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Family Business Groups and Tunneling Framework: Application and Evidence from Pakistan

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Family Business Groups and Tunneling Framework:
Application and Evidence from Pakistan

Atif Ikram and Syed Ali Asjad Naqvi

I. Introduction

Evidence on the Pakistan's corporate structure strongly suggests a ubiquity of firms which have a controlling shareholder, often in the form of the family [Ashraf and Ghanni (2004), Cheema (2003), Amjad (1982), White (1974)]. These "family-business groups" are often structured in the form of pyramids, whereby the control of the family is maintained indirectly why cross-shareholding and interlocked-directorships.

Figure 1 describes a stylized control pyramid. A family firm, which is at the apex of the pyramid, controls a publicly traded firm (Firm A), which then controls another publicly traded firm (Firm B), which controls yet another publicly traded firm (Firm C) and so on. For simplification purposes, it is assumed that 51% ownership stake guarantees effective control over the firm. At each level of the pyramid, the public shareholders contribute a minority equity stake, which in our example, amounts to 49%. It is important to note that as a result of such a structure, although the owner of the apex firm controls all the firms in the pyramid, his actual investment in the firms in the pyramid's lower tiers is often very small. For example, in Figure 1, a Rs. 1,000,000 decline in the value of the Firm F translates to a Rs. 510000 (51% of 1,000,000) decline in the value of firm E, a Rs. 260100 (51% of 51000) decline in the value of firm D, and so on. Thus, a one million rupee hit on the value of firm F ultimately translates into a fall of Rs. 17,596 in the value of family firm at the apex of the pyramid.[1] In other words, the ultimate controller of Firm F has a financial stake of only 1.76% in that firm! This chain of ownership allows the owner to control all the firms, even the ones in which he has no direct ownership- the voting rights of the owner far exceed his cash flow rights, so that there exists a separation between ownership and control in such pyramidal structures.

The extent to which control is exercised by business groups in Pakistan via the formation of pyramidal structures is an issue that has not undergone much research. Amjad (1982) is one study that documents the extensive use of interlocking directorship in Pakistan's corporate structure during the 60s. Cheema (1999) confirms the persistence of such pyramidal structures among monopoly group companies in the textile sector during the 1980s. Using the methodology adopted by Claessens, Djankov, and Lang (1999), Cheema et al (2003) use a sample of 32 companies and suggest that the family firm uses pyramidal structures to exercise control in 66.7% of the textile firms and 78.3% of the non-textile firms in Pakistan. Even in the case of firms where direct family ownership exceeds 10%, the figures reported are as high as 47.6% and 56.5% respectively.

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[1] This example has been taken from Morck (2003).

The separation between ownership and control that is prevalent in pyramidal structures engenders strong incentives for the ultimate owner to divert resources between firms in the pyramid. This diversion has commonly been referred to as *tunneling*, and can take many forms (Johnson, La Porta, Lopez-de-Silanes and Shleifer, 2000). One of the ways, for example, is when the controlling shareholder uses confidential information for personal gain. For example, one company transfers resources to another company, the controlling family-member buys stock in the recipient company, and then the investment into the second company is announced (or signaled in some way), thereby increasing its share price. Another typical way of tunneling resources is through asset transfers, i.e selling the company's assets on very favorable terms to a related party. Co-investment is also a popular form of tunneling, whereby an investment is made on favorable terms by the company into another company (wholly) owned by the controlling shareholder. Finally, and most importantly, *transfer pricing* is widely employed to tunnel resources; rather than a single (large) transaction involving an asset sale, transfer pricing involves ongoing transactions between companies, and frequently involve intermediate inputs or services.

If prevalent, then, tunneling can have large consequences. Because well-functioning capital markets require that outside shareholders benefit from their shareholdings, tunneling may raise a serious barrier to financial development. The very process of transferring resources may also entail social costs. For example, tunneling may reduce the transparency of the entire economy, clouding accounting numbers and making it hard to infer the health of firms [Mullainathan et al. (2000)].

A few studies have attempted to gauge such benefits of control by measuring control premium, which is simply the difference between the market value of a block of shares and how much someone is willing to pay for those shares if they confer (or maintain) control over the company.[2] Control premium is usually said to exist when the controlling shareholder can acquire certain gains at the expense of minority shareholders. One study by Alexander Dyck and Luigi Zingales (2002) that looked at control transactions in a range of countries found that the average value of control is fourteen percent of the company's equity. For the twenty emerging countries in their sample, the average was eighteen percent, and as much as sixty-five percent in Brazil. These figures suggest that in many countries a significant portion of a firm's value goes to those who control the firm rather than those who own it.[3] The authors also find that this control premium is correlated with measures of investor legal protection (including enforcement) and other indicators to the ease with which the controlling shareholders may be able to gain benefits at the expense of outside shareholders.

Other studies argue that larger amounts of tunneling from a particular company should reflect in a lower valuation for that company. La Porta, Lopez-de-Silanes, Shleifer and

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[3] The authors also find that this control premium is correlated with measures of investor legal protection (including enforcement) and other indicators to the ease with which the controlling shareholders may be able to gain benefits at the expense of outside shareholders.

