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Multinationals Do It Better:

Evidence on the Efficiency of Corporations' Capital Budgeting

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ABSTRACT

This paper examines the effectiveness of multinational enterprises' capital budgeting decisions as compared to the decisions of purely domestic enterprises. This is an important question because of multinationals' role in allocating capital globally. Answering this question may also shed light on whether multinationals are indeed better managed than are purely domestic firms. We examine this question empirically using the deviation of a firm's estimated *marginal* Tobin's *q* from an appropriate benchmark as an indicator of effective resource allocation. We find that multinationals make more efficient capital budgeting decisions than do purely domestic firms. The result stems from multinational enterprises' exercising greater restraint on over-investment, but is not due to looser liquidity constraints. In obtaining the result, we account for the impact of institutional ownership, managerial ownership, and managerial entrenchment. We also test whether multinationals' greater capital budgeting efficiency might be due to their investment locations, since they might thereby be monitored by more agents and also may be more successful in resisting pressures from special interest groups and governments to adopt practices that are not consistent with firm value maximization. We do not find support for the monitoring and bargaining hypotheses. Our observations therefore suggest that multinationals may be intrinsically better managed firms than are purely domestic firms. (JEL F23, G31)

1. INTRODUCTION

The relationship between firm organization (e.g., corporate segment diversification) and performance has been studied extensively through the use of market value metrics (e.g., Tobin's *q*). In this paper we undertake a different approach to evaluate the relationship between firm organization and performance: an examination of the extent to which a firm's capital budgeting decisions enhance firm value, as measured by the deviation of a firm's estimated *marginal q* from the appropriate benchmark.

The focal interest of this paper is whether U.S.-headquartered multinational enterprises (MNEs) and purely domestic U.S. enterprises (PDEs) differ significantly in their capital budgeting decisions. This research question is important because of the rapid growth in global foreign direct investment (FDI) outflows in the 1990s (from US$233 bn in 1990 to US$1,379 bn in 2000). For example, the total stock of U.S. direct investment abroad nearly tripled over the 1990s (from $2.2 trillion in 1990 to $6.3 trillion in 2000) as American MNEs generated an increasingly large share of world GDP (6.8% in 1994 and 8.6% in 2000). Multinational firms have become an important conduit in the global allocation of investment funds. Further, recent studies show that inflows of foreign capital, including FDI, are associated with improvements in the capital market efficiency of the host countries (e.g., Rajan and Zingales, 2003; Morck *et al.* 2000, Bekaert and Harvey (2000), Henry (2000a, b), and Li *et al.* 2004, and many others). While the evidence suggests that foreign capital inflows have a positive impact, further understanding of the capital budgeting decisions of MNEs may aid our understanding of this relationship.

We define optimal capital budgeting decisions in the context of firm value maximization and thus use marginal Tobin's *q*, which is the ratio of the marginal change in market value to the unexpected marginal change in assets. On the assumption that the appropriate benchmark

marginal q can be identified, the deviation of a firm's estimated marginal q from this benchmark can serve as an indicator of the quality of a firm's capital budgeting decisions. For example, if the theoretical benchmark marginal q is 1.0, firms with estimated marginal q's above (below) this level can be classified as under- (over-) investing. This two-stage economic methodology was developed by Durnev, Morck, and Yeung (2004).

We improve this methodology in two ways. First, we use a random coefficients methodology to estimate marginal q (instead of OLS as in Durnev *et al.* (2004)) to incorporate explicitly firm heterogeneity. Second, in a second-stage regression, marginal q, an estimated coefficient, is used in modified form as a dependent variable to analyze the relationship between the efficacy of the firm's capital budgeting decisions and multinationality after controlling for other firm characteristics. In this second stage, we correct for heteroscedasticity using a weighted generalized least squares methodology (e.g., Saxonhouse, 1976) instead of a general White correction for heteroscedasticity as in Durnev *et al.* (2004). Moreover, in our second stage analysis we estimate the benchmark marginal q for MNEs and PDEs, and then use the difference between the estimated firm-specific marginal q's and the benchmark marginal q's to form the dependent variable.

We examine whether effective capital budgeting is associated with a firm's multinationality, firm characteristics such as corporate governance, or characteristics of the countries in which the firm invests. Our sample is an unbalanced panel dataset of 332 U.S. manufacturing firms from 1992-2000 for which we have reliable data as to their multinational presence. Manufacturing industries represent the bulk of U.S. FDI – both in terms of the dollar stock of outstanding FDI and in terms of new FDI made in the 1990s. Within our sample, as is observed repeatedly in many empirical studies, MNEs and PDEs differ markedly. Consistent

with the international business literature, we find that MNEs are larger, invest more in research and development, and are more diversified.

