Financial Liberalization and Investment Sensitivity to the Cash Flow

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Abstract
This study examines the impact of financial liberalization on the investment sensitivity to cash flows of 63 non-financial firms listed in Amman Stock Exchange (ASE) over the period of 1985-2010. Our analysis provide evidence supporting the hypothesis that financial liberalization efforts have succeeded in relaxing financial constraint faced by the Jordanian firms listed in ASE. Moreover, it reveals that financial liberalization tends to tighten up financial constraints for small firms. The reasonable explanation of this finding is that because of market frictions, small firms are less levered compared with larger ones, making small firms are more financially flexible and consequently, increasing their ability to generate more external funds externally and reducing their investment sensitivity to the cash flows

Keywords: Investment; Financial liberalization, financial constraint and Amman Stock Exchange

1. Introduction
After gained its independence, Jordan was confronted with many problems relating to social and economic development. The lack of financial resources has hindered its efforts and ambitions to achieve a sustainable economic growth and development, increasing its dependency on external income flows. Like other developing countries, Jordan has chosen a state– sponsored route for development with inconsiderable role of the Jordanian private corporate sector. The considerable role of the Government with its extensive involvement in the financial system during the period of 1960-1990 has adversely impacted the efficiency of financial system, the allocation of financial resources and result in structural imbalance in all sectors of Jordanian economy (Maghyereh, 2004).

Therefore, Jordan, since 1990, has been implementing comprehensive economic, social, and structural reform programs. These programs aim to improve the efficiency and competitiveness of the economy, to bring about fiscal and monetary stability and to create a favorable investment environment. Consistence with the above goals of financial liberalization, the Jordanian government
carried out a set of policies and procedures to free interest rates, increasing the flexible of exchange prices, reviewing investment encouragement laws, removing lending limits, increasing the dependence on the private sector and updating the financial regulations to international standards (Al-Otoom, 1996). The government’s effort to liberalize and increase the openness of the economy was crowned with Jordan’s accession to the World Trade Organization (WTO). However this accession to the WTO creates new competitive threats for the Jordanian firms. While on the one side, it offers Jordanian firms a chance to compete in the international market, on the other, it also offers the foreign companies a free access to the Jordanian market For Jordanian firms, competition requires keeping a flow of high quality products and services while getting cost down (Khasawneh and Alkhouri, 2002; Alnuaimat and Albakheet, 2005) by obtaining low costs funds.

However, Jordanian firms have limited choices of financing sources. The Jordanian banking sector is the main source of financing for the industrial, services and commercial operations, and their credit policies is largely affected firstly, by economic and political uncertainties and secondly, by monetary policy considerations. Moreover, the features and barriers of capital market makes this market fails to create a successful choice of financing, which increases the use of internally generated funds for financing and consequently making firms' investment highly sensitive to the cash flow. This, along with the fact that none of the Jordanian firms has experience in raising money abroad, made the Jordanian government increasingly paid attention to the Amman Financial Market as an important pillar of the economy (Central Bank of Jordan, 2000).

Therefore, New laws and regulations are set such as the Securities Law of 1997, Companies Law of 1997 and the Transparency Law of 1998 and aiming at increasing the capital market competition and liquidity and thereby, its efficiency. In response to the governments' promotional policies for stock market expansion, new Electronic Trading System is used and foreigners are allowed to own up to 100% of the stocks of any listed firms. These procedures are assumed to increase the firm's accessibility to capital market, especially the small ones, reducing their investment's sensitivity to the availability of internal funds and consequently, generating sufficient fund for dividend. Unfortunately, Investment sensitivity to cash flows in general and under financial liberalization, in particular at Jordanian non-financial firms is less well known due to the lack of research in this area.

This reason, combined with the previous discussion, motivated the researcher to carry out the current study to fill this gap and provide a comprehensive view of the current practices of Jordanian non-financial firms regarding their investment and financing decisions. Such a comprehensive view would serve as a basis for evaluating the effectiveness of financial liberalization in reducing capital market frictions and financing constraints. Therefore, the remainder of this study is organized as follows: section two provides the theoretical background of capital market liberalization with some empirical evidence from developed countries. Section 3 describes our data and model specification, while section 4 presents the empirical analysis and results. Section 5 is the summary and concluding remarks.

### 2. Financial Liberalization

#### 2.1. Theoretical Backgrounds

In their irrelevancy theory of capital structure, Modigliani and Miller (1958) concludes that the firm's value is independent of its capital structure, suggesting the firm will be indifferent between the use of internal and external capital to finance its new investment opportunities and consequently, making internal capital (retained earning) and external capital (Debt and equity) are perfectly substitute for

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1 According to El-Khoury and Hmedat (1992), these barriers might be classified into two categories. The first category includes general environmental factors such as the economic and political instability, which gives rise to capital flight. The second category includes the complicated listed procedures, high issue costs, high transaction costs and investors desire for current dividend income.
each other. Based on this statement, firm should not have any preference of internal over external capital, indicating that a firm’s investment decision is totally determined by the profitability of new investment opportunities, not by the way of financing. The underlying assumption behind their proposition is the perfection of capital market, where there are no transaction costs, no information asymmetry, no bankruptcy costs, no taxes and management acts on the exclusive behalf of shareholders so no agency costs exist. However, these assumptions have been criticized on the grounds that imperfections in capital markets do exist; making investment is relevant and largely affected by the way of financing, consequently, investment highly sensitive to the availability of internal funds.

