



### FINANCIAL DEVELOPMENT AND FINANCING CONSTRAINTS IN A DEVELOPING COUNTRY: THE CASE OF BANGLADESH

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#### Abstract

This paper examines the sensitivity of investment to available cash-stock, a measure for internal funds, for 192 listed non-financial firms of Bangladesh from 1992 to 2002. The empirical results show that smaller firms have greater financing constraints to investment than larger firms due to financial market imperfection and unequal access to external finance. We also find that financing constraints of investment by small firms are eased along with financial development. It is likely that financial development encourages efficiency of the financial market in Bangladesh, and hence decreases cash stock sensitivity of investment of small firms. Our finding demonstrates the importance of financial development for economic growth even in a developing country like Bangladesh.

**Keywords:** financing constraints, financial development, investment, Bangladesh

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## **1. Introduction**

Does financial development promote economic growth? Many argue that the development of the financial market should increase investment and its efficiency, thereby spurring economic growth. There have been a large number of empirical studies that use macroeconomic data in the framework of cross-country regressions, most of which support the benefit of financial development to economic growth (King & Levine, 1993a, b; Levine, 1997, 2005). However, some studies point to the serious endogeneity problem in this argument since economic growth may also promote financial development and it is not easy to address this problem with macroeconomic empirical studies.

Recently, researchers have been turning their interest to microeconomic empirical studies. They assume that the financial development should make the financial market work more efficiently, and thus lower cash flow sensitivity of firms' investment. It is well known that firms, especially small ones, are faced with serious constraints in financing their investment as the financial market is not perfect due to information problems. Corporate investment is constrained by the availability of liquidity or internal funds in reality, and this is more serious to small firms that have more difficulty in obtaining external finance. Following from Fazzari, Hubbard and Peterson (1988), this so-called financing constraint argument is supported by a great deal of empirical studies regarding both developed and developing countries. Financing constraints must be more serious when the financial sector is underdeveloped with more imperfectness, and financial development should lead to a reduction of financing constraints as more developed financial markets work more efficiently. And policies to promote the financial market such as financial liberalisation must bring about this benefit. In fact, empirical studies are being undertaken that examine the role of financial liberalisation or development in reducing firms' financing constraints in several developing countries.

In this paper, we focus on the experience of Bangladesh, one of the poorest countries in the world, and investigate whether financial development encourages efficiency of the financial market by lowering financing constraints. The financial market in Bangladesh is yet underdeveloped but the market has been developing following a financial reform introduced in the early 1990s. Our finding demonstrates that small firms in Bangladesh are faced with serious financing constraints but they became less due to the development of the financial sector. Though we should carefully interpret the results and more studies are necessary, efforts to develop the financial sector and institutions are desirable for the increase of efficiency in the financial market in very poor countries too.

The paper consists of six sections. Section 2 reviews the current empirical literature about financing constraints and financial development. Section 3 presents a historical overview of financial policy and the development of the financial market in Bangladesh. After explaining our empirical specifications and data in Section 4, we present and discuss the result of empirical examinations about financing constraints of firm-level investment in Bangladesh in Section 5. Section 6 summarises our analysis and concludes.

## **2. Literature Review: Financing Constraints and Financial Development**

When the financial market is not perfect and external finance is more costly relative to internal finance, a firm's investment is constrained by the lack of available external finance. For this reason, a variable such as cash flow or liquidity is considered important to investment decision as a proxy for internal financing. Following Fazzari, Hubbard and Peterson (1988) a substantial body of empirical literature about this 'financing constraint' on investment has emerged. These studies have used various models including the liquidity variable as well as other variables, and recently a model based on the Euler equation in the process of solving firms' maximization problem has become popular (Bond and Meghir, 1994; Laeven, 2003; Saltari, 2001). Having examined many countries from the perspective of

these theories, economists have reported that the coefficient of cash flow or stock variables is significant and concluded that firms are faced with financing constraints. Financing constraints are found to be more serious for small or independent firms as compared to large ones or corporate groups.

A large number of studies about developed countries including Hoshi, Kashyap and Scharfstein (1991) for Japan, Gilchrist and Himmelberg (1995), Mairesse et al. (1999) for the U.S., Audretsch and Elston (2002) for Germany, and Bond et al. (1997) for selected European countries present similar evidence. This line of study does not only examine developed countries but also developing and transition countries and reports that financing constraints of firms' investment are also evident in poorer countries. These include Harris et al. (1994) for Indonesia, Jaramillo et al. (1996) for Ecuador, Shin and Park (1999) for Korea, Budina et al. (2000) for Bulgaria, Gallego and Loayza (2000) for Chile, Bahlous and Nabli (2001) for Tunisia, Arbelaez and Echavarría (2001) for Colombia, Aivazian et al. (2001) for Sri Lanka, Perotti and Gelfer (2001) for Russia, Lizal and Sveznar (2001) for Czech, Gelos and Werner (2002) and Castaneda (2002) for Mexico, Barbieri et al. (2002) for Uruguay, and Gangopadhyay et al. (2002) and George et al. (2005) for India.

It is interesting that many of these studies on developing countries have given important insights on the effect of financial liberalisation in developing countries, including Harris et al. (1994) for Indonesia, Jaramillo et al. (1996) for Ecuador, Gallego and Loayza (2000) for Chile, Gelos and Werner (2002) for Mexico, and Basu (2002) for India. Most conclude that liberalisation eases financing constraints of small firms as financial liberalisation makes the financial market more efficient. For example, Gallego and Loayza (2000) report that the investment of firms became less sensitive to cash flow or debt, while it became more sensitive to Tobin's  $q$  after financial liberalisation in Chile. Gelos and Werner (2002) examine the Mexican case, adding a cash flow variable to a simple accelerator

specification. They also find that the cash flow sensitivity is higher for smaller firms, and the sensitivity decreases significantly after financial liberalisation. While most other studies report a similar benefit of financial liberalisation using various econometric specifications (Harris et al, 1994), Jaramillo et al. (1996) find no significant result in the Ecuadorian case.

Another line of study compares firms in different countries, using a cross-country firm-level panel data.<sup>1</sup> Laeven (2003) conducted the first study to examine the difference in the cash flow sensitivity across different levels of financial liberalisation. He reports that investment is largely constrained by cash flow, and financial liberalisation reduces these constraints, especially for small firms that suffered from more severe constraints prior to liberalisation. Love (2003) also shows that financial development lowers financing constraints for firms, using cash stock measures. She finds financial development and legal origin to be important to easing constraints, and smaller companies obtain higher benefits from financial development. Galindo, Schiantarelli and Weiss (2007) conduct an alternative firm-level study and report that financial liberalisation has increased the share of investment going to firms with a higher marginal return to capital by improving capital allocation.<sup>2</sup> Other studies examine the role of foreign investment or capital account liberalisation in financing constraints. Harrison, Love and McMillan (2004) analyse whether greater foreign direct investment (FDI) inflows are associated with a reduction in firm-level financing constraints, and report that the increase of FDI indeed lowers constraints. Meanwhile, Harrison and McMillan (2003) find that this effect is not significant after examining the case of Ivory Coast.

In general, most studies lend support to the argument that financial development or liberalisation decreases financing constraints since it increases the efficiency of the financial market. It should be noted that the measures particularly for financial liberalisation may not be perfect and results should be carefully interpreted.<sup>3</sup> Despite this, there is ample evidence

that financial development together with financial liberalisation and opening lowers financing constraints. However, the extent to which financial constraints are lowered is likely to differ between countries according to levels of economic and institutional development. In particular, a certain level of financial infrastructure may be required before benefits of liberalisation can be captured. Therefore, in this paper, we are more interested in the benefit of financial development in a poor country, and we examine the impact of financial development on financing constraints in the case of Bangladesh.