The efficiency of a firm's capital budgeting decision depends on corporate governance inside and external to a firm. We observe that MNEs and PDEs differ significantly with regards to measures of their internal corporate governance structures. While there is a systematic relationship between the efficacy of corporate capital budgeting decisions and corporate governance characteristics, the relationship is not straightforward. For example, our results suggest that effective capital budgeting is positively associated with managerial entrenchment and negatively with institutional ownership.

MNEs inherently differ from PDEs in that they have operations in multiple locations; that could affect the efficiency of its capital budgeting decisions. We therefore examine the relationship between a company's capital budgeting decisions and its corporate locations' characteristics, including a location's creditors' rights and financial market development. The presumption is that financial communities in these locations augment home market financial communities' monitoring. Also, for U.S. MNEs, investing in less developed countries could raise their bargaining power against special interest groups, including the government. However, the evidence provides no support for the monitoring and the bargaining hypotheses.

The most important finding is that more effective capital budgeting is positively associated with multinationality even after controlling for the influences just described. Moreover, this result appears to reflect greater restraints on over-investment and not reduced liquidity constraints that may reflect MNEs' being able to access multiple capital markets. Thus, we conclude that MNEs may well have an intrinsic advantage with regards to effective resource allocation.

In Section 2 we delineate the theoretical rationale for why MNEs and PDEs might differ in their ability to invest effectively. Section 3 introduces the method for measuring investment efficiency and the econometric methodology. The data are described in Section 4. Section 5 presents and analyzes the results from empirical testing, and their implications. Section 6 concludes.

2. THEORETICAL MOTIVATION

MNEs might differ systematically from PDEs in terms of the effectiveness of their capital budgeting decisions. Some of these differences could be a function of firm characteristics (e.g., firm size), yet much of this difference may simply be a function of the firm's multinationality itself. A MNE is present in at least two distinct operating environments (e.g., the U.S. and Mexico), and this may expose the MNE to more diverse challenges. Theoretically, it is unclear whether MNEs should be expected to make more or less effective capital budgeting decisions than would PDEs.

2.1 MNEs May Have Better Management

To use capital effectively a firm needs capable, competent managers to efficiently collect and digest information, delegate responsibilities, evaluate performance, etc. These managerial characteristics have been described as "entrepreneur" capabilities in a long series of contributions to the Coasean theory-of-the-firm framework (e.g., Coase, 1937; Alchian and Demsetz, 1972; Lucas, 1978; and Jensen and Meckling, 1995).

The international business literature suggests that a firm becomes multinational because it has greater management capabilities (e.g., Buckley and Casson, 1976). Another possibility is that MNEs, compared to PDEs, may have better management capability simply because their

sheer size and job diversity enable them to attract and retain more capable managers. *Ceteris paribus*, larger firms pay higher salaries (Medoff and Brown, 1989), and the higher compensation attracts higher quality workers and better aligns employer and employee interests. Alternatively, by virtue of their size and job diversity, MNEs are able to offer skilled employees a wider array of growth opportunities. For all of these reasons, MNEs may be able to recruit and retain higher quality staff.

2.2 Agency and Information Asymmetry and Corporate governance

Agency and Information Asymmetry

The above arguments notwithstanding, the resultant complexity of a multinational corporate structure could overwhelm management and cause it to make investment mistakes. In addition, the complexity might give more room for managers to pursue agency behavior. For example, managers could deliberately mis-invest in order to entrench themselves (Shleifer and Vishny, 1989), over-invest for empire building (Jensen, 1986), including wasteful multinational expansions (Morck and Yeung 1992), or be excessively risk-averse to protect personal interests (John, Litov, and Yeung, 2005). Thus, relative to PDEs, MNEs are larger and more complicated firms that should have greater informational asymmetry and agency problems within and across firm boundaries. Hence, it is possible that MNEs invest less optimally than do PDEs.

Another reason why a firm might invest sub-optimally is that investor recognition of potential information asymmetry and agency problems leads investors to supply external financing to firms at a premium (Myers and Majluf, 1984). The extra cost associated with external financing constitutes a liquidity constraint, and firms with inadequate internal funds to finance investments have to curtail prematurely the size of their investments (Himmelberg,

Hubbard, and Love, 2002), thereby inducing an upward bias to observed marginal q. MNEs are larger firms with greater internal capital markets. The importance of internal capital markets is underscored by the imperfections of external finance markets and inter-dependency of investments made by segments of a corporation (Lamont, 1997). Using these internal markets allows conglomerates to allocate resources more effectively based on cost-benefit analysis of the marginal investment opportunities available to each segment of the corporation (Maksimovic and Phillips, 2002), and this could lead to a decreased deviation of observed marginal q from the appropriate benchmark.