Different explanations are given as to why investment is sensitive to the cash flows. All explanations are generally attributed the reason to the presence of market frictions such as information asymmetries (Myer and Majluf 1984, Myers, 1984), agency costs (i.e. Jenson and Meckling 1976, Jensen, 1986) and bankruptcy costs. These considerations are expected to restrict a firm’s ability to generate funds externally (debt and equity), increasing its reliance on internally generated funds and consequently making its investment decisions highly sensitive to the availability of internal funds.

Greenwald et.al., (1984) have pointed out that developed countries are wake up early to information and agency problems by liberalizing early their financial systems and capital markets with compatible regulations and sufficient supervision to increase their competitiveness and liquidity. In developing countries (including Jordan) market frictions such as information and agency problems are expected to be more severe than it would be in developed countries. The reason is mainly attributed to the fact that, developing capital markets are small and thin with low level of competition and liquidity. Moreover, they are less developed and suffering from the lack of compatible regulations and sufficient supervision. Drake (1977) argues that these characteristics make stocks prices more volatile in secondary markets and consequently, making the cost of financing in primary markets relatively high (Gandhi et al, 1980). These considerations, besides the agency, information asymmetries and bankruptcy costs make firms in developing countries are financially constrained and consequently, investment decisions are highly sensitive to the availability of internal funds.

However, in US market, Fazzari et al., (1988) provide evidence suggesting that investment of financially constrained firms is highly sensitive to the availability of internal funds. As this is the case in developed countries where their capital markets are developed well with high level of competition, liquidity and sufficient supervision, a key question arises. What should be expected regarding the relationship between a firm's investment and financing decisions in developing countries as Jordan? And what should be expected regarding the impact of financial liberalization on this relationship.

Because of globalization and their retraction attempts to the World Trade Organization (WTO), many developing countries (including Jordan) are forced to move toward the free market economy. As a result, extensive efforts and measures have been taken to liberalize their financial system and capital markets to integrate these markets into the world capital market. It is expected that the financial liberalization in developing countries will smooth international capital flows, helping their economies to overwhelm the lack of capital shortage. Moreover, it is expected to reduce the cost of capital, increasing firms' accessibility to external capital, consequently, increasing investment rate (Henry, 2000). Based on this view, financial liberalization will weaken the underlying argument of pecking order theory which states that because of information asymmetries, agency costs and transaction costs, firms will follow the hierarchy behavior with respect to their financing sources. The finding of Martell and Stulz (2003) support this view. They conclude that capital market liberalization reduces the cost of capital by sharing risk, and improving corporate governance. They attribute the reason to the fact that removing the barriers that may restrict foreign investors’ entry increases monitoring intensity, consequently reducing the costs of asymmetric information and agency costs of debt and free cash flow (Chen et al., 2009). Chen et al., (2009) point out that following liberalization, firms that are prone to agency problems, are expected to experience greater increases in equity value, increasing the use of 

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2 Fazzari et al., (1988) split the study sample into two groups: financially constrained and unconstrained firms using paying and non-paying dividend criteria to split the sample.
Based on the previous discussion, the presence of market friction makes the capital market inefficient, which in turn leads to the misallocation of financial resources, and high cost of capital. These considerations, besides the lack of capital, are the bases for the impetus of developing countries to follow the path of financial liberalization. It is assumed that the financial liberalization should positively affect the competition, liquidity and efficiency of capital market by increasing the number of foreign investors, thereby the monitoring efficiency, besides, improving risk management (Martell and Stulz, 2003). Moreover, it is expected that financial liberalization allocate financial resources efficiently; it encourages savings and investment (Kaminsky and Schnukler, 2008). It also increases the choices of financing and flexibility of financial managers in choosing among.

However, there is evidence to suggest that financial liberalization may fail in meeting it goals in developing countries. The studies that have been conducted in the context of developing countries regarding the impact of financial liberalization on investments provide mixed results, implying that this impact still ambiguous (see Bhaduri, 2005). The reason may be attributed to the fact that developing countries may fail to meet its requirement. The rapid movement toward free market economy before setting the ideal infrastructure for financial liberalization may be the reason as to why financial liberalization fails in developing countries. Villanueva and Mirakhor (1990) find that the gradual financial liberalization enables countries to stable their macroeconomic environments. They control budget deficits and money growth. Hence the country who decides to follow the path of financial liberalization should reduce the government budget deficit and reduce inflationary expectation, Pill and Pradhan, (1997) support this view and point that macroeconomic stability is a prerequisite for successful financial liberalization. Stigltz (2000) points that capital markets liberalization help stabilize the economy through diversification. However, There is evidence to suggest the banking crisis are more likely to take place in liberalized financial system (Deniruc-Kunt and Detragiache, 1998) and recently the word financial crisis provides evidence supporting their findings.