### **3. Financial Development in Bangladesh**

#### **3.1. Financial repression and underdevelopment of the financial sector**

After the victory in the Liberation war with West Pakistan (Now Pakistan) in 1971, the Government of the People's Republic of Bangladesh (GOB) took over the management of the economy. Under nationalization policy of March, 1972, about 90 percent of major industries went under government control and almost all the financial institutions, except a few foreign bank branches, were nationalised and reorganised by the government at that time. The Bangladesh government has maintained strong control over the whole financial sector since then. The capitalist idol, Dhaka Stock Exchange (DSE) was immediately closed down and severe restrictions were imposed on both domestic and foreign private investment. The socialist oriented industrial policy of 1973 assigned a very minor role for the private sector in industrial activities. A fixed ceiling of 2.5 million taka was set for initial investment by private firms, and there was a ceiling of 3.5 million taka for reinvestment of profits (Ali, 2002). However public sector enterprises could not run profitably and efficiently and many of them ran into severe financial difficulties.

The initial pessimism of the government policy makers about the role of private sector started to change. The revised industrial policy of 1974 attempted to encourage the private sector by enhancing the ceiling of investment to 30 million taka and promoting both local and

foreign private investors to set up industries in joint collaboration with public sector corporations in certain industries. It also offered incentives to private investments including tax holidays and concessional tariffs on imports of machinery and parts. However these measures did not spur private investment significantly due to the lack of investors' confidence and growing economic volatility. The Government of Bangladesh (GOB) finally began to reverse its policy of nationalization due to the heavy burdens of the public sector enterprises with the change of regime in 1975. The abandonment of 'socialism' as a state principle and the movement toward economic liberalisation facilitated liberalisation and reform in the financial sector too. The Dhaka Stock Exchange (DSE) was re-opened in 1976 and some measures to support the capital market were introduced. However, in spite of such liberalisation initiatives starting from 1975, their coverage was very small, and banks and other financial institutions continued to remain under government ownership until the early 1980s.

The financial liberalisation process in Bangladesh gathered a new momentum with the privatization of two nationalised commercial banks and the permission of private commercial banks to operate in 1982. The government attempted to demonstrate its commitment to encourage the private sector and create competition in the banking sector by these policies (The National Commission on Money, Banking and Credit (NCMBC) Report, 1986, p.13). In 1986, the government also established the NCMBC in an attempt to identify major problems of banking sector in Bangladesh along with suggestions for necessary remedial measures. Notwithstanding these measures, government control was not relinquished in the financial sector. It was not until the early 1990s that important financial reforms were introduced when the government sought cooperation from the World Bank for more effective implementation of financial liberalisation.

### **3.2. Financial reform in the 1990s and its results**

Bangladesh launched extensive Financial Sector Reform Program (FSRP) in 1990 (scheduled to be implemented in different phases) under a financial sector adjustment credit of the International Development Agency in cooperation with the World Bank. This reform was introduced as an important component of a market-led structural adjustment program including economic liberalisation and opening in general. The FSRP was a long term project to be implemented in different phases and its first phase constituted the 5 year period from 1991 to 1995.

The major objectives of the FSRP were: (i) to assist monetary policy reforms; (ii) to strengthen bank supervision by Bangladesh Bank (central bank of Bangladesh); (iii) to improve the quality of bankers' training; (iv) to equip the banking sector with improved technology (Khaled, 2003). The main issues addressed by FSRP included: Interest rate liberalisation, loan classification and provisioning, capital adequacy, introduction of instruments for indirect monetary management, legal reforms, strengthening of the central bank, strengthening of bank supervision, improving operational efficiency of commercial banks and reforms in the foreign exchange management regime (Chowdhury , 2000). This program was in general aimed at reducing the strong control of the government over the financial sector and promoting the private financial market in Bangladesh. After the end of the first phase of this plan, the government established the Bank Reform Committee (BRC) which was assigned to monitor and strengthen the ongoing banking sector reform from 1996 onwards (Choudhury and Raihan, 2000).

There are evaluations that point to the limits of the ongoing financial sector reforms. According to the assessment by the USAID in 1997, most of banking sector officers' were under-qualified and this sector suffered from low efficiency. Public banks have failed to recruit and retain competent officers and executives due to poor compensation packages and



personnel policy. One report concludes about the first phase of the project, “The project has been implemented successfully but results fall far short of expectations” (Khaled, 2003). Though there were limits of the reform, the project and reform measures appear to have resulted in a gradual development in the financial sector to some extent as we see below in figure 1.

[Insert Figure 1]

Figure 1 demonstrates the development of financial deepening, by comparing the pre-reform period (1975-1989) and the post-reform period (1990-2002) in Bangladesh. The ratio of narrow money (M1) to broad money (M2) has been decreased significantly after the reform, which indicates that a substantial amount of term deposits have been accumulated during that period. Besides, other financial development measures such as M2/GDP, Private Credit by banking sector (PC)/ total Domestic credit by banking sector (DC), PC/GDP, quasi liquid liabilities (Q) that is  $(M3 \text{ minus } M1) / \text{GDP}$ , and DC/GDP have been increased after the reform. Real interest rates (RIR) have significantly gone up after the reform thanks to financial liberalisation and lower inflation during this period. The interest rate spread (difference between lending rate and deposit rate) has increased in the post-reform period due to the effort to recover the burden of default loans by setting higher lending rates. In addition, there has also been a gradual development in the stock market, which can be seen in the increase of stock market capitalization/GDP and turnover/GDP as shown in the following figure 2.

[Insert Figure 2]

Thus, the experience of gradual financial development in Bangladesh after the reform in the 1990s provides us with a good case of incipient financial development in a poor country. The interesting question is whether this development increased efficiency in the financial

market. We attempt to answer this by examining the change of financing constraints of firms' investment in Bangladesh in the next section.

## **4. Empirical Techniques and Data**

### **4.1. Empirical investment models**

In this section, we present our investment models and test strategy. We use the standard investment model with financing constraints based on the common Euler equation approach. The model is derived from the first order conditions of a managers' maximization problem of firm value, using dynamic optimization. It uses the marginal profitability of capital as the fundamental variable and a cash variable to capture features of financing constraints, and adds a lagged investment variable to control for costly adjustment. A higher sensitivity of investment to cash flow suggests financing constraints and inefficiency in the financial market since investment should be responsive to only fundamentals in a perfect financial market.

As a fundamental variable, some use sales divided by assets and others use the q ratio. Because it is impossible to calculate the ideal marginal q ratio, the average q ratio is commonly used though limited. We use the sales based variable mainly but we also check the result using the q ratio.<sup>4</sup> Concerning the liquidity variable, the traditional measure of cash flow, that is operating income plus depreciation could be problematic as it is correlated with profitability. The sensitivity of investment to this cash flow variable may reflect fundamentals in part because cash flow is related to profit closely, which may be associated with future profit opportunities (Gilchirst, and Himmelberg, 1995). Hence, we use cash stock including cash and cash equivalents as a measure for liquidity instead. If external finance is costly due to information problems firms hold higher cash stock and investment is responsive to this variable (Love, 2003).

Our baseline model is a rather simplified one following the model used in Carpenter and Guariglia (2003), Love (2003) and Laeven (2003):

$$\frac{I_{i,t}}{K_{i,t-1}} = \delta_0 + \delta_1 \frac{I_{i,t-1}}{K_{i,t-2}} + \delta_2 \frac{CS_{i,t-1}}{K_{i,t-2}} + \delta_3 \frac{S_{i,t-1}}{K_{i,t-2}} + f_i + t_t + \varepsilon_{it} \quad (1)$$

Where,  $I$  indicates firm's investment;  $K$  = Beginning period capital (Net tangible assets – capital expenditure + depreciation and amortization expenses);  $CS$  = Cash Stock (Cash + Cash Equivalents);  $S$  = Net Sales;  $f_i$  = Firm-specific effects ;  $t_t$  = time-specific effect and  $\varepsilon$  = Random error term. The subscripts “ $i$ ” and “ $t$ ” represent firms (where total number of firms is 192) and time period (where total time period is from 1992 to 2002), respectively.