Vishny (2002) and Claessens, Djankov, Fan, and Lang (2003) look at the relationship between ownership structure and valuation in a wide range of countries, and examine the impact of greater control (voting) rights versus greater cash flow (ownership) rights on firm value, hypothesizing that lower cash flow rights should lead to greater diversion of funds, and hence a lower value for the firm. Their research suggests that there indeed is a positive correlation between cash-flow rights and firm value, and that greater control rights relative to cash-flow rights are correlated with lower firm valuations.

In this paper, we adopt the model and methodology formulated by Mullainathan et al. (2000) to measure the extent to which the 'marginal rupee' is tunneled. Unlike other studies, this technique attempts to track the flow of resources within group-affiliated firms, which is the essence of tunneling. Much of the evidence in favor of tunneling in Pakistan has been anecdotal. The motivation behind this paper is to give this evidence mathematical and econometric soundness.

At the same time, however, the aim of this paper is not to suggest any corporate governance policy – at least not at this stage. While evidence in favor of tunneling may tend to support the Code's emphasis on dilution of family control, we refrain from suggesting this conclusion. While it is true that family business groups impinge on the rights of the minority stake holders via tunneling, they also make up for several institutional voids prevalent in third world countries like Pakistan. Thus, an argument in favor of dilution of family control is incomplete without duly analyzing the benefits that family business groups provide in the face of weak institutional structures. Without delving into this discussion, we simply report the results obtained once Mullainathan et al's (2000) methodology is applied to Pakistani firms.

2. Test For Tunneling

2.1 Methodology

Suppose that the profitability of a particular firm (say Firm X) in a pyramid in a particular year should have been some rupee amount, say Rs. A. Then, very simply, the tunneling of resources from X can be measured as the difference between the earnings that it should have incurred – its fundamental earnings - and its actual reported earnings. For example, if in a particular year, company X should have reported profits of Rs. 100 but instead reports profits of only Rs. 80, then it can be argued that Rs. 20 were tunneled from firm X.

With this basic idea, Mullainathan et al. (2000) develop a model for tunneling.[4] Using a simple constrained maximization problem technique, the authors conclude that the presence of tunneling in a pyramidal structure should at least imply the following:

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[4]For a formal treatment of the model, see Mullainathan et al. (2000).

1. Firm X's actual earnings/profits should increase by less than its fundamental profits/earnings in the face of a positive industry shock, the shortfall indicating the amount of tunneling.

2. Since tunneling ought to be more prevalent lower in the pyramid (where the ultimate owner's cash flow rights are weak), we should expect this shortfall to be larger in 'low' firms than in 'high' firms. In other words, the magnitude of tunneling should be decreasing in cash flow rights of the controlling family.

3. Since tunneling implies diversion of resources into higher-up firms, we should expect firms in a pyramid to respond to each other's shocks. In particular, (i) higher up firms should respond more to other firms' shocks, and (ii) firms should respond more to the shocks that affect low-down firms.

In order to contextualize these assertions, refer back to the stylized pyramid above. The hypotheses imply that (a) firms B, C, and D should respond less than one-to-one to their own respective shocks, (b) firm D should be less responsive to its own shock than firm C, and (c) firms A, B, and C should be responsive to D's shock. It also follows from the last hypothesis that (i) firm A should be more responsive to firm C's shock than should firm B, and (ii) firm A should be more responsive to firm D's shock than to firm C's. These sets of assertions are quite straightforward and intuitive. The main premise on which all these assertions base themselves is that the controlling shareholder has incentives to expropriate from firms in which his cash flow rights are weak.

The above discussion reveals that to test for tunneling all we need is a measure of fundamental earnings and actual earnings of the firm in the pyramid. However, while the latter can be gauged by some measure of profitability that is reported by companies in the financial statements, the latter cannot. To ask "What are a company's fundamental earnings?" is merely another way of asking the same question that has motivated our discussion so far: "What is the extent to which tunneling takes place in Pakistani business group firm?" Without a measure of fundamental earnings, tunneling cannot be measured.

Mullainathan et al. (2000) resolve this problem by observing shocks to the level of fundamental earnings instead of estimating the level of fundamental earnings. In other words, instead of trying to compare the level of fundamental and actual earnings of a particular firm at a particular time, the authors attempt to estimate the magnitude by which the fundamental earnings of a pyramidal firm should have changed. By comparing this with the change in reported earnings, a measure of tunneling can be obtained. For illustration, consider the following example adapted from Mullainathan et al (2000):

> "Suppose that the world price of gold rises, causing the gold industry's profits to rise on average. By comparing this average industry rise to the rise in the reported earnings for a pyramidal gold firm, we have a measure for diversion. In other words, if the rise in gold prices increases profits in comparable firms by Rs. 100, and we know that pyramidal firm reports a rise of Rs. 90, we can guess that Rs. 10, on average, has been diverted away."

It is important to mention, as Mullainathan et al. (2000) do, that this is only a statistical measure of diversion, working on average over all firms. Clearly, the profits of a particular firm could be driven by several other firm-specific factors, and may therefore be lesser or greater than the expected change in the industry profits. In other words, a particular textile firm may report an increase in profits of greater or less than Rs 100, the change in fundamental earnings. In need also be kept in mind that when we say that our measure of diversion works on average for all firms, it is an implicit assumption that such firm-specific factors cancel out when aggregated over all firms. This may not be true. For example, if pyramidal textile firms are partly diversified, we may observe these firms to be systematically responding less than average industry response to the shock, even in the absence of tunneling. For the purpose of this paper, however, we will assume these firm-specific factors to be idiosyncratic.