2.2. The Relevant Market Frictions in the Jordanian Context

In Jordan, the capital market is imperfect, making asymmetries information, agency and bankruptcy costs more relevant in the Jordanian context. Moreover, it is small and thin market with low liquidity, high spreads, and high price volatility. According to Gandhi et al., (1980), high price volatility and low trading volume in the secondary market would raise the cost of finance in the primary market and inhibit the flow of funds and constrain the overall growth of developing countries. In thin and small market, information is not available for investors which places too much risk, and consequently raising the costs of generating capital externally through debt and equity. The adverse selection problem that might arise due to the lack of information induces investors to ask for risk premium (Myers and Majluf, 1984) because they are unable to monitor all aspects of investment projects and managerial behavior. The higher costs of external financing (through debt and equity) is not attributed only to the presence of information asymmetries but also to other market frictions such as transaction agency and bankruptcy costs. In their Pecking order theory of capital structure, Myers and Majluf, (1984) listed the main sources of costs hierarchy that may force firms to follow the pecking order for financing (see, Fazzari et al., 1988 for more details).They suggests that pecking order arises because of information costs, agency costs of free cash flow, agency costs of debt and bankruptcy costs of debt.

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3 In the presence of asymmetric information, debt creates a conflict of interests between shareholders and debt holders, increasing the cost of debt financing because of assets substitution problem and consequently, creating underinvestment problem (Jensen and Meckling, 1976).
With respect to the agency problem, the ownership structure of the Jordanian firms makes the agency conflicts between managers and shareholders possible since, managers of the Jordanian firms do not have a large percentage of investment. On average, it is not more than 4% (Amman stock exchange, 2005). According to (Jensen and Meckling, 1976), this form of ownership might give rise to the agency problem. However, the majority of stockholders in these firms are institutional investors who may work for the benefits of other stockholders. Moreover, the Jordanian financial system is a bank-based system. Therefore, it is expected that Jordanian banks experience a significant monitoring control over manager’s behavior and mitigating the agency costs of debt financing. This is because banks have the accessibility advantage to information relative to what is available to debt holders (Gillan and Starts, 2003). The majority of Jordanian banks credits are in the short term forms which need to be repaid or renewed on a regular basis. Therefore, banks work to assure that their claims will be repaid on time and not be wasted. In the context of agency theory of capital structure, short term financing is suggested as a technique to mitigate the agency costs of assets substitution problem (see, Jensen and Meckling, 1976 and Myers, 1977). Hence, one could expect that the agency cost of debt is significantly large in the Jordan market. On the other hand, the bankruptcy costs are relevant due to the nature of Jordanian bankruptcy law; the law which emphasizes on the role of lenders and put less emphasize on the firm as an ongoing concern.

The above analysis suggests that the most relevant considerations which apply in the Jordanian context are the agency costs, information asymmetries, transaction and bankruptcy costs; these considerations affect firm’s policies in borrowing and issuing equity and consequently, their investment decisions.

2.3. Empirical Evidence

Although Jordan has followed the path of financial liberalization since, 1990, no studies, to the best of researcher knowledge, have analyzed the impact of capital market liberalization on mitigating the severity of market frictions. It is worth noting that the attempts of retracting to the Word Trade Organization (WTO) force many developing countries to move rapidly toward the free market economy, and consequently, failing to meet the ideal requirements for success. In their comparison study between rapid liberalizes countries with those of gradual liberalizes countries, Villanueva and Mirakhor (1990) concludes that gradual liberalization provides countries with the required time for stabilizing their economy to take the advantage of financial liberalization. They attributed the reason to the fact that gradual liberalizes countries have manageable budget deficits and money growth before starting liberalization. More precisely, they have stable macroeconomic environment, suggesting that economic stability is the pre-requisite for financial liberalization success. However, Stiglitz (2000) considers that capital market liberalization help stabilize the economy through diversification. Hence, he argues that open capital market will be required for funding needed investment projects by using external funds, reducing the need for internal funds for financing and consequently reducing investment sensitivity to the availability to the cash flows. In this context, many studies have been conducted in both developed and developed countries and provide mixed results. Bhaduri (2005) investigates the impact of financial liberalization on the investment patterns in India. He provides evidence supporting the hypothesis that the liberalization effort has succeeded in relaxing financial constraint faced by the Indian firms. Moreover, he found that small and young firms experienced a significant increase in financial constraint in the post liberalization period. This finding does not support the view that liberalization increases small new firms’ accessibility to capital market. Bhaduri (2005) attributes this finding to the reduction in government intervention in financial system. Using data from the same market, Ghosh (2006) provide evidence supporting the finding of Bhaduri (2005). His finding suggests that after liberalization, investment of Indian firms become less sensitive to the cash flows. Hence, Ghosh (2006) concludes that that financial liberalization improves the access of financially constrained firms to the external funds, particularly the small ones. Love (2003) provides evidence suggesting that financial development impacts investment by reducing financing constraints.
Therefore, he concludes that financial development reduces the effect of financing constraint on investment. Leavn (2003) who explores the impact of financial market reforms on financing constraints of firms in developing countries provides evidence suggesting that financial liberalization reduces firms financing constraints, especially for small firms. Hence, Leavn (2003) expects that firms will experience less investment sensitivity to the cash flows. This is because that financial liberalization removes the barriers that restrict the firms’ ability to generate funds externally. Using data from Nigerian Stock Exchange, Adelegen and Ariyo (2008) provide evidence supporting the finding of Bhaduri (2005), Ghosh (2006), Love (2003) and Leavn (2003). However, they conclude that the relationship between information imperfection, financing constraints and investment varies across firms and industries, given capital market imperfection.