We first test whether there are financing constraints for firms' investment, especially in the small and medium firms. Dividing our samples into large firms and small and medium ones, we examine whether there is difference in financing constraints. We also use an alternative method examining the interaction term of the size variable using total assets and the cash variable, expecting that the interaction term should be negative if there are a higher level of constraints for smaller firms. One should be careful about the interpretation of cash flow sensitivity of investment, which may be affected by other factors, such as the business cycle, and may not be a good measure for financing constraints (Kaplan and Zingales, 1997; Cleary, 1999).<sup>5</sup> We focus, however, on the sensitivity of investment to the liquidity variable assuming that the financial market is imperfect following many studies.

Concerning the test of the effect of financial development on financing constraints, we add the interaction term of the cash stock variable and commonly used financial development indicators in the model. As many demonstrate, financing constraints should be more severe for small and medium firms. Thus, we use the interaction term of three variables including cash stock, firm size and financial development, following Love (2003). If financial development lowers constraints for smaller firms relatively more than for larger firms, as

theory predicts, the interaction term should be significantly positive. We also include other interaction terms in the model as following:

$$\begin{aligned} \frac{I_{i,t}}{K_{i,t-1}} = & \delta_0 + \delta_1 \frac{I_{i,t-1}}{K_{i,t-2}} + \delta_2 \frac{CS_{i,t-1}}{K_{i,t-2}} + \delta_3 \left( \frac{CS_{i,t-1}}{K_{i,t-2}} * F_{i,t-1} \right) \\ & + \delta_4 \left( \frac{CS_{i,t-1}}{K_{i,t-2}} * Z_{i,t-1} \right) + \delta_5 \left( \frac{CS_{i,t-1}}{K_{i,t-2}} * F_{i,t-1} * Z_{i,t-1} \right) + \delta_6 \frac{S_{i,t-1}}{K_{i,t-2}} + f_i + t_t + \varepsilon_{it} \end{aligned} \quad (2)$$

Where, F= Financial Development Indicators of Bangladesh [Banking sector indicators are Broad Money, M2/GDP or, Liquid Liabilities, M3/GDP; Stock market indicator is Turnover, TR/GDP and Combined financial indicators of both banking sector and stock market are (M2+TR)/GDP and (M3+TR)/GDP]; Z =Size of the firms measured by Log of the value of total assets; The subscripts “i” and “t” represent firms and time period respectively.

In our baseline model (equation 1), the expected sign of the cash stock coefficient is non-negative ( $\delta_2 \geq 0$ ), which implies that there are financing constraints. In our extended model (equation 2) the expected signs of the coefficients are:  $\delta_2 \geq 0$  and  $\delta_3 < 0$ , which reflects the theory that financing constraints will decrease with financial development. Also,  $\delta_4 < 0$  states that financing constraints are smaller for larger firms. And finally,  $\delta_5 > 0$  demonstrates that the reduction in constraints is larger for smaller firms faced with higher constraints initially.

#### 4.2. Estimation Technique: Dynamic Panel Model

We use a dynamic panel data model that can address possible biases in ordinary panel estimators. Let us consider a simple panel regression model as follows:

$$y_{it} = \alpha y_{i,t-1} + \beta x_{it} + f_i + \varepsilon_{it} \quad (3)$$

Where  $\varepsilon_{it} = \mu_{it} + \eta_i$ ;  $i = 1, \dots, N$  cross section units ;  $t = 1, \dots, T$  time periods;  $f_i$  is the observed individual effect and  $\eta_i$  is an unobserved individual effect. Hence, the model in equation (3) includes a lagged dependent variable as one of the regressors.

There is a clear simultaneity problem as the lagged dependent variable  $y_{i,t-1}$  is correlated with the error term  $\varepsilon_{it}$  by virtue of its correlation with the time-invariant component of the error term,  $\mu_{it}$ . In this case, the usual Ordinary Least Squares (OLS) estimator suffers from biases due to unobserved heterogeneity and possible endogeneity of the regressors. Due to the possibility of unobserved firm-specific effects, the OLS estimator may result in upward –biased estimates of the autoregressive coefficients if firm-specific effects are important (Bond, Elston, Mairesse and Mulkay, 1997). A within group estimator, after transforming the data to deviations from firm mean, in order to eliminate firm-specific fixed effects, is not consistent either because the transformed lagged dependent variable and the transformed error term are negatively correlated, (Nickell, 1981).

The standard Generalised Method of Moments (GMM) approach due to Arellano and Bond (1991) and Arellano and Bover (1995) start with first differencing equation (3) to eliminate the fixed effects. This estimator controls unobserved individual effects, and resolves endogeneity of explanatory variables when we use lagged dependent variables. The transformed model takes the following form

$$\Delta y_{it} = \alpha \Delta y_{i,t-1} + \beta \Delta x_{it} + \Delta \mu_{it} \quad (4)$$

Where,  $\Delta$  is the first difference operator. Since the new error term  $\Delta \mu_{it}$  is by definition correlated with the lagged dependent variable,  $\Delta y_{i,t-1}$ , one should use instrumental variables. The GMM first difference approach uses all available lags of the dependent and the exogenous variables to form an optimal instrumental variable matrix.

In our study, two-step first difference GMM dynamic panel approach is applied following several tests.<sup>6</sup> The Sargan test of over-identifying restrictions is used under the null hypothesis of instrument validity. The first and second order serial correlation tests are also carried out using the m1 test and m2 test for residuals distributed as  $N(0,1)$ . The assumption

of no serial correlation in the error term  $\mu_{it}$  (equation 3) is essential for the consistency of estimators, which instrument the lagged dependent variable with further lags of the same variable.<sup>7</sup> In our empirical study, only two-step first difference GMM results have passed all these standard tests successfully. Thus, we will concentrate on this result although OLS level and Within Group estimates are exhibited.

### **4.3. Data**

We use firm level data on annual financial statement items from balance sheets and income statements of publicly traded Bangladeshi firms. The following tables 1 and 2 presents descriptive statistics and correlation matrix. There are a total of 1,171 observations of 192 Bangladeshi non-financial firms for the period 1992 to 2002 used in our empirical analysis. The data are an unbalanced panel of firms that have data for at least 5 years.

[Insert Table 1 and 2]

Tables 1 and 2 exhibit the descriptive statistics as well as correlation matrix of the major variables (used in empirical study) of Bangladeshi firm (listed) level data from 1992 to 2002. The dependent variable is  $I/K (-1)$ , that is current year's Investment (I) is deflated by last year's Capital stock (K) which is justified upon the assumption that the current investment decision is based on last year's available capital stock. The data has been segregated into three categories-total firms, large firms and small firms. This paper will focus on mostly small firms.

The balance sheet and income statement data for individual firms have been collected from the various issues of "Balance Sheet Analysis of Joint Stock Companies" published by the Statistical Department of Bangladesh Bank. Other macroeconomic data have been compiled from the publications (various issues) of Statistical Department of Bangladesh Bank, annual Reports (various issues) of Securities & Exchange Commissions of Bangladesh (SEC). Concerning the effect of financial development, we use the most commonly used

macroeconomic indexes of financial development such as broad money, M2/GDP; liquid liability, M3/GDP; and stock market turnover, TR/GDP. We indicate that the financial development indicator is annual, only one observation for each year, while other data vary across both firms and years. Better measures for firm-level financial development should be developed in the future, however this study investigates the general effect of overall financial development on individual firms.

In order to ensure that the regression results are not driven by a few outliers, the upper and lower 1 percent values of observations for all the variables are removed from the original dataset. In regression analysis dynamic panel regression has been exercised using the two-step first difference Generalised Method of Moments (GMM). Besides, OLS level and Within Group estimates are also checked along with two-step first difference GMM.