Corporate Governance

Adoption of stronger corporate governance measures can decrease inter- and intra-firm agency and information asymmetry problems (Shleifer and Vishny, 1997; Himmelberg, Hubbard and Love, 2002), and should lead a firm to make more effective capital budgeting decisions. Corporate governance measures can be classified as internal (e.g., investor protection measures incorporated in the firm's bylaws, board monitoring, and insider ownership) or external (e.g., institutional investors). It is possible that MNEs and PDEs differ systematically in terms of the quality of their corporate governance, and that these differences alone may explain any systematic differences in the efficacy of their corporate capital budgeting decisions.

Note that the internal and external corporate governance measures can develop simultaneously and in a mutually reinforcing manner. For example, firms with higher levels of investor protection may have higher levels of institutional investment while institutional investors may pressure the firm to adopt investor protection measures. It is desirable to incorporate both measures to capture the impact of corporate governance on the quality of corporate capital budgeting decisions.

We look at three internal measures of corporate governance. First, a firm's bylaws on investor protection alter the relative balance of power between the firm's management and shareholders, giving investors more power to monitor and discipline managers. Gompers, Ishii, and Metrick, (2003) report that stronger investor protection is associated with higher firm value. Bebchuk *et al.* (2004) point out that a sub-section of the Gompers *et al.* (2003) measures that more closely capture internal constraints on managerial entrenchment appear to possess all the reported effects.

Second, a board of directors monitors and advises the firm's senior management. Publicly traded firms are required to have a board of directors, but its structure varies across firms. A board of directors could be staggered (or classified) as directors are placed into different classes that serve overlapping terms (usually for three years). Firms often adopt staggered boards in order to deter hostile take-over attempts (Bebchuk *et al.*, 2002). It is also possible that a firm adopts a staggered board in order to preserve the independence of outside directors, or to promote board stability by reducing potential annual turnover of board directors. However, Bebchuk *et al.* (2002) are unable to find empirical evidence supporting these theories. Instead, staggered boards are associated with lower firm value (Bebchuk and Cohen, 2004), and are a deterrent in takeover battles (Daines and Klausner, 2001).

Third, insider ownership (i.e., senior management's share holdings) can align managerial and shareholder interests. Alternatively, large insider ownership could be indicative of managerial entrenchment, thereby reducing the board's ability and tendency to monitor and discipline management. Firm value and insider ownership are positively related when insiders own a small share of the firm and the convergence of interest theory dominates, but high levels

of insider ownership reduce firm value as the entrenchment theory dominates (Morck, Shleifer, and Vishny, 1988, 1990; Demsetz and Villalonga, 2001).

Next, we look at one external measure of corporate governance: institutional ownership.[1] Within the U.S. context, large block holding by investors, particularly institutional investors, is associated with higher levels of monitoring (Shleifer and Vishny, 1986; Gillan and Starks, 2000). Because of their size and profile, institutional investors often have preferential access to top corporate managers, are more likely to attend annual shareholder meetings, or vote for boards of directors. Therefore, they may be able to press for more corporate disclosure, thus mitigate information asymmetry, and reduce the levels of agency problems, leading to better corporate investment decisions. By the same token, institutional investment could be a signal of transparency and better corporate governance in the sense that institutional investors are attracted to firms with such characteristics (Gompers and Metrick, 1997).

It is unclear whether MNEs have stronger investor protection measures in their bylaws and higher quality boards. It is likely the case that insiders in multinational firms own a smaller percentage of shares due to the sheer size of multinationals; but that does not necessarily mean that the insiders are less likely to be entrenched because other shareholders likely have diluted ownership too. Likewise, while we would expect that multinationals have more institutional investors because of their sheer size, we expect that the institutional investors may individually have diluted ownership too. Hence, theoretically it is not straightforward to make a prediction whether multinational have better or worse corporate governance than purely domestic firms.

2.3 Host Country Characteristics

[1] Institutional investors include banks, insurance companies, mutual funds, pension funds, university endowment funds, and other professionally managed asset pools.

In addition to the above, there are additional influences on managers' capital budgeting decisions that are particularly relevant to multinationals. We examine three.

First, multinational firms have a physical presence in multiple capital markets, and that may give them an advantage in bypassing location-specific liquidity constraints. To the extent that there is some degree of international capital market segmentation, investment in a given country would be affected by the supply of capital within it (Feldstein and Horioka, 1980). A firm that is present in multiple locations and that has the ability to transfer funds internally and across national borders will be subject to fewer investment funding constraints (Feldstein, 1994; Desai, Foley, and Hines, 2004). Thus, by virtue of being present in multiple geographic locations, and if international capital is indeed not perfectly mobile, MNEs may simply face looser liquidity constraints and thus be able to undertake more effective capital budgeting.