3. Data and Model Specification

3.1. Data

The sample of this study consists of all services and industrial firms listed in Amman Stock Exchange (ASE) over the period of 1985-2010. To include large numbers of firms in the study sample, the current study uses unbalanced panel data. Using unbalanced panel data allows testing for the age effect. In general, panel data analysis allows accommodating for the unobserved effects of the unobserved individual and time specific factors on the dependent variable (Gujarati, 2003). It is usually estimated either by fixed effects model or random effects model. The data for panel econometrics techniques is extracted from the firm’s annual reports, and from Amman Stock Exchange’s publications (The Yearly Shareholding Companies Guide and Amman Stock Exchange Monthly Statistical Bulletins). Data is also readily available in CD format and on the web site of the Amman Stock Exchange. For the purpose of data collection, all firms that have been engaged in merger or acquisitions or liquidated during the study period are excluded. Moreover, the companies that have missed data after incorporating will be excluded.

3.2. Model Specification

Literature suggests different ways to investigate the impact of financial liberalization on firms' financing constraints, but, the most common way is to investigate whether firms' investment become less sensitive to the availability of cash flows (Castañeda, 2002). Adelegen, and Ariyo (2008) argue that imperfect substitution between internal and external funds will result in the excess sensitivity of investment to cash flow, making firms are financially constrained. As financial liberalization removes the barriers that may restrict firms ability to generate funds externally, their investment becomes less sensitive to cash flows, suggesting that the coefficient on the cash flow variable should decline after financial liberalization. Bhaduri (2005) suggests that cash flow would be a better measure of investment opportunities than Q. He attributed the reason to the fact that in an imperfect capital market, market expectation might not truly reflect the insiders’ valuations of investment opportunities. Therefore, Bhaduri (2005) concludes that the Q model may not be a recommended framework for investment analysis. Consistent with this argument, Adelegen and Ariyo(2008) argues that using q as a measure of investment opportunities may be a poor proxy because of a breakdown observable to capital market imperfections. Moreover, they conclude that if firms are financially constrained, investments will only be sensitive to internal funds. Therefore, they demonstrate that the standard measure for internal funds used in the empirical literature is the cash flow. There is evidence to suggests that investments will only be sensitive to internal funds, and financial liberalization tends to mitigate the sever of market frictions, increasing the firms' accessibility to external fund and consequently reducing their investment sensitivity to the cash flows (Leavn, 2003; Adelegen and

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4 External finance will be more costly than internal finance because of transaction costs, agency problems, and asymmetric information. Hence, firms prefer to finance investment with internal funds not external financing.
To investigate the impact of financial liberalization on investment sensitivity to the cash flows in the Jordanian listed firms, the current study will use the interaction dummy form by introducing two dummy variables as additional explanatory variables to the empirical model that has been used by Leavn (2003), Love (2003) Bhaduri (2005), and Adelegan and Ariyo (2008) to investigate the relationship between financial liberalization and financing constraints. $D_{it}^{lib}$ is a dummy variable which equals one for years during the period of 1997 to 2010, and zero otherwise (zero for the years during the period of 1985 to 1996), and the interaction dummy term variable which is constructed by multiplying $D_{it}^{lib}$ by $\left(\frac{CF_{it-1}^{lib}}{K_{it-1}}\right)$. The two dummy variables in the model are used to differentiating between the intercept and slope coefficients of investment sensitivity to the cash flows before and after financial liberalization (see, Gujarati, 2003:308). Hence the empirical model can be written as:

$$
\left(\frac{I_{it}}{K_{it}}\right) = \lambda_0 + \lambda_4 \left(\frac{I_{it-1}^{lib}}{K_{it-1}}\right) + \lambda_2 \left(\frac{Y_{it-1}^{lib}}{K_{it-1}}\right) + \lambda_3 \left(\frac{CF_{it-1}^{lib}}{K_{it-1}}\right) + \lambda_4 D_{it}^{lib} + \lambda_5 \left(\frac{CF_{it-1}^{lib}}{K_{it-1}}\right) + \varepsilon_{it}
$$