## **5. Financing Constraints and Financial Development in Bangladesh**

### **5.1. Firm investment and financing constraints**

Table 3 reports the result of the simple investment model based on the Euler approach. In the case of all samples, variables have expected signs and are significant as the theory suggests when we use the OLS regression. Not only the fundamental variable measured by sales but also the cash stock variable is statistically significant, which means that there are financing constraints in general. However, the result using the GMM method using the all firms' sample is not significant. If we consider that the result of the GMM regression is more reliable, these mixed results mean that at least there is no strong evidence regarding the financing constraints to all firms in the given period.

[Insert Table 3]

Next we divide companies into 2 groups, large and small according to their total assets in comparison with their median value in an attempt to verify the differential aspect of financing constraints depending on the firm size. The result of Table 3 demonstrates that

financing constraints are more serious to small and medium companies in contrast to large companies in Bangladesh, as many report in other countries' case studies. The coefficient of the cash stock variable is not statistically significant in the regression of the large firms' sample while that in that of the smaller firms' sample is very significant.

When we do not divide samples but we use the interaction term of the firm size measured by total assets and cash stock, the results appear somewhat weaker. However, the t value is still over 1.4, though not reported here. Therefore, we find evidence for the existence of financing constraints, particularly for small firms, due to financial market imperfections in Bangladesh in general as the theory predicts. This result is overall consistent with the model using Tobin's q as a variable for fundamentals for investment instead of the sales/K variable as the following table 4 shows.

[Insert Table 4]

There may be another possible way to interpret this result. Although large firms do not show any significant investment-cash stock sensitivity, it might not be because of the less severe problem of asymmetric information in the financial market. Rather, this result might reflect the aspect of connected lending associated with cronyism that is common in developing countries. In fact, those large firms are mostly owned and controlled by leading businessmen and political leaders who have a great influence on the financial sector and strong ties with powerful politicians and government officials. Thus, the lower financing constraints faced by large firms may not necessarily reflect the financial market failure related with information problems.

However, it is clear that such discrimination between large and small firms in the financial market works as a hurdle for smaller firms with less political connection, possibly with even better investment project, to increase investment. The result of the higher investment-cash stock sensitivity of smaller firms reveals this feature clearly. Therefore,



although it is not easy to interpret, our result shows that there are financing constraints for firms' investment and they are more severe for smaller firms, partly due to imperfect information and partly due to the discrimination against smaller firms in the financial market.

## **5. 2. Financial development and financing constraints**

As we mentioned above, financial liberalisation policy was introduced starting from the early 1990s and the financial sector has shown gradual development following these reforms in Bangladesh. Our test examines whether this financial development reduced the cash stock sensitivity of firms' investment particularly for smaller firms.

In order to analyse the impact of financial development on financing constraints, we use the complex interaction terms of the cash stock, firm size and financial development index. We use the broad money to GDP ratio such as M2/GDP or M3/GDP as a proxy for the banking sector development and financial intermediation, and the stock market turnover/GDP as a proxy for the capital market development following Love (2003). Additionally, we combine both the indicators of the development of the financial market and stock market to see the impact of aggregate financial development on the investment-cash stock sensitivity of Bangladeshi firms.

[Insert Table 5]

Table 5 reports the result about financial development and financing constraints, using M2/GDP and the stock market turnover ratio. The coefficient of cash stock is statistically significant although that of sales is not significant in GMM estimations. It is noteworthy that all the coefficients of the interaction terms are significant in regressions using the GMM method although they are not significant and sometimes with opposite signs in OLS estimations. The interaction term of financial development and cash stock, and that of the firm size and cash stock are significantly negative as the theory predicts. This means that financial development lowers financing constraints overall, and financing constraints are

smaller for larger firms. More importantly, the interaction term of three variables including cash stock, the firm size and financial development is significantly positive. From this, we infer that the more the financial market develops, the lower the financing constraints facing smaller firms.

We carry out further estimation using M3 instead of M2 for robustness check. The result in the following table 6 is consistent with that using M2 overall. When we use private credit instead of monetary variables for the robustness check, the result is still statistically significant though not as strong as the monetary variable.

[Insert Table 6]

There are debates about which financial system, whether bank-based or stock market-based is more functional to economic growth in developing countries. Most cross-country empirical studies indicate that both the development of the banking sector measured by monetary variables such as liquid liabilities and that of the stock market measured by the turnover ratio are crucial to growth (Beck and Levine, 2004). The result of our microeconomic empirical study of Bangladesh is consistent with this common finding. It presents that the turnover ratio in the stock market as well as monetary variables is significant in reducing financing constraints, and especially that of smaller firms. The result becomes even more significant when we use M2 and stock market turnover at the same time in the regression. This suggests that as the banking sector and the stock market develop altogether in developing countries, financing constraints on smaller firms associated with the underdeveloped financial markets would be eased more.

It is well known that many studies have argued that financial development makes the financial market more efficient by reducing information problems and thereby lowering financing constraints. This appears to be true in case of Bangladesh following our empirical findings. As we mentioned above, lower financing constraints may not always mean the

increase of efficiency in the financial market when we take into account the possibility of connected lending by larger firms. Nevertheless, it is certain that financial development addresses serious discrimination of smaller firms in the financial market. If connected lending of large firms based on a cosy relationship is relatively inefficient as seen in many cases, this change would encourage investment efficiency in general. To summarise, our result suggests that the smaller firms that have larger constraints compared with large firms would face less and less constraints along with the financial development in a poor country such as Bangladesh.

There may be many factors to promote the financial sector including financial liberalisation policy, institutional reform with better regulation and other measures. Capital account liberalisation and foreign investment may play another role in financial development.<sup>8</sup> At any rate, it is highly likely that once the financial market sets in development it would exert a beneficial effect on the economy by lowering financing constraints to smaller firms. Easing financing constraints can help promote investment, and thus improve employment and wages of workers of small and medium companies that are the most important in the Bangladeshi economy. The governments in poor countries must make significant efforts to promote the financial market so that it may increase investment and encourage investment efficiency, which is one of the most important sources of economic growth.

## **6. Conclusions**

The economic benefit of financial development has been in question for many years and as such, a large body of empirical studies examining the relationship has emerged. Common macroeconomic empirical studies apply cross-country regressions, however because of several limitations of this approach; recent studies have moved to examine the impact of financial development on microeconomic efficiency. Using the investment model

considering cash flow sensitivity, most studies have reported that financial development lowers financing constraints of small companies that face relatively higher constraints in underdeveloped financial market.

The results from our firm-level empirical study of Bangladesh clarify that financing constraints, measured by the sensitivity of investment to cash stock, are significant in general. We find that small firms are faced with higher sensitivity of investment to cash stock and larger financing constraints over the whole period in comparison with large firms, which reflects unequal access to external finance. As most firms in Bangladesh are small and medium sized, such constraints prevent them from increasing investment and ultimately hinder long-run growth of the economy. It is also reported in our study that this investment-cash stock sensitivity of small firms is significantly negatively related to financial development. We observe that smaller firms get larger benefits from financial development such as the development of monetary variables and stock market variables. The reduction of financing constraints reflects more efficiency and less discrimination in the financial market, along with the more financial development. Thus, financial development allows small firms in Bangladesh to invest more and encourage economic growth in the long-run, promoting more production and generating more employment. Moreover, such development enhances overall efficiency of investment by checking serious discrimination in the financial market and connected lending by larger firms.

In sum, our empirical examination points to the essential benefit of the development of the financial sector including both the banking sector and the stock market. Our results confirm the positive microeconomic effect of financial development on the efficiency of the financial market and corporate investment even in a developing country such as Bangladesh.