Second, to the extent that MNEs raise capital in multiple locations, they face multiple external monitors of their corporate investment behavior in these locations. Thus, MNEs may be subject to more external monitoring than are their domestic counterparts. The monitoring capabilities of a particular agent are a function of the particular institutional environment from which it originates. A large law and finance literature has shown that countries with better protection for investors and creditors have more developed markets (e.g., La Porta et al. 1997) and have more firm-specific information (e.g., Morck, Yeung and Yu, 2000), and their investments are more responsive to growth opportunities (Wurgler, 2000). When more firm-specific information is available to investors, firms undertake more effective capital budgeting decisions (Durnev, Morck, and Yeung, 2004). Thus, MNEs that invest in countries with strong legal and financial systems may be monitored more effectively, and thereby make more effective capital budgeting decisions.

Finally, MNEs are footloose and may leverage this to bargain with different parties. For example, special interest groups (e.g., Greenpeace, labor unions) may exert sufficient pressure that a corporation is forced to adopt practices not consistent with firm value maximization. To the extent that a MNE is present in multiple locations, the firm may play different governments and special interest groups against one another. This would reduce, or offset, the host governments' and local special interest groups' ability to constrain MNEs' ability to invest for firm value maximization. Note, moreover, that this footloose effect ought to be more important if a multinational invests in countries (e.g., less developed countries) that have different economic and social interests than do its home country (e.g., in our empirical case the U.S.).

3. MODEL AND EMPIRICAL METHODOLOGY

Given the theoretical ambiguity regarding whether MNEs or PDEs would make more effective capital budgeting decisions, we conduct an empirical examination of this question. This section reports the key ingredient in our empirical design and how it is used in our empirical analysis.

Firms derive incremental value, which should be reflected in changes in the firm's market value in informed capital markets, from each investment that they make. Due to diminishing returns to investment, the firm will eventually have a marginal investment project with a net present value of zero, where the incremental value created exactly equals the cost. If we define marginal q as the ratio of incremental firm market value created by (and divided by) the unexpected marginal investment, the optimal capital budgeting decision yields a marginal q

equal to 1.0. Positive (negative) deviation of a firm's marginal *q* from 1 indicates under (over) investment.[2]

Distortions in the economic environment that surround the firms – e.g., due to taxes – may cause the optimal benchmark to differ from the theoretical benchmark of 1.0. Still, when the estimated marginal *q* for a firm is above (below) the "optimal" benchmark, the firm likely under (over) invests, and the distance of the estimated marginal *q* from the benchmark could be an index for the efficacy of a firm's capital budgeting decisions. This is the methodology developed by Durnev, Morck, and Yeung (2004). We follow their methodology but extend it by using random parameters to estimate marginal *q*, and use the resultant statistical information to account explicitly for latent heterogeneity in subsequent analyses.

3.1 Marginal *q* Estimation[3]

Our first step is to estimate firm level marginal *q*. By definition and following Durnev *et al*. (2004, eq. 9), the marginal *q* of firm *i* can be written as follows:

$$\dot{q}_i = \frac{V_{i,t} - E_{t-1}V_{i,t}}{A_{i,t} - E_{t-1}A_{i,t}} = \frac{V_{i,t} - V_{i,t-1}\left(1 + \hat{r}_{i,t} - \hat{d}_{i,t}\right)}{A_{i,t} - A_{i,t-1}\left(1 + \hat{g}_{i,t} - \hat{\delta}_{i,t}\right)}, \qquad [1]$$

where $V_{i,t}$ is the market value, equity plus debt, of firm *i* at time *t*, and $A_{i,t}$ is the total assets of firm *i* at time *t*. E_{t-1} is the expectations operator, which uses all information available to the firm at time *t-1*. The unexpected change in firm value between periods *t-1* and *t* is the difference

[2] The current framework is an ex post examination of investors' assessment of chosen and announced investment projects. It does not address the possibility that managers may have ex ante multiple possible investment types (e.g., high risk versus low risk investments), which investors fundamentally cannot observe, and choose to invest sub-optimally, e.g., when a manager deliberately ignores some value-enhancing risky investment opportunities for the sake of self-interest. This is the focus of John, Litov, and Yeung (2005).

[3] The derivation of the empirical specification for estimating marginal *q* reported in this sub-section is essentially borrowed from Durnev *et al.* 2004.

between the new and old firm value minus the expected return from owning the firm, $V_{i,t-1}\hat{r}_{i,t}$, plus disbursements to investors, $V_{i,t-1}\hat{d}_{i,t}$, including dividends, share repurchases, and interest expenses. Meanwhile the firm's unexpected change in assets is the difference in the new and old dollar value of assets minus the expected expenditures on capital goods, $A_{i,t-1}\hat{g}_{i,t}$, plus the expected depreciation, $A_{i,t-1}\hat{\delta}_{i,t}$.