Where, The subscript $i$ refers to company, and $t$ refers to time period, $\left(\frac{I_{it}}{K_{it}}\right)$ is investment to capital ratio, $\left(\frac{Y_{it-1}^{lib}}{K_{it-1}}\right)$ is the output (net sales) to capital ratio, $\left(\frac{CF_{it-1}^{lib}}{K_{it-1}}\right)$ is the cash flow to capital ratio, $D_{it}^{lib}$ is a dummy variable used to capture the impact of financial liberalization for specific firm-year observations. $D_{it}^{lib} \times \left(\frac{CF_{it-1}^{lib}}{K_{it-1}}\right)$ is the interaction dummy form.

In interaction dummy form, $\lambda_4$ is the differential intercept coefficient and measures the potential difference in the intercept for financially constrained and unconstrained firms. $\lambda_5$ is the differential slope coefficient and measures by how much the slope coefficient of financially constrained firms differs from that of unconstrained firms. Based on the definition of interaction dummy term, the significant negative $\lambda_5$ suggests that financial liberalization tends to reduce the sensitivity of a firm's investment to the cash flows, making firms financially unconstrained, while the insignificant $\lambda_5$ implies that financial liberalization does not influence investment-sensitivity to the internally generated funds, implying that it does not ease the firms' accessibility to external funds and consequently increasing a firms' reliance on internally generated funds.

For other estimated coefficients, Leavn (2003), Bhaduri (2005), Ghosh (2006) suggests that under the null hypothesis that no financial frictions exist, $\lambda_4 > 1$, $\lambda_5 \geq 0$ and $\lambda_3 < 0$. $\lambda_7 > 0$ implies that firms are financially constrained where a substantial increase in firm's cash flow result in a higher level of investment financed by internal capital (Leavn, 2003). It is worth noting that the current study will test for the financial flexibility and size effects, but the theoretical background and models will be developed later. Moreover, all empirical models will be tested using pooled and panel data analysis. For the purpose of identifying the best econometrics regressors, the study uses Breusch and Pagan (1980) Lagrange multiplier (LM) for testing random effects models against pooled OLS model under the null hypothesis that the cross-sectional variance components are zero ($H_0: \sigma^2 = 0$). While Hausman test will be used to discriminate between fixed effects and the random effects model under the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator.\(^5\)

\(^5\) It is worth noting that the random effects estimator is efficient, consistent under the null hypothesis, and inconsistent under the alternative hypothesis, and the fixed effects model is consistent under both the null and the alternative hypothesis.
4. The Results

This section displays the Descriptive Statistics with the diagnostic tests for the underlying assumptions of regressions and presents the estimation results of empirical models using random and fixed effects regressors. Furthermore, it presents the estimation results of empirical models with financial flexibility and size effects.

4.1. Descriptive Statistics

The descriptive statistics are reported for the pooled sample of firms listed on Amman Stock (ASE) over the period of 1985-2010. The study is restricted to 63 industrial and services companies that have been continuously listed on the Amman Stock Exchange (ASE) during the period of study.\(^6\) The data collected was for firms that had published data continuously for 26 years and had not changed their financial years (the financial year starts at 1/1 and ends at 31/12). Table 4.1 reports descriptive information for the full sample of firms used in this study. It contains the mean values and standard deviations and the minimum and maximum values of the key variables used in the study. It is worth noting that for the purpose of investigating the financial flexibility and size effects, the study reports the descriptive statistics of financial leverage and firm's size with the key variables in the model.

Table 4.1: Descriptive statistics of dependent and explanatory variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/K</td>
<td>0.343</td>
<td>0.209</td>
<td>0.082</td>
<td>0.762</td>
</tr>
<tr>
<td>S/K</td>
<td>0.288</td>
<td>0.296</td>
<td>0.168</td>
<td>0.626</td>
</tr>
<tr>
<td>CF/K</td>
<td>0.305</td>
<td>0.721</td>
<td>0.107</td>
<td>0.902</td>
</tr>
<tr>
<td>LEV</td>
<td>0.326</td>
<td>0.209</td>
<td>0.008</td>
<td>0.922</td>
</tr>
<tr>
<td>SZ</td>
<td>15.334</td>
<td>1.202</td>
<td>11.064</td>
<td>20.178</td>
</tr>
</tbody>
</table>

Notes: I/K is investment to capital ratio. S/K is the net sales to capital ratio. CF/K is the cash flows to capital ratio. LEV is the financial leverage (the short and long term debt over total assets). SZ is the firm's size (measured by the natural logarithm of total assets). Non-debt tax shields (NDT): depreciation expenses over total assets Growth (GR): the market to book ratio. Volatility (VOL): the standard deviation of earning before interest and taxes.