One can use practically any relevant exogenous shock to obtain a measure of the change in fundamental earnings. For instance, we can look at changes in energy costs, commodity prices or exchange rates, and see how changes in these factors are causing the profits of a particular industry to change. This would give us a measure of fundamental earnings, against which the actual earnings of pyramidal firms can be compared, and the extent of tunneling thus estimated. For our purposes, we follow Mullainathan et al. (2000) methodology and use mean industry movements as our shock. In other words, we obtain an estimate of the change in average industry performance - changes in the mean industry performance serves as a measure of the change in fundamental earnings of firms belonging to that industry. We then compare this change with the change in the actual earnings reported by pyramidal firms in the industry.

2.2 Econometric Framework

In order to make the afore-stated hypotheses testable, we now introduce a few notations that we will use later for regression estimation purposes.[5] Let $Earn_{kIt}$ be some measure of the change in actual earnings of firm k in industry I at time period t. Associated with this level measure of performance will be a measure of assets, $Assets_{kIt}$, and a return measure, $Return_{kIt}$, such that

$$Return_{kIt} = \frac{Earn_{kIt}}{Assets_{kIt}}$$

For example, if $Earn_{kIt}$ were profits in dollars and $Assets_{kIt}$ were the total assets of the firm, $Return_{kIt}$ would simply be the return on assets (ROA) of the firm. Given $Return_{kIt}$, we can estimate the overall return of industry I, r_{It}, by taking an asset-weighted average of the firms in that industry. In other words,

$$\hat{r}_{It} = \frac{\sum_k Return_{kIt} * Assets_{kIt}}{\sum_k Assets_{kIt}}$$

The fundamental earnings $Fund_{It}$ of a particular firm can hence be calculated as the product of its assets and the estimated industry return. In other words, $Fund_{It} = \hat{r}_{It} * Assets_{kIt}$.

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[5] We will use the same regressions that were used by Mullainathan et al (2000) in their study on Indian business groups.

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Now, if we introduce a dummy variable which takes the value of 1 for group firms and zero otherwise, then the first hypothesis can be tested as follows:

$$Earn_{kt} = \beta_1 + \beta_2(Fund_{kt}) + \beta_3(group_k * Fund_k) + \beta_4(Control_{kt}) + Firm_k + Time_t$$

The variable Control$_{kt}$ includes all those variables that might have a differential impact on profitability of firms in a particular industry, such as age, fixed assets etc. The coefficient β_2 on indicates how sensitive firms are, on average, to industry performance. For example, if $\beta_2 = 1$, it means that the non-pyramidal firms respond one-to-one to each shock. The interaction term $group_k * Fund_{kt}$ is included to assess whether pyramidal firms are differentially sensitive to industry performance. If tunneling is indeed prevalent, we should expect β_3 to be negative. For instance, if $\beta_3 = - 0.1$, this means that the pyramidal firm is 10% less sensitive to the shock.

In order to test for the increasing skimming lower down the pyramid, we introduce to denote the position of firm k. Assuming that a larger number would represent a firm that is lower down, we estimate the following regression for the sample of pyramidal firms only:

$$Earn_{kt} = \beta_1 + \beta_2(Fund_{kt}) + \beta_3(position_k * Fund_k) + \beta_4(Control_{kt}) + Firm_k + Time_t$$

As in the previous case, the interaction term, $Position_k * Fund_{kt}$, , measures the differential sensitivity. If lower down firms are less sensitive to their own shock, this means that as the position$_k$ increases, the actual earnings of the firm corresponds less and less with its fundamental earnings. In other words, we would expect to be negative.

The next set of hypothesis alludes to the propagation of the shock, suggesting in particular that firms should be sensitive to each others' shocks. Following Mullainathan et al. (2000), instead of attempting to tract the sensitivity of each firm to every other firm's shocks, we will simply look at their sensitivity to the combined shock of all other firms. For this purpose, we define $Sfund_{kt} = \sum_{j \neq k} Fund_{jt}$ where the sum is over all other firms in the group. We can then test for the sensitivity of pyramidal firms to other firms' shocks by estimating the following regression:

$$Earn_{kt} = \beta_1 + \beta_2(Fund_{kt}) + \beta_3(Sfund_k) + \beta_4(Control_{kt}) + Firm_k + Time_t$$

As is evident, a positive β_3 coefficient would indicate that group firms are indeed sensitive to the shocks of other firms in the pyramid.[6] For example, if $\beta_3 = 0.4$, this means that of every one dollar increase in the total industry profits, on average Rs. 0.4 are diverted to other firms.