The terms in equation [1] are cross-multiplied, rearranged and simplified as:

$$\frac{V_{i,t} - V_{i,t-1}}{A_{i,t-1}} = -\dot{q}_i\left(g_i - \delta_i\right) + \dot{q}_i \frac{A_{i,t} - A_{i,t-1}}{A_{i,t-1}} + r_i \frac{V_{i,t-1}}{A_{i,t-1}} - \xi_i \frac{D_{i,t-1}}{A_{i,t-1}} + u_{i,t}, \qquad [2]$$

where $D_{i,t-1} \equiv d_{i,t}V_{i,t-1}$ and the term ξ_i reflects the possibility of tax distortions on the value of disbursements. Equation [2] yields the following empirical specification:

$$\frac{\Delta V_{i,t}}{A_{i,t-1}} = \beta_{0,i} + \beta_{1,i}\frac{\Delta A_{i,t}}{A_{i,t-1}} + \beta_{2,i}\frac{V_{i,t-1}}{A_{i,t-1}} + \beta_{3,i}\frac{D_{i,t-1}}{A_{i,t-1}} + u_{i,t} \qquad [3]$$

In this equation, the regression coefficient $\beta_{1,i}$ is firm i's marginal q. (This equation is identical to equation 11 in Durnev *et al.* (2004)).

OLS estimation of [3], as was done by Durnev *et al.* (2004), may be inefficient because it assumes that there is no parameter variation across firms.[4] But firm heterogeneity can be interpreted as implying that the OLS estimate of $\hat{\beta}_{1,i}$ is generated by a random process with a mean and firm-specific error. That is, $y_i = \beta_j' X_{i,j} + \varepsilon_i$ should instead be evaluated subject to the

[4] Durnev *et al.* (2004) pooled firm level data to estimate an industry level marginal q. One can use OLS to estimate equation [3] once per firm to obtain a unique set of coefficient estimates for each firm. But this requires that each firm has a long time series data, and that a firm's degree of investment efficiency is invariant within the sample period.

constraint that $\hat{\beta}_j = \beta + \nu_{i,j}$. Because all four coefficients in [3] may reflect firm heterogeneity, all coefficients are treated as random in empirical testing.[5] The random coefficients results were used to form the dependent variables for the second-round testing, explained in Section 3.3.

The random coefficients methodology pools all the data from different firms, yielding more reliable coefficient estimates with greater degrees of freedom.[6] A series of year fixed effects, P_t, are also included to reflect cyclical economic factors that may affect all firms. The empirical specification therefore becomes:

$$\frac{\Delta V_{i,t}}{A_{i,t-1}} = \beta_{0,i} + \beta_{1,i}\frac{\Delta A_{i,t}}{A_{i,t-1}} + \beta_{2,i}\frac{V_{i,t-1}}{A_{i,t-1}} + \beta_{3,i}\frac{D_{i,t-1}}{A_{i,t-1}} + \delta_t P_t + u_{i,t} \qquad [3']$$

such that all the coefficients are estimated as $\hat{\beta}_j = \beta + \nu_{i,j}$ where i indicates firm (1…I), and j denotes coefficient number (0…3). This yields an estimate and variance for each coefficient, $\hat{\beta}_j$, and a series of firm-specific estimates of each coefficient, $\hat{\beta}_{i,j}$. See Greene and Hornstein (2006) for a detailed explanation of this methodology.

3.2 Caveats and Complications

The estimated marginal q (i.e., $\hat{\beta}_{1,i}$) could be biased due to non-systematic and systematic estimation biases.

[5] We use Limdep for all random parameters estimations. We also tested the hypothesis that just some of the coefficients might be random, but likelihood ratio tests confirmed the intuition that all coefficients should be treated as random.

[6] The random coefficients estimation of marginal q has n-4 degrees of freedom when n observations are used to estimate the system of equations. However, when equation [3'] is estimated using OLS, the coefficients are estimated firm-by-firm. It is necessary to have a minimum of six observations per firm (including the lagged values of V and A) to estimate marginal q with at least one degree of freedom.

There are two sources of non-systematic biases. First, we may mis-estimate the change in investment, e.g., due to accounting data errors. Over- (under-) estimating the change in investment should lead to a downward (upward) bias in the marginal *q* estimation. Second, the change in firm value may be related to new information about previous investments but not be related to new investments. These non-systematic biases would cause the firm's marginal *q* to be estimated with noise.