## Endnotes

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<sup>1</sup> They use the Worldscope database mostly. However it is not free from problems. It includes a very small number of firms in developing countries compared to those in developed countries.

<sup>2</sup> The efficiency index to show relative marginal return is the total return actually achieved divided by a benchmark return, an estimate of a return if investment had been allocated to firms in proportion to their share of capital in the economy. They use sales-based and profit-based measures. This is similar to the index of efficiency in Wurgler (2000).

<sup>3</sup> One-country study usually uses a before and after approach to financial liberalisation, using the period dummies. And measures for financial development and capital inflows are just annual macroeconomic variables, different from firm-level data from financial statements.

<sup>4</sup> The sales to capital ratio could be a measure for fundamentals of firms based on the assumption of the Cobb-Douglas production function. The Euler equation approach, using the sales variable for fundamentals, looks somewhat similar to the accelerator model although it does not use the sales growth variable. In fact, another measure for fundamentals using profitability is possible based on the assumption of no fixed costs.

<sup>5</sup> There is a debate regarding whether the cash flow sensitivity reflects financing constraints. Kaplan and Zingales (1997) and Cleary (1999) do not find that firms with more constraints actually have higher cash flow sensitivity. For further discussion, see Fazzari et al. (2000) and Kaplan and Zingales (2000).

<sup>6</sup> DPD (package version 1.21) for Ox (version 3.40) (Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) has been used in estimating two-step first difference GMM results.

<sup>7</sup> If the disturbances  $\mu_{it}$  are not serially correlated, there should be evidence of significant negative first-order serial correlation (measured by m1) in differenced residuals  $\Delta\mu_{it}$ , and no evidence of second order serial correlation (measured by m2) in differenced residuals  $\Delta\mu_{it}$  (Doornik, Arellano and Bond, 2002).

<sup>8</sup> Several studies indicate that foreign investment lowers financing constraints of smaller firms by increasing efficiency of the financial market (Harrison, Love and McMillan, 2004). We also found the similar result, using foreign direct investment in Bangladesh though we do not report it.

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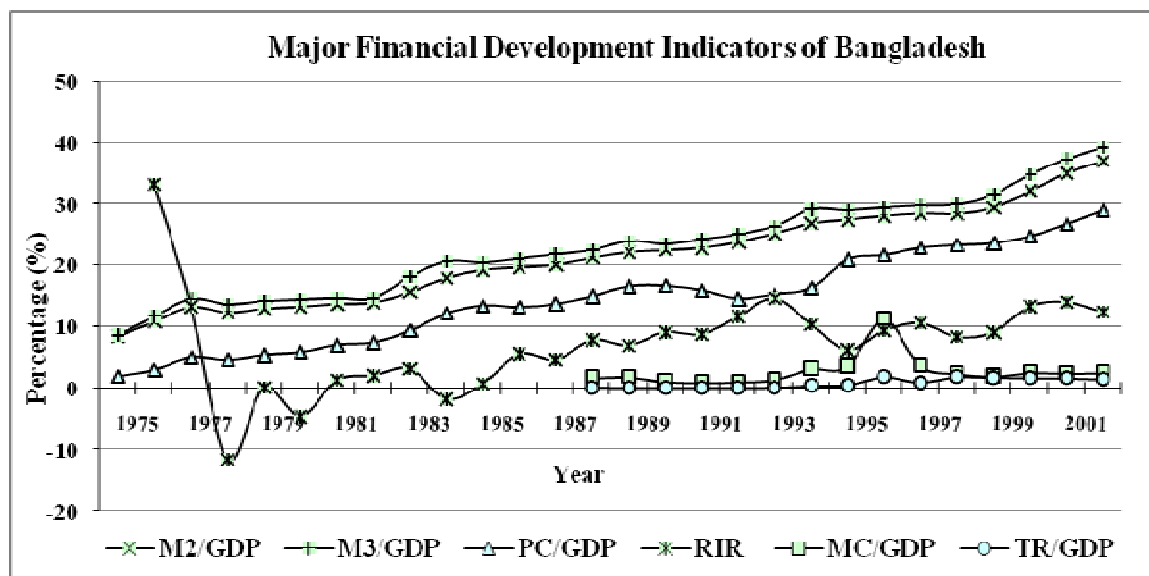
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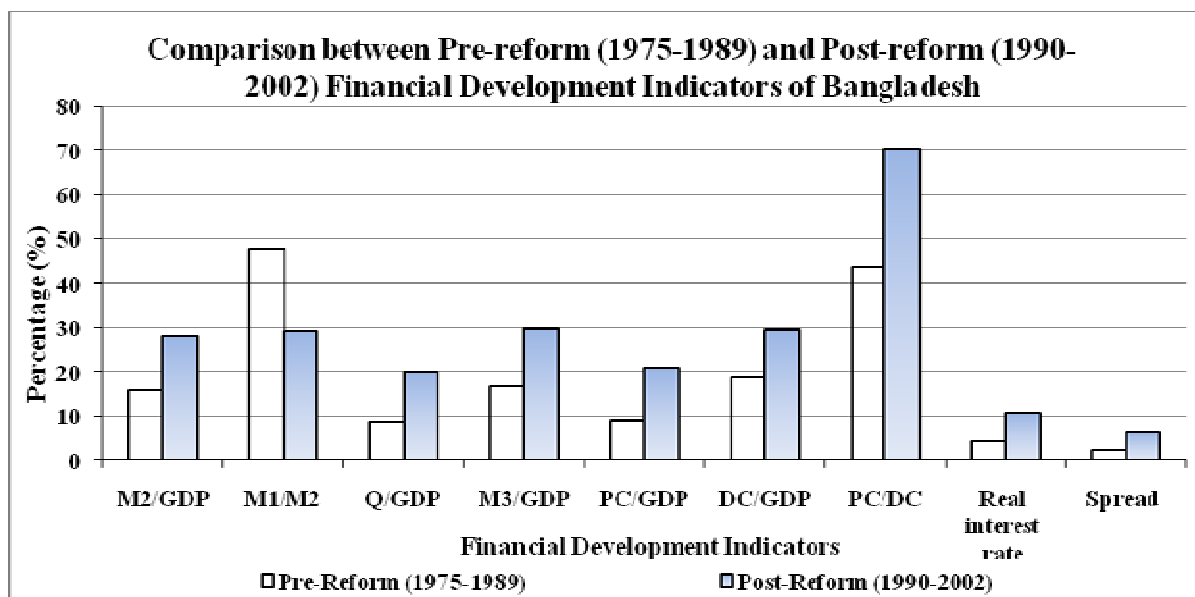
## Appendix

Figure 1: Comparison between Pre-reform and Post-reform Financial Development in Bangladesh



Source: World Development Indicators (WDI) CD-ROM -2004

Figure 2: Major Financial Development Indicators of Bangladesh (1975-2002)



Source: World Development Indicators (WDI) CD-ROM -2004

Notes: **Variable Specification:** GDP = Gross Domestic Product, M1 = Narrow Money, M2 = Broad Money, M3= Liquid Liabilities, Q = Quasi Liquid Liabilities (that is M3-M1), PC= Private Sector Credit by Banking Sector, DC = Total Domestic Credit by Banking Sector, RIR = Real Interest Rate, Spread = Difference between Lending and Deposit rate, MC = Stock Market Capitalization and TR= Stock Market Turnover.