The previous regression provides an idea about how a pyramidal firm responds to the shock of an *average* member firm. In other words, it simply tells us how much (on average)

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[6] It is worth noting, as Mullainathan et al. (2000) mention, that this regression controls for the firm's own shock, which means that 'we do not confuse an overlap of industry between firms in the same pyramid with flow of cash within the pyramid" (Mullainathan et al. 2000).

out of a marginal rupee is expropriated from an average pyramidal firm. However, as implied by theory, one should expect shocks to lower down firms to be redistributed more, on average, than shocks to higher up firms. In other words, member firms should be more responsive to shock to an average low firm than to an average high firm. Following Mullainathan et al (2000), we test for this hypothesis by decomposing the actual total shock. "To do this, let P be such that firms with $Position_k > P$ can be thought of as low in the pyramid and firms $Position_k < P$ with can be thought of as high in the pyramid.[7] Then, we can define two more variables as follows:

$$LSfund_{kt} = \sum_{j \neq k, position_k > P} Fund_{jt}$$

$$HSfund_{kt} = \sum_{j \neq k, position_k \leq P} Fund_{jt}$$

Of course, the way these variables have been defined, it has to be the case that the variable $Sfund_{kt} = LSfund_{kt} + HSfund_{kt}$. And now, given these variables, we can now estimate the following regression:

$$Earn_{kt} = \beta_1 + \beta_2(Fund_{kt}) + \beta_3(LSfund_{kt}) + \beta_4(HSfund_{kt}) + \beta_5(Control_{kt}) + Firm_k + Time_t$$

If it is indeed the case that firms are more sensitive to lower down member firms' shocks, we should expect to be greater than β_4.

Finally, a related implication these hypotheses is that higher up firms should be more sensitive to other firm's shocks. This can be tested by simply incorporating an interaction term between position and other firms' combined shock in the fourth regression:

$$Earn_{kt} = \beta_1 + \beta_2(Fund_{kt}) + \beta_3(Sfund_k) + \beta_4(position_k * Sfund_{kt}) + \beta_5(Control_{kt}) + Firm_k + Time_t$$

If the prediction is indeed true, we should expect β_4 coefficient to be negative, since that would imply that lower down firms show reduced sensitivity to other firms' shocks.

In this paper, we present our conclusions on the basis of the results that we derive from the first four of the five regressions stated above. The data requirements for these regressions are quite modest. We need some measure of a firm's performance, as well as a clear idea about the firm's industry to compute the associated industry shock. We also proxy for position within the pyramid, $Position_k$. Ideally, we would want an accurate measure for the ultimate owner's cash flow rights in an affiliate firm. This way, we would be able to label those firms with little cash flow rights of the ultimate owner as low down ones. Unfortunately, as this kind of information is difficult to obtain, we, like Mullainathan et al (2000), resort to cruder proxies.

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[7] For example, P may be chosen so that we isolate the bottom and top half of the firms in a pyramid.

Another point regarding the variable needs to be mentioned. It may seem that the way we define the position of the firm is not realistic. After all, more often than not, pyramidal firms are structured in complex ways. For instance, there may be more than one company at each tier, or a firm may own shares in firms other than those immediately below it. Cross-shareholding and interlocking directorships are also common practices in Pakistani business groups. Such technicalities are not difficult to incorporate in complex models. In fact, Mullainathan et al. (2000) show that incorporating these technicalities does not change the implications of the asserted hypotheses. No matter what the underlying structure, one need only order/position firms according to the ultimate owner's cash flow rights on that firm; this would conveniently serve the purpose of measuring tunneling.

3. Evidence on Tunneling from Pakistan

3.1 Data Source and Definition of Variables

The preceding section highlighted Mullainathan et al's (2000) methodology to test for tunneling. As mentioned earlier, we apply this framework to the case of Pakistani firms. We rely on a self-generated dataset which makes use of financial reports of companies listed on the Lahore and Karachi Stock Exchange. At the time of writing this paper, most of the data on Karachi based firms was unavailable. As a result, much of our analysis is based on firms and groups prevalent and listed on the Lahore Stock Exchange.[8] For the most part we rely on Center for Management and Economic Resource's (CMER) classification of firms into groups and non-groups, and of group firms by group affiliation.[9] This database is motivated to include financial statement data, industry information, group affiliation for each firm, and corporate ownership data.

In order to estimate the various regressions mentioned above, the salient variables we need information on are actual performances ($Earn_{kt}$) and assets ($Assets_{kt}$) of firms. We use profit before interest, tax and depreciation (PBITD) and total assets of the firm for this purpose. We use industry classifications of listed firms as defined by the Karachi Stock Exchange.

Another important variable we need for most our regressions is $position_{klt}$, i.e. the position of the group firm in its pyramid. As mentioned earlier, an ideal way to measure this would be to look at the cash flow rights of the controlling firm in the firm, and rank group firms according to decreasing cash flow rights. However, to get accurate and reliable data on such ownership is almost impossible to get.

One way to circumvent this problem could be to use the ownership stake of the board of directors as a proxy for the cash flow rights of the controlling firm. Evidence from

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[8] We exclude state-owned and foreign-owned from this sample as they may not be comparable to the privately owned domestic firms that interest us.

[9] CMER is a research center of the Lahore University of Management Sciences and maintains a comprehensive database of annual reports on listed companies from 1993 onwards.