Systematic biases stem from several sources. First, capital expenditures are reported on a quarterly or annual basis. Therefore, it is not possible to estimate a precise marginal *q* that reflects the actual instantaneous change in firm value associated with a firm's unexpected marginal investment. Instead, the marginal *q* estimations are really the ratio of the sum of the value of all unexpected investments made by a firm in a given period divided by the sum of the investments' costs. The systematic bias reflects the use of lumpy, aggregated data, rather than continuous time data. It is not clear whether MNEs or PDEs may be more susceptible to this systematic bias, but it is clear that all of the firm-level estimates of marginal *q* may be biased.[7] However, it is unclear a priori whether this bias is systematically correlated with the marginal q estimate itself.

Another source of systematic bias stems from tax considerations. If a firm invests its earnings in capital assets in lieu of disbursements to shareholders, then the incremental value to investors is $(1-T_{CG})(V_{i,t}-E_{t-1}V_{i,t})$ where T_{CG} captures the capital gains tax that the investor would pay upon selling the shares. For this incremental value, the value of forgone dividends is $(1-T_D)(A_{i,t}-E_{t-1}A_{i,t})$ when T_D is personal income tax rates on dividends. Hence, the correct

[7] Moreover, there may be cyclical factors due to the state of the U.S. or foreign economies or related to the U.S. dollar exchange rate. A series of year fixed effects, P_t, were therefore included in estimating equation [3'] because likelihood ratio tests found that this improved the marginal *q* estimation process.

expression for $\dot{q}_{i,t}$ is $\frac{(1-T_{CG})(V_{i,t}-E_{t-1}V_{i,t})}{(1-T_d)(A_{i,t}-E_{t-1}A_{i,t})}$. Using this definition instead of that in equation [1], and repeating the algebraic rearrangements in 3.1, we obtain equation [4], which is equivalent to equation [12] in Durnev *et al.* (2004) and is analogous to equation [3'] above.

$$\frac{\Delta V_{i,t}}{A_{i,t-1}} = \beta_{0,i} + \dot{q}_{i,t}\frac{1-T_D}{1-T_{CG}}\frac{\Delta A_{i,t}}{A_{i,t-1}} + \beta_{2,i}\frac{V_{i,t-1}}{A_{i,t-1}} + \beta_{3,i}\frac{D_{i,t-1}}{A_{i,t-1}} + \delta_t P_t + u_{i,t} \qquad [4]$$

In other words, the estimated marginal, $\hat{q}_i$, i.e., $\beta_{i,1}$, in eq. 3', is the real marginal q_i times the relevant tax factors, that is:

$$\hat{q}_i = q_i * \left(\frac{1-T_D}{1-T_{CG}}\right) \qquad [5]$$

3.3 Measuring Capital Budgeting Efficiency Based on Marginal *q*

We use the distance between the estimated marginal *q* and its "optimal" value as an indicator for the efficiency in capital budgeting decision. Note that while the optimal value for $q_{i,t}$ is 1.0, the optimal value for the estimated marginal *q*, $\hat{q}_{i,t}$, is not 1.0 because of the biases, as equation [5] illustrates. It is not clear what the '*optimality benchmark*' for the estimated marginal *q* ought to be after taking into consideration all the systematic biases. We therefore use a non-linear technique to estimate

$$(\hat{q}_i - h)^2 = \alpha + \lambda L_i + \tau G_i + \eta C_i + \omega_{SIC} S_{SIC,i} + \varepsilon_i \qquad [6]$$

where $h = [h_{MNE} * INTL] + [h_{PDE} * (1 - INTL)]$, such that $\boldsymbol{h}$ is then the benchmark marginal *q* estimated separately for MNEs and PDEs as INTL is a dummy variable denoting whether a firm

is an MNE. The variables used to measure multinationality, ***M***, are explained in Section 4.2; the location institutional measures, ***L***, are explained in Section 4.3; the corporate governance measures, ***G***, are explained in Section 4.4; and the control variables that might affect the firm's ability to make optimal capital budgeting decisions, ***C***, are explained in Section 4.5; and S_{SIC} are industry fixed effects that capture each firm's primary two-digit SIC industry code. Finally, we assume that the disturbance term is normally distributed with mean zero and constant variance σ^2.

In other words, we use Eq. 6 to identify the relationship between the value-enhancing quality of a firm's capital budgeting decisions and relevant independent variables like corporate governance measures (G), the institutional characteristics of the location of its investments (L), and controls (C). Using weighted non-linear least squares, we estimate the vector of parameters $\boldsymbol{b} = \{h_{MNE}, h_{PDE}, \alpha, \tau, \lambda, \eta, \omega\}$ simultaneously.[8] Because marginal *q* was estimated with varying degrees of precision, it is appropriate to use a heteroscedasticity-consistent estimation technique. We use the White correction in estimation of [6].