**Table 1. Descriptive Statistics for Key Variables of Bangladeshi Firm-Level Dataset (1992-2002)**

|                     | <b>I/K(-1)</b> | <b>I(-1)/K(-2)</b> | <b>CS(-1)/K(-2)</b> | <b>S(-1)/K(-2)</b> |
|---------------------|----------------|--------------------|---------------------|--------------------|
| <b>Total Firms</b>  |                |                    |                     |                    |
| Mean                | 0.12           | 0.14               | 0.22                | 3.09               |
| Maximum             | 1.94           | 1.85               | 14.84               | 48.25              |
| Minimum             | -1.07          | -1.07              | 0.00                | 0.002              |
| Standard Deviation  | 0.26           | 0.27               | 0.92                | 5.75               |
| No. of Observations | 1171           | 1171               | 1171                | 1171               |
| <b>Large Firms</b>  |                |                    |                     |                    |
| Mean                | 0.13           | 0.16               | 0.19                | 2.95               |
| Maximum             | 1.85           | 1.85               | 8.99                | 48.25              |
| Minimum             | -1.07          | -1.07              | 0.00                | 0.01               |
| Standard Deviation  | 0.25           | 0.29               | 0.60                | 4.87               |
| No. of Observations | 587            | 587                | 587                 | 587                |
| <b>Small Firms</b>  |                |                    |                     |                    |
| Mean                | 0.11           | 0.11               | 0.25                | 3.22               |
| Maximum             | 1.94           | 1.77               | 14.84               | 47.19              |
| Minimum             | -1.00          | -0.82              | 0.00                | 0.002              |
| Standard Deviation  | 0.26           | 0.240              | 1.16                | 6.52               |
| No. of Observations | 584            | 584                | 584                 | 584                |

**Table 2. Correlation Matrix for Key Variables of Bangladeshi Firm-Level Dataset (1992-2002)**

|                    | <b>I/K(-1)</b> | <b>I(-1)/K(-2)</b> | <b>CS(-1)/K(-2)</b> | <b>S(-1)/K(-2)</b> |
|--------------------|----------------|--------------------|---------------------|--------------------|
| <b>Total Firms</b> |                |                    |                     |                    |
| I/K(-1)            | 1.00           |                    |                     |                    |
| I(-1)/K(-2)        | 0.20           | 1.00               |                     |                    |
| CS(-1)/K(-2)       | 0.12           | 0.12               | 1.00                |                    |
| S(-1)/K(-2)        | 0.22           | 0.22               | 0.21                | 1.00               |
| <b>Large Firms</b> |                |                    |                     |                    |
| I/K(-1)            | 1.00           |                    |                     |                    |
| I(-1)/K(-2)        | 0.22           | 1.00               |                     |                    |
| CS(-1)/K(-2)       | 0.18           | 0.17               | 1.00                |                    |
| S(-1)/K(-2)        | 0.23           | 0.18               | 0.44                | 1.00               |
| <b>Small Firms</b> |                |                    |                     |                    |
| I/K(-1)            | 1.00           |                    |                     |                    |
| I(-1)/K(-2)        | 0.17           | 1.00               |                     |                    |
| CS(-1)/K(-2)       | 0.09           | 0.11               | 1.00                |                    |
| S(-1)/K(-2)        | 0.21           | 0.28               | 0.12                | 1.00               |

Notes: (i) **Variable Specification:** I = Investment, K = Capital Stock, CS = Cash Stock (Cash + Cash Equivalents), and S = Net Sales; (ii) (-1) and (-2) indicates one period and two periods lag respectively.

**Table 3. Investment-Cash Stock Sensitivity of Bangladeshi Firms (Taking Sales/Capital) (1992-2002)**

| Independent Variables | Dependent Variable = $I_{it} / K_{i,t-1}$ |                  |                               |                  |                  |                               |                  |                  |                               |
|-----------------------|---|------------------|-------------------------------|------------------|------------------|-------------------------------|------------------|------------------|-------------------------------|
|                       | All Firms (192)                           |                  |                               | Large Firms (96) |                  |                               | Small Firms (96) |                  |                               |
|                       | OLS Level                                 | OLS Within Group | Two-Step First Difference GMM | OLS Level        | OLS Within Group | Two-Step First Difference GMM | OLS Level        | OLS Within Group | Two-Step First Difference GMM |
| $I_{i,t-1}$           | 0.14***                                   | -0.04            | 0.11***                       | 0.14***          | -0.007           | 0.11***                       | 0.12**           | -0.12**          | 0.03**                        |
| $K_{i,t-2}$           | (4.16)                                    | (-1.19)          | (5.74)                        | (3.55)           | (-0.18)          | (7.57)                        | (2.18)           | (-2.37)          | (2.06)                        |
| $CS_{i,t-1}$          | 0.01*                                     | 0.04**           | 0.01                          | 0.02             | 0.02             | -0.004                        | 0.01***          | 0.07***          | 0.05***                       |
| $K_{i,t-2}$           | (1.88)                                    | (2.20)           | (0.87)                        | (0.64)           | (0.69)           | (-0.19)                       | (3.25)           | (5.00)           | (5.45)                        |
| $S_{i,t-1}$           | 0.007***                                  | 0.01**           | 0.001                         | 0.008***         | 0.01             | 0.002                         | 0.007**          | 0.01**           | 0.006***                      |
| $K_{i,t-2}$           | (3.19)                                    | (2.33)           | (0.43)                        | (3.27)           | (1.45)           | (0.76)                        | (2.05)           | (2.22)           | (2.90)                        |
| Constant              | 0.08***                                   |                  | 0.06**                        | 0.09**           |                  | 0.04***                       | 0.07***          |                  | 0.08***                       |
|                       | (3.52)                                    |                  | (2.64)                        | (2.44)           |                  | (3.00)                        | (2.63)           |                  | (3.26)                        |
| Wald Test             | 43.78***                                  | 20.46***         | 40.04***                      | 51.25***         | 11.51***         | 72.96***                      | 29.07***         | 29.17***         | 55.02***                      |
|                       | [0.00]                                    | [0.00]           | [0.00]                        | [0.00]           | [0.00]           | [0.00]                        | [0.00]           | [0.00]           | [0.00]                        |
| Sargan Test           |   |                  | 38.14                         |                  |                  | 43.36                         |                  |                  | 34.69                         |
|                       |   |                  | [0.32]                        |                  |                  | [0.15]                        |                  |                  | [0.48]                        |
| m1 Test               |   |                  | -5.59***                      |                  |                  | -3.57***                      |                  |                  | -4.50***                      |
|                       |   |                  | [0.00]                        |                  |                  | [0.00]                        |                  |                  | [0.00]                        |
| m2 Test               |   |                  | -1.36                         |                  |                  | -1.42                         |                  |                  | -0.53                         |
|                       |   |                  | [0.17]                        |                  |                  | [0.15]                        |                  |                  | [0.59]                        |
| Observations          | 1171                                      | 1162             | 988                           | 587              | 582              | 495                           | 584              | 580              | 493                           |

**Notes:** (i) I = Investment, K = Capital Stock, CS = Cash Stock (Cash + Cash Equivalents), S = Net Sales, i = particular firm, t = specific time period (ii) Figures in parentheses ( ) & [ ] are t-values and p-values respectively, significant at 1% Level (\*\*\*) or, 5% Level (\*\*) or, 10% Level (\*); (iii) For all firms, two-step **first difference GMM instruments** are : (a)Level Instruments : Time dummies (not reported), I(-2)/k(-3) and next lags ; (b) Differenced instruments :  $\Delta CS(-1)/K(-2)$  and  $\Delta S(-1)/K(-2)$ . The same instruments are applied for both large and small firms; (iv) The Wald test is a test of joint significance of the estimated coefficients asymptotically distributed as Chi-Square under the null hypothesis of “No Relationship” ; (v) The Sargan test of over-identifying restrictions is asymptotically distributed as Chi-Square under the null hypothesis of instrument validity, that is, “the instruments used in the model are not correlated with the residuals” ; (vi) The m1 test is the test for first order autocorrelation of residuals distributed as N(0,1), where the null hypothesis is that the residuals or error terms in the first differenced regression exhibit no first order serial correlation and (vii) The m2 test is a test for second order autocorrelation of residuals distributed as N(0,1), where the null hypothesis is that the residuals or error terms in the first differenced regression exhibit no second order serial correlation.