Pakistan is strongly suggestive of the fact that families typically control firms in which they have financial stakes by appointing family members or family friends to the board of directors and to the top managerial positions (Cheema (2002), Naqvi and Ikram (2004)). Thus, Mullainathan et al. (2000) suggest that equity stake of the directors may form a good proxy for the family's cash flow rights. In the case of Pakistan, however, such a solution is neither feasible nor appropriate. For one, prior to the issuance of the code of corporate governance of Pakistan in 2002, no company was required to publish information on the ownership stakes of the directors. Hence, for the pre-2002 period, such information is almost impossible to find. Secondly, even if the ownership stake of the BOD were known, it would seriously underestimate the true control of the family due to the dominant practice of issuing *bainaam* shares, i.e. shares which cannot be traced to any entity. More often than not, such shares are issued to close relatives, and are not shown on the financial statements. Even the Code of Corporate Governance has been unable to tackle this problem.[10]

It is for this reason that (following Mullainathan et al. (2000)) we adopt an indirect approach of measuring the controlling shareholder's cash flow rights by looking at equity held by "other shareholders". In other words, we try to get an idea about the controlling family's cash flow rights by looking at shares which it does *not* own. Mullainathan et al (2000) define other equity as "… shares that are held neither by directors, nor banks, nor foreigners, nor financial institutions, nor government bodies, nor corporate bodies, nor the top fifty shareholders. It measures shares that are almost entirely held by outside shareholders". However, gauging equity held by other shareholders in this way still requires comprehensive knowledge of the shares held by the afore-mentioned parties, such as the board of directors, government bodies etc. This information, as mentioned above, was seriously lacking prior to imposition of the Code of Corporate Governance in Pakistan.

For our purposes, therefore, we define "other ownership" as total number of issued shares less shares held by the top 200 shareholders. The number 200 has no intrinsic significance, and a similar measure can be attained using a different threshold. In fact, one can carry out a sensitivity analysis by using different thresholds, say top 50, top 100, top 150, top 250 shareholders etc. We feel, however, that subtracting the top 200 shareholders from the total number of shares is a safe way of estimating the percentage of shares that are most certainly held by outside shareholders. It is this variable we use as a proxy for the position of the firm in its pyramid: the greater the percentage of other ownership, the lesser the cash flow rights of the controlling family in that particular firm, and thus the lower its position in the pyramid. In other words, $position_{kIt}$ increases in other ownership.

3.2 Summary Statistics

From the data that we gathered, we were able to identify a total of 86 group firms associated with 35 distinct groups.[11] Given the limitations on the number of financial reports available at the time of writing this paper,

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[10] For a discussion on this see Naqvi and Ikram (2004).

[11] We associated a firm with a particular group on the basis of the information provided to us by CMER as well as that available on the website: "http://richpaki.tripod.com/barons.html".

this data seriously underestimates both the total number of groups as well as the number of listed companies belonging to each group. Moreover, for most groups on which we do have information, it is true that the total number of firms belonging to them is far more than what we have been able to record. This can attributed to fact that groups maintain anonymity with regards to their group sizes and no official record is available on the undertakings of many of these business empires.

Table 1 gives the summary statistics for the full sample and for the group and stand-alone firms. These statistics suggest that group firms are, on average, 5 years older than non-groups firms. Moreover, group firms are far larger than stand-alone firms: group firms have an average of Rs. 989 million of total assets, while the average non-group firm only has Rs. 424 million of assets. Similarly, the average sales and profits of stand-alone firms are far less than the average sales and profits of group firms. A comparison of ROA also reveals that group firms are far more profitable than stand alone firms: a group firm on average has an ROA of 11% while a stand alone firm has a meager 3% return on asset.

In ownership structure, however, there doesn't seem to be much of a difference. On average, the percentage shares of "other ownership" are greater in non-group firms, on average, than in group firms, (11% vs. 8%). However, this is most likely due to the fact that in Pakistan, even most listed stand-alone firms are family owned and controlled.

3.3 Sensitivity to Industry Shock: Group vs. Non-group Firms

In order to test for tunneling, we start by estimating our first regression, which checks for whether group firms are less sensitive to their industry shocks or not. In other words, we estimate the following equation:

$$\text{Earn}_{kt} = \beta_1 + \beta_2(\text{Fund}_{kt}) + \beta_3(\text{group}_k * \text{Fund}_k) + \beta_4(\text{Control}_{kt}) + \text{Firm}_k + \text{Time}_t$$

We use the natural logarithm of total assets as control variable in this model. As mentioned above, we expect β_3 to be negative.

Column 1 in Table 2 shows the result that we obtain upon estimation. Contrary to our expectation, the β_3 estimate we obtain is 0.6087, i.e. positive. Even when we control for the possible differential sensitivity of group firms to their total assets and then their age in Columns 2 and 3 respectively, we do not get much different results. What this seems to suggest is that group firms are, on average, more sensitive to their own group shock. Moreover, we obtain a negative coefficient on β_2, which suggests that an increase in mean industry profitability *reduces* the earnings of stand alone firms. Again, this result is contrary to what one our theory suggests. Clearly, if stand alone firms are not subject to tunneling, then their earnings should correspond very highly with change in fundamental earnings. Our results seem to suggest otherwise.

While this may lead one to question the validity of our hypothesis and/or the specification of our regression, we believe that there are at least two reasons why these results should be looked at doubtfully. Firstly, the results of this regression are extremely sensitive to the correct identification of group firms and stand alone firms. While the sources through which

we have been able to identify firms as belonging to certain groups are quite reliable, the same cannot be said of stand alone firms. In other words, it is quite possible that a particular firm that we have identified as a stand alone firm is actually a group firm.[12] This may be one reason why both and coefficients may not be reflecting the true sensitivities of firms' earnings to the industry shock.