The results presented in Table 4.1 show that leverage has a mean value of 0.283 and standard deviation of 0.209 with 0.008 and 0.922 minimum and maximum values respectively. The mean value suggests that Jordanian firms are not highly leveraged. The reason mainly attributed to the absence of bonds market and conservative credit policy adopted by Jordanian banks. However, minimum and maximum values indicate a large range in leverage value which may be attributed to the size effect where the large firms are less likely subject to the bankruptcy risk, hence; they can create more debt at more attractive costs. This may be the reason as to why previous empirical studies (i.e. Leavn, 2003, Love, 2003) assumed that small firms are financially constrained. With respect to the investment to capital ratio, the results show that it has a mean value of 0.343 with a standard deviation of 0.209. The large range of this ratio suggests that Jordanian firms have different investment levels or their investment level differs from one year to another. Cash flow to capital ratio reports a mean value of 0.305 with a standard deviation of 0.621, which implies that Jordanian firms face low liquidity.

To address the problem that explanatory variables may be correlated, the study tests for the multicollinearity using the Variance Inflation Factor (VIF). According to the Gujarati (2003), the presence of multicollinearity, makes the estimation and hypothesis testing about individual coefficients in regression not possible.\(^7\) The results of VIF indicates that the model does not suffer from any

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\(^6\) This number corresponds to 55.61% of all companies listed on ASE at the end of year 2005 and 71.25% of all non-financial companies listed at the end of year 2005, making the study sample consists of significant proportion of listed companies in the ASE during the nine-year-period 1997-2005.

\(^7\) As rule of thumb, a VIF greater than 10 indicates the presence of harmful collinearity (Gujarati, 2003).
multicollinearity problem in the since that the mean VIF for all the variables included in the model is 1.82. The study uses Breuch-Pagan test to detect heteroskedasticity problem using Breuch-Pagan test for heteroskedasticity, the test is based on the use of Ordinary Least Square (OLS) residuals regression under the null hypothesis that the variance of the residuals is homogenous. Its result suggests that the heteroskedasticity problem does not exist for the sample of this study since the chi-square distribution was not statistically significant (the result of the chi-square distribution will be reported along with estimation results of the empirical model.

4.2. The Estimation Results of Financial Liberalization Model

Table (4.2) reports the estimation results of fixed and random effects model along with those of pooled OLS regression. The result shows that Lagrange Multiplier (LM) and Hausman tests are statistically significant at 1% and 5% respectively. This finding suggests that individual (firm) and time–specific effects do exist, hence, the estimate coefficients obtained from pooled model are not consistent which implies that the unobserved effects of the unobserved individual and time specific factors on the dependent variable can be accommodated by using one of the panel data techniques (Gujarati, 2003). It also suggests that fixed effects estimations are more appropriate than random effects estimations. Therefore, the fixed effects model is found to be the preferred specification. F-statistic is found to be statistically significant for all panel and pooled models, implying that, at least, one of the estimated coefficients is not zero.

Table 4.2: The estimation results of model

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Pooled OLS Model</th>
<th>Fixed Effects Model</th>
<th>Random Effects Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.433 (0.000)</td>
<td>-0.501 (0.000)</td>
<td>-0.536 (0.000)</td>
</tr>
<tr>
<td>(I_{it}^K)</td>
<td>0.209 (0.000)</td>
<td>0.192 (0.000)</td>
<td>0.202 (0.000)</td>
</tr>
<tr>
<td>(S_{it}^K)</td>
<td>0.389 (0.005)</td>
<td>0.359 (0.009)</td>
<td>0.348 (0.010)</td>
</tr>
<tr>
<td>(CF_{it}^K)</td>
<td>0.414 (0.004)</td>
<td>0.459 (0.001)</td>
<td>0.429 (0.004)</td>
</tr>
<tr>
<td>(D_{it}^{Lib})</td>
<td>-0.112 (0.102)</td>
<td>-0.092 (0.051)</td>
<td>-0.104 (0.094)</td>
</tr>
<tr>
<td>(D_{it}^{Lib} \times CF_{it-1}^K)</td>
<td>-0.112 (0.094)</td>
<td>-0.107 (0.042)</td>
<td>-0.109 (0.088)</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.48 (0.000)</td>
<td>0.52 (0.000)</td>
<td>0.50 (0.000)</td>
</tr>
<tr>
<td>P-value</td>
<td>1638</td>
<td>1638</td>
<td>1638</td>
</tr>
<tr>
<td>LM Test</td>
<td>91.37 (0.000)</td>
<td>91.37 (0.000)</td>
<td>91.37 (0.000)</td>
</tr>
<tr>
<td>Hausman Test</td>
<td>2.01 (0.570)</td>
<td>2.01 (0.570)</td>
<td>2.01 (0.570)</td>
</tr>
</tbody>
</table>