After accounting for the factors G, L, and C, the efficiency of a firm's capital budgeting decisions is inversely related to the deviation of the estimated marginal *q* from the benchmark value, ***h.*** Thus, we can use the estimated residuals, $\hat{\varepsilon}_i$, as indicators of the efficiency of firm i's capital budgeting decision. We can partition $\hat{\varepsilon}_i$ by the multinational status of firm i and thus compare $\frac{1}{N}\sum_i |\hat{\varepsilon}_i|$ and $\frac{1}{N}\sum_i \hat{\varepsilon}_i^{\,2}$ for MNEs and PDEs.

3.4 Under- and Over-investment

[8] A complete explanation of this estimation procedure can be found in Appendix A.4 of Durnev et al. (2004).

In addition to examining the residuals of all firms together, we can conduct separate analyses of firms that under- and over-invest; that is, when $(\hat{q}_i - \hat{h})$ is above and below zero, respectively. In these analyses, the sample is split into two sub-samples according to whether $\hat{q}_i \gtrless \hat{h}$; that is, $(\hat{q}_i - \hat{h})^+$ and $(\hat{q}_i - \hat{h})^-$ are used as dependent variables in two separate regressions on under- and over-investing firms, respectively. We can adopt the independent variables in equation [6] but add indicators of various degree of multinationality, M ; that is:

$$\left\{\begin{matrix}\left(\hat{q}_i - \hat{h}\right)^+ \\ \left(\hat{q}_i - \hat{h}\right)^-\end{matrix}\right\} = \alpha + \gamma M_i + \lambda L_i + \tau G_i + \eta C_i + \omega_{SIC} S_{SIC,i} + \varepsilon_i \qquad [7]$$

This step allows us to understand whether MNEs and PDEs differ in the extent to which they under- and over-invest, and may shed further light on the relationship between multinationality and effective capital budgeting decisions. Note that the estimation of equation [4] yielded an estimate and a standard deviation for each coefficient per firm. Since the $\hat{\beta}_{1,i}$ coefficients from the estimation of [4] are used to form the dependent variables $(\hat{q}_i - \hat{h})^+$ and $(\hat{q}_i - \hat{h})^-$, a potential problem of heteroscedasticity arises. To deal with this problem, the Saxonhouse (1976) technique is used to weight all observations by the inverse of the standard error associated with the estimate of marginal *q*. Employing this technique both improves the fit of the model and reduces the standard error associated with each coefficient estimate.

When performing separate analyses of under- and over-investing firms based on the estimated marginal *q*'s, it is appropriate to use a weighted truncated regression model. We use the truncated normal distribution, which has the properties that if the truncation is from below [above] (i.e., including only firms with estimated marginal *q*s above [below] $\hat{h}$), then the mean

of the truncated variable is higher [lower] than the mean of the full sample, and the variance of the truncated sample is smaller than the variance of the full sample. Details of the truncated regression model are presented in Greene (2003). The key results used herein are for the conditional mean and the marginal effects. Because the truncated variance is between 0 and 1, the marginal effect of each variable is smaller than that of the corresponding coefficient.

4 DATA AND VARIABLES

In this section, we report our data sample and sources, as well as variable construction; we provide the details in the appendix.

4.1 Data Sample and Sources

The key ingredient in our empirical work is a set of reliable estimates for marginal q, which first involves reliable estimates of a firm's market value and assets. We estimate the former as the sum of equity and debt value and the latter using accounting data. We construct these estimates following Durnev *et al.* (2004); the procedures are reported in the appendix. It is important that the market value data reflect true firm value in an unbiased and informed manner and that the firm-level accounting data are reliable. We therefore focus on US public firms because the US capital markets are likely among the most efficient globally and these firms' accounting data are reliably audited, the Enron problem not withstanding. Following the common practice, we include only manufacturing firms (i.e., SIC codes 2000-3999) to ascertain that our accounting data are comparable.

Our data are from the CRSP/Compustat Merged Database and the CRSP Daily Stocks Database.[9] To ensure that shareholders are well-informed about the firm, that the firm's financial reports are stable, and that extreme noise is not in our data, we impose the following sample filters: (i) we exclude firm-year observations in which the firm's value or assets changed by more than 300% in absolute value; (ii) we use only those firms for which five or more consecutive years of data are available; and, (iii) we exclude firms with annual sales of at less than $25 millions and/or average Tobin's greater than 5.0. Re-running our tests without these filter rules does not qualitatively change our results. While we required all firms to have a minimum of five observations, the sample average is 7.2 observations (out of a maximum of 9).