Secondly, the data set on the basis of which we have derived our results does not have as many observations on stand-alone firms as it does on groups and group firms. This is one reason why the β_2 and β_3 values change significantly once the specification of the regression is changed slightly, e.g. by controlling for assets and time. With a greater number of observations on the number of stand alone firms (and with their correct identification), we can hope to get results that are more indicative of the actual picture.

Fortunately, the remaining regressions do not have to suffer from these problems, since these regressions will only make use of information on pyramidal firms. As mentioned above, the data set that we have used for our analysis is one in which there is a reasonable large number of observations on group firms, and the sources through which they have been identified as members of a particular group and industry are far more reliable. We now turn to these regressions.

3.4 Varying Sensitivity to Industry Shocks Within a Group

As mentioned above, one of the implication of the theory on tunneling is that lower down firms should be less sensitive to industry shocks than higher up firms in the pyramid. Confining to data on pyramidal firms only, we now estimate the following regression:

$$Earn_{kt} = \beta_1 + \beta_2 (Fund_{kt}) + \beta_3 (position_k * Fund_k) + \beta_4 (Control_{kt}) + Firm_k + Time_t$$

As mentioned earlier, we expect β_3 to be negative, as that is what the case should be if more resources are being skimmed from lower down firms, i.e. from those firms which have a high position$_k$ in the pyramid.

Results from the regression are reported in Table 3. Position of a pyramidal firm has been estimated via the percentage of "other ownership" held. In other words, as "other ownership" in a firm increases, the cash flow rights of the controlling families reduce, which implies higher diversion. Columns 1 and 2 show the results obtained when the regression is applied to all groups. In Column 1, we do not allow for the differential impact of size via the interaction terms, while in Column 2 we do. In both cases, our estimated coefficient remains almost the same at about -0.018. This suggests that lower down pyramidal firms are indeed less sensitive to industry shocks. In particular, a one percentage point increase in other ownership decreases the responsiveness of a group firm to a one rupee shock by about 0.018 rupees.

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[12] The possibility of error in the reverse direction, i.e. stand alone firm (wrongly) identified as group firm is much less likely.

In larger groups, we should expect lower down pyramids to be even less sensitive to their own shocks since the number of firms is high and the cash flow rights of the controlling family get weaker lower down the pyramid. To put this hypothesis to test, we repeat the aforementioned exercise for the largest group that we have data on.[13] Column 3 reports the results that we obtain. These results suggest that that in this group low down firms are, on average, much less sensitive than are group firms in general. In particular, a one percentage point increase in other ownership decreases the responsiveness of a group firm to a one rupee shock by about 0.05 rupees in the largest group. In Column 4 we report the results by controlling for the differential impact of size of the largest group. Our results do not change significantly.

Overall, results from this regression seem to be consistent with the idea that firms in which the cash flow rights of the controlling family are weak are subject to greater tunneling.

3.5 The Effect of Group Shocks

So far, our results seem to be in line with the possibility of tunneling in Pakistani group firms. However, an important aspect of the test for tunneling is to see how the shock is propagated to other firms in the pyramid. In other words, we want to see how firms in the group react to shocks to other firms in the group. "Without this evidence, it is possible that group firms are merely mismanaged. In such a case, the reduced sensitivity would not represent a diversion of resources elsewhere, but merely dissipation of resources by inefficient operation" (Mullainathan et al. (2000).

Therefore, we estimate the following regression:

$$Earn_{kt} = \beta_1 + \beta_2(Fund_{kt}) + \beta_3(Sfund_k) + \beta_4(Control_{kt}) + Firm_k + Time_t$$

As mentioned before, this regression tests for whether the earnings of a pyramidal firm are affected by the combined shock to all other firms in the pyramid. In the presence of tunneling, β_3 should be a positive number, suggesting a positive relationship between industry shock and earnings of a firm.

In Column 1 of Table 4, we report the results obtained when the equation is estimated. Our expectations are borne out by the data, with β_3 estimated at approximately 0.1. This implies that for each one rupee earned by the group as a whole, other firms in the group on average receive 10 paisas. In Column 2 we repeat the exercise for large groups only and get similar results. In assessing the magnitude of this coefficient, recall that it averages a potential tunneling effect in two ways. First, it cumulates shocks to bottom firms in the group (where we would expect the money to come from) as well as to top firms in the group. Second, it includes the sensitivity of all firms, not only the top firms in the group (where we would expect money to go to) but also low down firms.

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[13] By largest group, we do not mean that largest group in Pakistan. Rather, it is the group for which we had the most information on (at the time of writing this paper) regarding the number of firms in the pyramid.

In order to test for the hypothesis that the source of the shock matters, i.e. shocks that affect low down firms are redistributed more, we estimate the following regression:

$$\text{Earn}_{kt} = \beta_1 + \beta_2(\text{Fund}_{kt}) + \beta_3(LSfund_{kt}) + \beta_4(HSfund_{kt}) + \beta_5(\text{Control}_{kt}) + \text{Firm}_k + \text{Time}_t$$

In the context of this regression equation, this hypothesis is tantamount to testing as to whether $\beta_3 > \beta_4$.