Although the study reports the estimation results of pooled OLS, fixed effects and random effects models, discussion will be restricted to the one that has been found as the preferred one for the study sample. Table (4.2) shows that all estimated coefficients are statistically significant at 1% and 5% level. The lagged investment to capital ratio has the correct sign. The significant positive coefficient on lagged investment to capital ratio suggests that Jordanian firms experience dynamic
adjustment toward the optimal level. However, the low value of its coefficient implies that this adjustment moves slowly which is may be attributed to the financial restriction that these firms face. The finding that investment of Jordanian firms is highly sensitive to the cash flows makes this explanation more reasonable, taking in consideration the standard deviation of cash flow to capital ratio is amounted to 0.721. The coefficient on cash flow to capital ratio is estimated to be 0.459 and statistically significant at 1%. The reasonable explanation of this finding could be attributed to the imperfection of Jordanian capital market where, the presence of agency costs, information asymmetries and bankruptcy costs restrict their ability to generate external funds at more attractive costs, making these firms depend heavily on internal funds to finance the investment projects. Therefore, their adjustment to the previous investment occurs slowly. The low value of the estimated coefficient on lagged investment variable (0.192) suggests that Jordanian firms need at least 6.5 years to fully eliminate the divergence from the long run investment level. This finding is consistent with that of Leavn (2003) who displayed that investment rates are lethargy. It also supports the finding of Bhaduri (2005) and others.

With respect to the impact of financial liberalization, the results presented in Table (4.2) shows that the interaction dummy variables are statistically significant at 5% level. The negative sign of the interaction dummy term $D_{it}^{bb} \times \left( \frac{CF_{it}}{K_{it-1}} \right)$ suggests that Jordanian firms become less sensitive to the availability of cash flows. Hence, one could conclude that capital market liberalization tends to increase the accessibility of Jordanian firms to external fund and consequently, their investment sensitivity to the cash flows declines. The negative differential slope coefficient (-0.107) indicates that post liberalization, the slope coefficient on investment – sensitivity variable is lower than that of priori liberalization by 0.107.

4.2.1. The Size Effect
There is evidence to suggest that the firm size plays a key in a firm's investment and financing decision (see Baskin, 1989; Allen, 1992 and Adadiji 1998). The most obvious explanation relies on the bankruptcy costs. Warner (1977) argues that there are “scale economies” regarding bankruptcy costs, such that these costs constitute a larger proportion of the firm’s value as that value decreases. Consistent with this view, Titman and Wessels (1988) argue that large firms are more diversified and less susceptible to bankruptcy than smaller ones. Hence, firm size is an inverse proxy of the probability of bankruptcy and, hence, larger firms have higher debt capacity and can borrow at more favorable risk-adjusted interest rates than smaller firms.

Moreover, large firms are subject to more news than small firms because the investment community would be more concerned with gathering and providing information about large firms (Kadapakkam et al., 1998), making large firms less subject to information asymmetry than small firms. Thus, they should be more capable of issuing equity which is more sensitive to information asymmetry and have lower debt (Rajan and Zingales, 1995). Jordan et al. (1998) claim that owners of small companies who are reluctant to give up control are, in general, willing to finance expansion first through internal funds. Besides the information costs, agency costs and bankruptcy costs, transactions costs are expected to be high for small firms because of their small issuances of debt or /and equity (Oliner and Rudebusch 1989; 1992). Therefore, one can expect that small firms are more likely to follow financing hierarchy because of difficult in accessing external financing sources.

The above analysis suggests that large firms are more capable to generate external funds for financing, reducing their reliance on internal funds and consequently, making their investment less sensitive to the cash flows. Leavn (2003), and Love, (2003) amongst others, provide evidence suggesting that small firms are more financially constrained than large ones. Hence, financial liberalization is expected to increase their accessibility to external funds which reduce their investment sensitivity to the cash flows. However, Bhaduri (2005) in India provides evidence that the financial constraints are less important for the young and small firms than for their more mature counter parts.
His results show that pre-reform period, the coefficient on cash flow for the small firms is substantially smaller compared to that of large firm. Leavn (2003) finds that financial liberalization affects small and large firms differently. As financial liberalization progresses, small firms become less financially constrained, while large firms become more financially constrained.

To investigate the size effect, model 1 will be retested by dividing the sample firms into two sub-sample groups; small firms and large firms depending on the median value of logarithm of total assets which is used in this study a proxy for the firm size. Firms with logarithm of total assets above the median are classified as large firms and given dummy value equals one \( D_{it}^{Large} = 1 \), while those with logarithm of total assets below the median are small firms. firms and given dummy value equals zero \( D_{it}^{Size} = 0 \). The estimation results for small and large group firms are presented in table (4.3) taking in consideration that discussion will be restricted to the econometrics approach that found to be the preferred one for small and large sample firms. The results of Lagrange Multiplier and Hausman tests suggest that the fixed effect estimation technique will be the preferred one.