**Table4. Investment-Cash Stock Sensitivity of Bangladeshi Firms (Taking Tobin's Q) (1992-2002)**

| Independent Variables | Dependent Variable = $I_{it} / K_{i,t-1}$ |                  |                               |                  |                  |                               |                  |                  |                               |
|-----------------------|---|------------------|-------------------------------|------------------|------------------|-------------------------------|------------------|------------------|-------------------------------|
|                       | All Firms (192)                           |                  |                               | Large Firms (96) |                  |                               | Small Firms (96) |                  |                               |
|                       | OLS Level                                 | OLS Within Group | Two-Step First Difference GMM | OLS Level        | OLS Within Group | Two-Step First Difference GMM | OLS Level        | OLS Within Group | Two-Step First Difference GMM |
| $I_{i,t-1}$           | 0.17***                                   | -0.01            | 0.10***                       | 0.16***          | -0.005           | 0.11***                       | 0.17***          | -0.05            | 0.07***                       |
| $K_{i,t-2}$           | (5.14)                                    | (-0.58)          | (5.50)                        | (3.79)           | (-0.15)          | (8.83)                        | (3.12)           | (-0.74)          | (3.56)                        |
| $CS_{i,t-1}$          | 0.02**                                    | 0.04**           | 0.006                         | 0.02             | 0.03             | -0.001                        | 0.01**           | 0.06***          | 0.05***                       |
| $K_{i,t-2}$           | (2.31)                                    | (2.24)           | (0.41)                        | (1.41)           | (1.14)           | (-0.08)                       | (2.46)           | (4.09)           | (4.77)                        |
| $Q_{i,t-1}$           | 0.007                                     | 0.009*           | 0.002                         | 0.006            | 0.007*           | 0.002                         | 0.01             | 0.02             | 0.01                          |
|                       | (1.44)                                    | (1.87)           | (0.55)                        | (1.27)           | (1.92)           | (1.12)                        | (1.13)           | (1.45)           | (1.29)                        |
| Constant              | 0.09***                                   |                  | 0.06***                       | 0.11***          |                  | 0.03***                       | 0.07**           |                  | 0.08***                       |
|                       | (3.97)                                    |                  | (2.71)                        | (2.96)           |                  | (2.74)                        | (2.19)           |                  | (3.62)                        |
| Wald Test             | 30.10 ***                                 | 8.006**          | 31.00***                      | 17.00***         | 4.35             | 78.16***                      | 17.51***         | 18.17 ***        | 56.11***                      |
|                       | [0.00]                                    | [0.04]           | [0.00]                        | [0.00]           | [0.22]           | [0.00]                        | [0.00]           | [0.00]           | [0.00]                        |
| Sargan Test           |   |                  | 33.55                         |                  |                  | 42.45                         |                  |                  | 34.79                         |
|                       |   |                  | [0.53]                        |                  |                  | [0.18]                        |                  |                  | [0.47]                        |
| m1 Test               |   |                  | -5.62***                      |                  |                  | -3.59***                      |                  |                  | -4.65***                      |
|                       |   |                  | [0.00]                        |                  |                  | [0.00]                        |                  |                  | [0.00]                        |
| m2 Test               |   |                  | -1.54                         |                  |                  | -1.36                         |                  |                  | -0.65                         |
|                       |   |                  | [0.12]                        |                  |                  | [0.17]                        |                  |                  | [0.51]                        |
| Observations          | 1184                                      | 1175             | 1000                          | 592              | 587              | 500                           | 592              | 588              | 500                           |

**Notes:** (i) I = Investment, K = Capital Stock, CS = Cash Stock (Cash + Cash Equivalents), Q = Tobin's Q, i = particular firm, t = specific time period (ii) Figures in parentheses ( ) & [ ] are t-values and p-values respectively, significant at 1% Level (\*\*\*) or, 5% Level (\*\*) or, 10% Level (\*) ; (iii) For all firms, two-step **first difference GMM instruments** are : (a)Level Instruments : Time dummies (not reported here), I(-2)/k(-3) and next lags (b) Differenced instruments :  $\Delta CS(-1)/K(-2)$  and  $\Delta Q(-1)$ .The same instruments are applied for both large and small firms and (iv) Explanations of different tests for GMM are the same as illustrated in Table 3.

**Table5. Impact of Financial Development on Investment-Cash Stock Sensitivity of Bangladeshi Listed Companies (Taking M2/GDP, TR/GDP and (M2+TR)/GDP as financial development measures) (1992-2002)**

| Independent Variables                  | Dependent Variable = $I_{it} / K_{i,t-1}$ |                    |                               |                    |                    |                               |                    |                    |                               |
|--|---|--------------------|-------------------------------|--------------------|--------------------|-------------------------------|--------------------|--------------------|-------------------------------|
|  | F=M2/GDP                                  |                    |                               | F=TR/GDP           |                    |                               | F=(M2+TR)/GDP      |                    |                               |
|  | OLS Level                                 | OLS Within Group   | Two-Step First Difference GMM | OLS Level          | OLS Within Group   | Two-Step First Difference GMM | OLS Level          | OLS Within Group   | Two-Step First Difference GMM |
| $\frac{I_{i,t-1}}{K_{i,t-2}}$          | 0.14***<br>(4.29)                         | -0.04<br>(-1.22)   | 0.10***<br>(5.03)             | 0.14***<br>(4.41)  | -0.04<br>(-1.18)   | 0.11***<br>(5.80)             | 0.14***<br>(4.34)  | -0.04<br>(-1.21)   | 0.10***<br>(5.44)             |
| $\frac{CS_{i,t-1}}{K_{i,t-2}}$         | -0.59<br>(-0.38)                          | -0.17<br>(-0.19)   | 2.59**<br>(2.36)              | 0.12<br>(0.58)     | 0.17<br>(0.88)     | 0.58***<br>(3.66)             | 0.02<br>(0.02)     | 0.24<br>(0.37)     | 3.49***<br>(3.03)             |
| $\frac{CS_{i,t-1}}{K_{i,t-2}} * F$     | 2.32<br>(0.42)                            | 1.60<br>(0.47)     | -8.55**<br>(-2.18)            | -5.00<br>(-0.60)   | -2.16<br>(-0.37)   | -16.12**<br>(-2.33)           | 0.10<br>(0.02)     | -0.12<br>(-0.05)   | -10.91***<br>(-2.90)          |
| $\frac{CS_{i,t-1}}{K_{i,t-2}} * Z$     | 0.15<br>(0.30)                            | -0.01<br>(-0.05)   | -0.87**<br>(-2.52)            | -0.03<br>(-0.48)   | -0.03<br>(-0.64)   | -0.15***<br>(-3.04)           | -0.02<br>(-0.07)   | -0.11<br>(-0.50)   | -1.02***<br>(-2.83)           |
| $\frac{CS_{i,t-1}}{K_{i,t-2}} * F * Z$ | -0.58<br>(-0.33)                          | -0.16<br>(-0.15)   | 2.94**<br>(2.38)              | 1.59<br>(0.58)     | 0.79<br>(0.41)     | 4.55**<br>(2.06)              | 0.05<br>(0.04)     | 0.22<br>(0.29)     | 3.21***<br>(2.72)             |
| $\frac{S_{i,t-1}}{K_{i,t-2}}$          | 0.007***<br>(3.20)                        | 0.01**<br>(2.33)   | 0.001<br>(0.60)               | 0.007***<br>(3.17) | 0.01**<br>(2.36)   | 0.001<br>(0.41)               | 0.007***<br>(3.18) | 0.01**<br>(2.43)   | 0.001<br>(0.65)               |
| Constant                               | 0.08***<br>(3.64)                         |                    | 0.06***<br>(2.71)             | 0.08***<br>(3.48)  |                    | 0.05**<br>(2.50)              | 0.08***<br>(3.60)  |                    | 0.06**<br>(2.56)              |
| Wald Test                              | 70.09***<br>[0.00]                        | 46.79***<br>[0.00] | 40.60***<br>[0.00]            | 56.56***<br>[0.00] | 33.17***<br>[0.00] | 84.29***<br>[0.00]            | 73.20***<br>[0.00] | 34.55***<br>[0.00] | 54.02***<br>[0.00]            |
| Sargan Test                            |   |                    | 34.51<br>[0.49]               |                    |                    | 38.16<br>[0.32]               |                    |                    | 36.69<br>[0.39]               |
| m1 Test                                |   |                    | -5.55***<br>[0.00]            |                    |                    | -5.45***<br>[0.00]            |                    |                    | -5.45***<br>[0.00]            |
| m2 Test                                |   |                    | -1.42<br>[0.15]               |                    |                    | -1.60<br>[0.11]               |                    |                    | -1.53<br>[0.12]               |
| Observations                           | 1171                                      | 1162               | 988                           | 1171               | 1162               | 988                           | 1171               | 1162               | 988                           |