To go about testing this proposition, we break down the overall group shock into two sub-shocks: shock to the group firms with below median "other ownership" (high firms) and firms with greater than and equal to median "other ownership" (low firms). Column 3 shows the results when we run this regression on all group firms. These results suggest, as expected, that on average group firms redistribute more money from low down firm that from high up firms. In particular, while approximately 10 paisas of every one rupee earned by the high firms gets redistributed, for the lower down firms the figure goes up to 16 paisas. Our results do not change significantly even when we estimate this regression for large groups only.

To accentuate the importance of the source of the shock, we redefine high firms and low firms, this time firms with less than 25th percentile of other ownership qualifying as high firms. In this case, we should expect even lesser sensitivity of average group firm to the combined shock to these high firms. Column 5 reports the results that we obtain, which are indeed according to our expectations. The results suggest that for each one rupee earned by the group as a whole, other firms in the group on average receive 0.009 rupees, which is a very negligible amount. On the other hand, the figure for low firms is 0.07 rupees, or approximately 7 paisas. Column 6 estimates the same regression for large groups, and the results obtained are not significantly different from those obtained earlier. All in all, these results suggest that the source of the shock does matter.

4. Concluding Comments

The results that we have obtained are indicative of the fact that tunneling is indeed prevalent in Pakistani business groups. But is it possible that the reduced sensitivity of group firms to industry and group shocks be derived from something else? At least three alternative explanations are worth discussing.

First, one may worry that the results that we have obtained arise from the fact that Pakistani business groups are characterized by cross-shareholdings, i.e. group companies owning shares in each other. Thus, if firms A and B belong to a group, and if A owns shares in B and B in A, then both will respond to each others' shocks. In such an instance, the apparent sensitivity of group firms to each other's performance would then mechanically arise through the dividend earnings from the shares held in each other. However, we do not believe this to be the factor explaining our results. Were this explanation true, then top firms would have been least responsive to shocks of low down firms due to the 'dilution' of

dividend earnings in the pyramidal chain. Our theory, however, suggests exactly the contrary.[14]

Second, we may have mismeasured a firm's industry. This is possible in the instance when the firm is well diversified, and, therefore, its primary industry may not be the one in which we have placed it but some other. Clearly in the event of this mismeasurement firms would appear less sensitive to "their" industry shock. However, this could only be a plausible explanation behind our results if group firms are more diversified than stand-alone firms. Again, the reverse sounds more logical – groups can diversify within themselves whereas stand-alone firms must do so 'within one shell'. Moreover, our results suggest that top firms are more sensitive to their own shock, while bottom down firms are the least sensitive to their own shock. If diversification is the answer for this pattern of sensitivity, then it would also have to be the case that top firms be less diversified than low-down firms. There doesn't seem to be any reason (or at least any that we know of) why this may be the case. Nonetheless, this calls for extra research in determining the diversification patterns within groups in Pakistan.

Finally, another alternative explanation behind our results could be the fact that groups provide insurance to their member firms. As mentioned earlier, in countries with weak institutional structures, groups act as an insurance mechanism. During lean times in an industry, a group firm can provide financing or cash to other firms in its group. This kind of financing may not be available to stand alone firms. "Such informal insurance mechanisms between group members could produce some empirical patterns that might appear like tunneling" (Mullainathan et al, 2000). For example, a group firm could be less sensitive to its own industry shock because it receives from other group firms. However, we again do not believe this to be the true explanation behind our results. This is because if it is indeed insurance that causes group firms to show lesser sensitivity to their own industry shock, then why does insurance have to follow the line of ownership? As our results indicate, higher up firms are more sensitive to their own shock than are lower down firms. The insurance story implies that high up firms (where ownership is high) should receive less 'insurance'. Moreover, this story fails to explain why 'insurance' flows in one direction only, i.e. from bottom to top. The only way in which this story can actually explain our results is if we assume that (a) it is always the cash cows of the group that provide insurance to cash-strapped firms, and (b) that positions in the pyramid proxies for cash richness, i.e. the firm at the top should be the richest, the firm below it the second-richest, so on and so forth. Thus further research should empirically test for whether this is indeed the case in Pakistani business groups, as only then can the insurance story account for the reduced sensitivities that we observe.

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[14] At the time of writing this paper, we were unable to estimate the last regression in the series which tests precisely for whether the tunneled money goes to the top firms or not. We hope to bolster our results by estimating this regression soon, hopefully with a superior quality data set.

In the absence of the information and research needed to test for these alternative explanations behind our results, we can at least suggest that tunneling is indeed prevalent in Pakistani business groups. This of course raises an equally important question: "How do these Pakistani businesses tunnel resources?" Unfortunately, this is a question which is beyond the scope of this paper. While in the first section we mentioned several ways in which companies tunnel resources, in order to see as to which specific methods are used to tunnel resources in Pakistani business groups, we will undertake a similar but a separate research agenda needs to be initiated. It is our hope that this paper provides a motivation for such an endeavor.