It is worth noting that financial liberalization theory predicts that post liberalization; small firms will be more capable to generate funds externally, consequently having low investment cash flow sensitivity. The reported results in table (4.3) provide a significant support for this prediction. They, generally, suggests that the size effect exists in Amman stock exchange. For small firms, the estimated coefficient on the interaction dummy variable is found statistically significant with negative sign, implying that financial liberalization tends to tighten up financial constraints for small firms. It is estimated to be -0.173, while for large firms, it is found to be statistically insignificant, implying that financial liberalization making investment of small firms less sensitive to the cash flows. This finding supports the finding of Leavn (2003), while inconsistent with that of Bhaduri (2005). The reasonable explanation of this finding is that because of market frictions, small firms are less levered compared with larger ones, making small firms are more financially flexible. Byoun (2008) finds that, in developing capital market, small firms are more likely to seek financial flexibility by lowing leverage and keeping large cash balance. As financial liberalization increases their accessibility to external funds, their reliance on internally generated funds will decline after liberalization, making their investment less sensitive to the cash flows. Moreover, DeAngelo and DeAngelo, (2007) and Byoun, (2008) concludes that financial flexible firms have large investment expenditures with low investment - sensitivity to cash flow. The low mean value of small firms' leverage makes this explanation more reasonable. For the whole sample firms, the mean leverage value is found to be 0.356, while for small and large firms are 0.282 and 0.414 respectively. Compare with small firms, large firms have easier access to the external funds because they are less likely subject to the bankruptcy and agency costs, making large firms experience higher leverage ratio than small firms do. The two estimates are found to be statistically different from each other. The F value is calculated to be greater than the critical value at the 1% level, and hence, the null hypothesis that the two sample (small and large firms) regressions are the same is soundly rejected. 

Moreover, the results show that before starting liberalization, small firms experience higher investment cash flow sensitivity than that of large firms. The estimated coefficient on cash flow to capital ratio \( \left( \frac{CF_{it}}{K_{it-1}} \right) \) was 0.427 and 0.369 for small and large firms respectively. However, after liberalization, small firms experience low investment cash flow sensitivity. The calculated coefficient

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8 F-statistic is calculated as follows:

\[
F = \frac{(R_u^2 - R_r^2)}{k} \text{ divided by } \frac{(1-R_u^2)}{(n-k)}, \text{ where, } K \text{ is the number of regressors in the unrestricted model. } R_u^2 \text{ and } R_r^2 \text{ are the explanatory powers of unrestricted and restricted models respectively.}
\]
for small is 0.276 compared with 0.369 for larger ones. For large firms the interaction dummy term-
\[ D_{it}^{lib} \neq \left( \frac{CF_{it-1}}{K_{it-1}} \right) \] - is found statistically insignificant.

With respect to lagged investment to capital ratio, the results presented in table 4.3, shows that for both small and large firms, the estimated coefficients are statistically significant (0.279 for small firms and 0.182 for large firms), suggesting that small firms correct the divergence from their optimal investment level faster than small firms. This finding may be attributed to the reason that small firms are financial flexible firms, consequently, have large investment expenditures which increase their adjustment speed toward the target level.

Table 4.3: The estimation results of model

| Independent variable | Small firms | | | | | Large firms | | | | |
|---|---|---|---|---|---|---|---|---|
| | Fixed effects model | | | Fixed effects model | | | | |
| Intercept | -1.033** | (0.042) | | -0.201* | (0.000) | |
| \( I_{it-1}/K_{it-1} \) | 0.279* | (0.000) | | 0.182* | (0.001) | |
| \( S_{it}/K_{it-1} \) | 0.317* | (0.015) | | 0.387* | (0.019) | |
| \( CF_{it}/K_{it-1} \) | 0.407* | (0.004) | | 0.369* | (0.001) | |
| \( D_{it}^{lib} \) | -0.142 | (0.122) | | -0.072 | (0.211) | |
| \( D_{it}^{lib} \neq CF_{it-1}/K_{it-1} \) | -0.151* | (0.004) | | -0.112 | (0.421) | |
| R² | 0.62 | (0.000) | | 0.44 | (0.000) | |
| P-value | 967 | 671 | | 91.72 | 671 | |
| LM Test | 98.37 | (0.000) | | 91.72 | (0.000) | |
| Hausman Test | 2.23 | (0.502) | | | | |

5. Conclusion
Using a sample of non-financial firms listed in Amman Stock Exchange, we investigate the impact of financial liberalization on the investment sensitivity to cash flows during the period of 1985-2010. The study shed the light on a number of interesting insights into the financial liberalization and financing constraints that have been uncovered in Jordan and even in some developed countries. The findings of our analysis suggest that the financial liberalization that Jordan has been implementing has tightened up the financial constraints that may restrict firms’ ability to generate funds externally. Post liberalization, empirical results show that Jordanian firms experience low investment-sensitivity to cash flows. Although Jordan needs to take further financial liberalization procedures, our finding suggest that there has been a decrease in financial constraint for the small firms. Compared with large nonfinancial Jordanian firms, post liberalization, small firms experience low investment-sensitivity to cash flows. This is because prior financial liberalization, small firms are more financially constrained than the large ones. Therefore, they become more financially flexible than large firms. This finding supports the presence of size effect en ASE.
References