Notes: (i) I = Investment, K = Capital Stock, CS = Cash Stock (Cash + Cash Equivalents), F= Financial development indicator (broad money, M2/GDP or, stock market turnover, TR/GDP or, (M2+TR)/GDP), Z= Firms' size (log of total assets), i = particular firm, t = specific time period (ii) Figures in parentheses ( ) & [ ] are t-values and p-values respectively, significant at 1% Level (\*\*\*) or, 5% Level (\*\*) or, 10% Level (\*); (iii) Two-step **first difference GMM instruments** are : (a)Level Instruments : Time dummies (not reported here), I(-2)/K(-3) and next lags (b) Differenced instruments :  $\Delta CS(-1)/K(-2)$ ,  $\Delta CS(-1)*F/K(-2)$ ,  $\Delta CS(-1)*Z/K(-2)$ ,  $\Delta CS(-1)*F*Z/K(-2)$ ,  $\Delta S(-1)/K(-2)$  and (iv) Explanations of different tests for GMM are the same as illustrated in Table 3.

**Table6. Impact of Financial Development on Investment-Cash Stock Sensitivity of Bangladeshi Listed Companies (Taking M3/GDP, TR/GDP and (M3+TR)/GDP as financial development measures) (1992-2002)**

| Independent Variables                  | Dependent Variable = $I_{it} / K_{i,t-1}$ |                    |                               |                    |                    |                               |                    |                    |                               |
|--|---|--------------------|-------------------------------|--------------------|--------------------|-------------------------------|--------------------|--------------------|-------------------------------|
|  | F=M3/GDP                                  |                    |                               | F=TR/GDP           |                    |                               | F=(M3+TR)/GDP      |                    |                               |
|  | OLS Level                                 | OLS Within Group   | Two-Step First Difference GMM | OLS Level          | OLS Within Group   | Two-Step First Difference GMM | OLS Level          | OLS Within Group   | Two-Step First Difference GMM |
| $\frac{I_{i,t-1}}{K_{i,t-2}}$          | 0.14***<br>(4.28)                         | -0.04<br>(-1.22)   | 0.10***<br>(5.21)             | 0.14***<br>(4.41)  | -0.04<br>(-1.18)   | 0.11***<br>(5.80)             | 0.14***<br>(4.33)  | -0.04<br>(-1.22)   | 0.11***<br>(5.49)             |
| $\frac{CS_{i,t-1}}{K_{i,t-2}}$         | -0.77<br>(-0.55)                          | -0.53<br>(-0.78)   | 2.63***<br>(3.56)             | 0.12<br>(0.58)     | 0.17<br>(0.88)     | 0.58***<br>(3.66)             | -0.18<br>(-0.15)   | -0.02<br>(-0.04)   | 3.47***<br>(3.20)             |
| $\frac{CS_{i,t-1} * F}{K_{i,t-2}}$     | 2.81<br>(0.59)                            | 2.67<br>(1.08)     | -8.20***<br>(-3.35)           | -5.00<br>(-0.60)   | -2.16<br>(-0.37)   | -16.12**<br>(-2.33)           | 0.77<br>(0.21)     | 0.75<br>(0.40)     | -10.32***<br>(-3.12)          |
| $\frac{CS_{i,t-1} * Z}{K_{i,t-2}}$     | 0.22<br>(0.51)                            | 0.12<br>(0.55)     | -0.86***<br>(-3.56)           | -0.03<br>(-0.48)   | -0.03<br>(-0.64)   | -0.15***<br>(-3.04)           | 0.04<br>(0.12)     | -0.01<br>(-0.07)   | -1.02***<br>(-2.94)           |
| $\frac{CS_{i,t-1} * F * Z}{K_{i,t-2}}$ | -0.80<br>(-0.54)                          | -0.60<br>(-0.78)   | 2.74***<br>(3.44)             | 1.59<br>(0.58)     | 0.79<br>(0.41)     | 4.55**<br>(2.06)              | -0.19<br>(-0.16)   | -0.09<br>(-0.15)   | 3.07***<br>(2.88)             |
| $\frac{S_{i,t-1}}{K_{i,t-2}}$          | 0.007***<br>(3.22)                        | 0.01**<br>(2.29)   | 0.001<br>(0.64)               | 0.007***<br>(3.17) | 0.01**<br>(2.36)   | 0.001<br>(0.41)               | 0.007***<br>(3.19) | 0.01**<br>(2.37)   | 0.001<br>(0.66)               |
| Constant                               | 0.08***<br>(3.60)                         |                    | 0.06**<br>(2.46)              | 0.08***<br>(3.48)  |                    | 0.05**<br>(2.50)              | 0.08***<br>(3.57)  |                    | 0.06**<br>(2.48)              |
| Wald Test                              | 69.14***<br>[0.00]                        | 41.48***<br>[0.00] | 49.19***<br>[0.00]            | 56.56***<br>[0.00] | 33.17***<br>[0.00] | 84.29***<br>[0.00]            | 74.20***<br>[0.00] | 35.76***<br>[0.00] | 56.26***<br>[0.00]            |
| Sargan Test                            |   |                    | 35.03<br>[0.46]               |                    |                    | 38.16<br>[0.32]               |                    |                    | 36.45<br>[0.40]               |
| m1 Test                                |   |                    | -5.561***<br>[0.00]           |                    |                    | -5.45***<br>[0.00]            |                    |                    | -5.461***<br>[0.00]           |
| m2 Test                                |   |                    | -1.45<br>[0.14]               |                    |                    | -1.60<br>[0.11]               |                    |                    | -1.54<br>[0.12]               |
| Observations                           | 1171                                      | 1162               | 988                           | 1171               | 1162               | 988                           | 1171               | 1162               | 988                           |

Notes: (i) I = Investment, K = Capital Stock, CS = Cash Stock (Cash + Cash Equivalents), F= Financial development indicator (Liquid Liabilities, M3/GDP or, stock market turnover, TR/GDP or, (M3+TR)/GDP), Z= Firms' size (log of total assets), i = particular firm, t = specific time period (ii) Figures in parentheses ( ) & [ ] are t-values and p-values respectively, significant at 1% Level (\*\*\*) or, 5% Level (\*\*) or, 10% Level (\*) ; (iii) Two-step **first difference GMM instruments** are : (a)Level Instruments : Time dummies (not reported here), I(-2)/k(-3) and next lags (b) Differenced instruments :  $\Delta CS(-1)/K(-2)$ ,  $\Delta CS(-1)*F/K(-2)$ ,  $\Delta CS(-1)*Z/K(-2)$ ,  $\Delta CS(-1)*F*Z/K(-2)$ ,  $\Delta S(-1)/K(-2)$  and (iv) Explanations of different tests for GMM are the same as illustrated in Table 3.