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Table 1
Summary Statistics

Variables	All Firms	Group Firms	Stand Alone Firms
Total Assets	854 (1310)	989 (1460)	424 (348)
Total Sales	828 (1230)	959 (1370)	415 (414)
Profit Before Depreciation, Interest, and Taxes (PBDIT)	109 (223)	1332 (249)	38.3 (64.8)
Ratio of PBIT to Total Assets (ROA)	0.0928 (0.285)	0.1131 (0.148)	0.028 (0.513)
Year of Incorporation	1977.28 (14.061)	1975.94 (14.41)	1981 (12.059)
Other Ownership	8.926 (9.137)	8.32 (8.55)	10.8 (10.6)

Notes:
1. Results are based on data collected data for 115 firms, (86 group firms and 29 stand-alone firms). All monetary variables are expressed in millions of Pakistani rupees.
2. Standard deviations are in parenthesis.
3. Other Ownership is measured in percentage terms.

Table 2
Sensitivity to Own Group Shocks: Group vs. Stand-Alone Firms
Dependent Variable: PBIT

	1	2	3
Own Shock	-0.0584	-2.1245	-27.922
	(0.1192)	(0.5758)	(5.053)
Own Shock * Group	0.6087	0.4019	0.8243
	(0.1228)	(0.1344)	(0.1336)
ln Total Assets	64.4	-63.6	62.3
	(8.33)	(8.28)	(8.98)
Own Shock * Ln Assets	-	0.102	-
	-	(0.028)	-
Own Shock * Year of Incorp.	-		0.014
	-		(0.0025)
Number of Observations	1032	1032	851
R^2	0.595	0.631	0.576

Notes:
1. Results are based on data collected data for 115 firms (86 group and 29 stand-alone firms) for the years 1993-2003. All monetary variables are expressed in millions of Pakistani rupees.
2. Standard errors are in parentheses.
3. In all regressions, we have controlled for time and firm fixed effects.

Table 3
Sensitivity to Own Shock by Other Ownership a
Dependent Variable: PBIT

	All Groups	All Groups	Largest Group	Largest Group
	(1)	(2)	(3)	(4)
Own Shock	0.6719	-1.8415	1.144	-3.638
	(-0.0545)	(0.67462)	(0.2529)	(4.3182)
Own Shock * Other Ownership	-0.018	-0.019	-0.051	-0.0526
	(0.0058)	(0.0057)	(0.0223)	(0.0227)
ln Total Assets	72.7	71.8	85.5	76.4
	(9.98)	(9.88)	(35.6)	(36.5)
Own Shock * Ln Assets	-	0.1131	-	0.2236
	-	(0.0303)	-	(0.2013)
Number of observations	771	771	74	74
R^2	0.591	0.634	0.689	0.732

Notes:
1. Results are based on data collected data for 86 group firms for the period 1993-2003. All monetary variables are expressed in millions of Pakistani rupees. "Largest Group" refers to the group for which we had the highest number of firms in the pyramid.
2. Standard deviations are in parenthesis.
3. In all regressions, we have controlled for time and firm fixed effects.

Table 4
Sensitivity of Group Firms to Group and Sub-Group Shocks a
Dependent Variable: PBIT

	All Groups	Large Groups	All Groups	Large Groups	All Groups	Large Groups
	(1)	(2)	(3)	(4)	(5)	(6)
Own Shock	0.416	0.2643	0.409	0.2842	0.4887	0.4004
	(0.0411)	(0.0775)	(0.0461)	(0.0804)	(0.0496)	(0.0807)
Group Shock	0.0901	0.084	-	-	-	-
	(0.0154)	(0.0191)	-	-	-	-
Shock to Firms With Other Ownership Below Median (High Firms)	-	-	0.0979	0.0938	-	-
	-	-	(0.0238)	0.0273	-	-
Shock to Firms With Other Ownership Above Median (Low Firms)	-	-	0.1641	0.16	-	-
	-	-	(0.039)	(0.044)	-	-
Shock to Firms With Other Ownership Below 25th Percentile (High Firms)	-	-	-	-	0.0092	-0.06
	-	-	-	-	(0.0426)	(0.0546)
Shock to Firms With Other Ownership Above 25th Percentile (Low Firms)	-	-	-	-	0.0719	0.0558
	-	-	-	-	(0.0188)	(0.0219)
Number of Observations	791	249	791	249	791	249
R^2	0.62	0.67	0.60	0.67	0.60	0.66

Notes:
1. Results are based on self-collected data for 86 group firms over the period 1993-2003. All monetary variables are expressed in millions of Pakistani rupees. "Large Groups" refers to groups for which the number of firms in the pyramid is equal to 5 or more.
2. Standard deviations are in parenthesis.
3. In all regressions, we have controlled for time and firm fixed effects.

Figure 1. A Stylized Pyramid

Abstract

In Pakistan there is a ubiquity of firms in which there exists a controlling shareholder, usually in the form of the family. By and large this control is maintained via cross-shareholding and inter-locked directorships which in turn is facilitated by the pyramidal organization of these firms. Moreover, these controlling families have often been alleged of tunneling resources from firms in which they have few cash flow rights to ones in which they have more cash flow rights. This paper attempts to quantify the extent of tunneling prevalent in Pakistani family business groups. The framework that is adopted is one that has been presented by Mullainathan et al. (2000): we use the responses of different firms to performance shocks and map out the flow of resources within a group of firms to quantify the extent to which the marginal rupee is tunneled. We apply this technique to data on Pakistan business groups.