087
F-test	-	-	-	-	0.127	0.225	0.248	0.858

Notes: Robust standard errors in parentheses. Also see Notes to Tables 1 and 3. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Asset Growth and Cash Flow in High Cash (HC) v. Low Cash (LC) Countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LC1	LC2	HC1	HC2	LC3	LC4	HC3	HC4
VARIABLES	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1
lag_assetsgr	0.0577**		0.0655*		0.0480		0.0293	
	(0.0293)		(0.0370)		(0.0299)		(0.0406)	
lag_assetsgr1		0.0992***		0.0278		0.0996***		0.00460
		(0.0329)		(0.0377)		(0.0330)		(0.0401)
cfa	1.559***	1.432***	1.265***	1.225***				
	(0.337)	(0.367)	(0.304)	(0.305)				
cfa*crisis					1.752***	1.193**	2.718***	2.206***
					(0.471)	(0.543)	(0.739)	(0.700)
cfa*(1-crisis)					1.554***	1.227***	2.285***	1.858***
					(0.401)	(0.450)	(0.541)	(0.501)
tobq	-0.150	1.161	9.091***	10.55***	2.737	5.818	1.075	4.356
	(2.687)	(3.083)	(1.784)	(1.923)	(3.748)	(4.196)	(2.728)	(2.710)
crisis	2.570***	1.716**	-3.408***	-3.991***				
	(0.643)	(0.666)	(0.678)	(0.755)				
Observations	4,066	3,895	3,855	3,618	4,066	3,895	3,855	3,618
Groups	1,710	1,626	1,193	1,159	1,710	1,626	1,193	1,159
J-test (p-value)	0.062	0.071	0.000	0.011	0.000	0.000	0.000	0.000
m1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m3 (p-value)	0.112	0.281	0.105	0.005	0.105	0.282	0.921	0.021
F-test	-	-	-	-	0.011	0.147	0.969	0.203

Notes: Robust standard errors in parentheses. Also see Notes to Tables 1 and 3. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Asset Growth and Cash Flow for Firms with Negative (NCF) v. Positive (PCF) Cash Flow

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	NCF1	NCF2	PCF1	PCF2	NCF3	NCF4	PCF3	PCF4
VARIABLES	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1
lag_assetsgr	0.0600*		0.0900***		0.0403		0.0948***	
	(0.0325)		(0.0326)		(0.0350)		(0.0319)	
lag_assetsgr1		0.115***		0.0474		0.0970***		0.0533
		(0.0328)		(0.0371)		(0.0341)		(0.0364)
cfa	1.407***	1.529***	0.889***	0.609***				
	(0.200)	(0.216)	(0.196)	(0.211)				
cfa*crisis					2.394***	2.251***	1.264***	0.440
					(0.653)	(0.668)	(0.353)	(0.389)
cfa*(1-crisis)					1.838***	1.951***	1.163***	0.724***
					(0.385)	(0.387)	(0.213)	(0.231)
tobq	2.200	2.110	8.798***	10.95***	-2.893	-1.348	1.417	7.594**
	(2.904)	(3.259)	(1.360)	(1.560)	(6.210)	(6.761)	(2.944)	(3.242)
crisis	1.298	0.444	-0.551	-0.458				
	(0.876)	(0.973)	(0.626)	(0.686)				
Observations	3,580	3,413	4,341	4,100	3,580	3,413	4,341	4,100
Groups	1,736	1,664	1,924	1,844	1,736	1,664	1,924	1,844
J-test (p-value)	0.001	0.004	0.003	0.001	0.000	0.001	0.137	0.002
m1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m3 (p-value)	0.495	0.450	0.363	0.021	0.381	0.496	0.758	0.029
F-test	-	-	-	-	0.171	0.471	0.725	0.386

Notes: Robust standard errors in parentheses. Also see Notes to Tables 1 and 3. *** p<0.01, ** p<0.05, * p<0.1.

Table 8. Asset Growth and Cash Flow for Firms with Negative (NWC) v. Positive Working Capital (PWC)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	NWC1	NWC2	PWC1	PWC2	NWC1	NWC2	PWC1	PWC2
VARIABLES	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1	assetsgr	assetsgr1
lag_assetsgr	0.00981		0.0963***		0.0124		0.0758***	
	(0.0615)		(0.0268)		(0.0696)		(0.0271)	
lag_assetsgr1		0.0158		0.106***		-0.00311		0.0974***
		(0.0590)		(0.0284)		(0.0675)		(0.0282)
cfa	1.099***	1.452***	1.250***	1.008***				
	(0.316)	(0.359)	(0.257)	(0.301)				
cfa*crisis					0.690	2.165*	2.072***	1.373***
					(0.944)	(1.223)	(0.439)	(0.470)
cfa*(1-crisis)					0.715	1.778**	1.771***	1.248***
					(0.598)	(0.785)	(0.322)	(0.347)
tobq	2.039	1.406	7.404***	9.366***	8.655	3.873	3.085	5.667**
	(3.719)	(4.168)	(1.706)	(1.945)	(6.427)	(7.731)	(2.673)	(2.779)
crisis	-0.439	-0.929	-0.213	-0.676				
	(1.654)	(1.837)	(0.529)	(0.579)				
Observations	1,124	1,075	6,206	5,870	1,124	1,075	6,206	5,870
Groups	574	549	2,462	2,362	574	549	2,462	2,362
J-test (p-value)	0.011	0.043	0.000	0.002	0.015	0.219	0.006	0.002
m1 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m3 (p-value)	0.278	0.506	0.436	0.180	0.335	0.457	0.998	0.208
F-test	-	-	-	-	0.959	0.562	0.116	0.544

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