We collect information on a firm's multinational status and location of its subsidiaries, both within the U.S. and abroad, from the Directory of Corporate Affiliations (DCA).[10] Many of the firms in the Compustat dataset cannot be found in the DCA dataset and are therefore removed from the dataset in order to have reliable information each firm's multinationality. [11]

[9] The CRSP data are reported on a calendar year basis, and the Compustat data are reported on a fiscal year basis. All data are converted to calendar years. If the firm's fiscal year ends in January-May (June-December), then the data used cover fiscal years 1991-1999 (1992-2000). We choose to use only the annual data because the quarterly data from Compustat are not audited and are less comprehensive.

[10] The DCA is an independent survey that contacts every firm included in Compustat. Should these firms fail to report voluntarily the data requested by the DCA, the DCA is persistent in contacting and re-contacting these firms until DCA receives a response.

[11] We gratefully appreciate Wilbur Chung's generosity in sharing a matching algorithm for use in matching the Compustat and DCA data. Our issue is how to identify a firm's multinational presences. Note first that we cannot use the Compustat data on firms' geographical segments. This is because the FASB grants firms considerable leeway to report geographical segments as they see fit. Second, we cannot use the Compustat data on firms' total and foreign pre-tax income to identify whether a firm has foreign operations. The foreign pre-tax income includes earnings from both exports and overseas investment. Therefore, we use the information from DCA. It is unclear a priori how to classify the multinationality of firms that appear in Compustat but not in DCA. Morck and Yeung (1991) treated these firms as PDEs on the theory that larger firms would be more likely to respond to the survey, and MNEs are generally larger than PDEs. Before employing this rule, we examined the annual reports for a subset of firms that appear in Compustat but not in DCA. A significant number of these firms were found to be MNEs for some or all of the years covered in this study. This suggests that it would be inappropriate to classify as PDEs all firms that are not in both datasets. We further checked the annual reports for a number of firms that do appear in both datasets. Among this latter group of firms, all firms that reported themselves to be PDEs were indeed PDEs. However, those firms that reported themselves to be MNEs occasionally under-reported their true number of foreign

The NBER business cycle dating committee has determined that the last business cycle ran from April 1991 to February 2001. We therefore use data for 1992-2000 in order to examine the most recent business cycle.[12] The resultant dataset contains 332 manufacturing firms in 18 two-digit SIC industry codes.

4.2 Multinationality Variables and Location Measures

Since our focus is on the relationship between multinationality and the efficiency in capital budgeting, we create two types of variables to capture a firm's degree of multinationality. The first type simply indicates the extent to which a firm is multinational, on the grounds that multinational firms with operations all over the world are different than those with operations only in a few selected countries. We create dummy variables to indicate that a firm is present in one to five foreign countries (CTY1), in five to ten foreign countries (CTY5), and in ten or more foreign countries (CTY10). The dataset contains 109 PDEs and 223 MNEs.[13] The average multinational in the dataset was in 8.6 countries (with a standard deviation of 9.5).

The second type indicates for a multinational firm the characteristics of the host country's capital market development and legal system. We use information on the location of a MNE's subsidiaries to create firm-level indicator variables that indicate whether a particular firm is present in countries with high or low values of a particular characteristic.[14] The creation of these indicators is motivated in Section 2.4. An extended network of subsidiaries raises a

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subsidiaries to DCA. Consequently, the international dummy variable used in empirical analysis (INTL) appears to be accurate but the country count variables may be downward biased estimates of the true values.

[12] The empirical results reported herein are robust to the exclusion of all data for the year 2000.

[13] It has been suggested that U.S. firms whose only international investments are in Canada and/or Mexico should be classified as PDEs because the creation of NAFTA has blurred these international boundaries for practical business purposes. While this paper classifies firms as MNEs even if their only investments are in Canada and/or Mexico, the empirical results reported herein are robust to classifying U.S. firms whose only non-U.S. investments are in Canada and/or Mexico as PDEs.

[14] The empirical results reported herein are robust to defining high/low as relative to the group's mean or median values for each measure.

multinational's ability to overcome location specific liquidity constraints. This would be especially true if the multinational is present in locations with highly developed capital markets. Also, a presence in locations with high protection for investor rights may subject a multinational to more investor monitoring. At the same time, an extended network of subsidiaries gives multinationals bargaining power against special interest groups. This would particularly be the case if a U.S. MNE is present in countries whose development characteristics are very different than the U.S. These considerations motivate the following variables.

Financial Markets

As a proxy for a host country's ability to monitor MNEs, we use a measure of the country's capital market development: the average ratio of private credit by deposit money banks to GDP from 1992 to 1997 (PRIV), as collected by Levine (2001).[15] Nearly all MNEs are present in countries with high private credit (96.8%), and 69.4% of MNEs are present in countries with low private credit. Just 3.2% of MNEs are present only in countries with low private credit, and 30.6% of MNEs are present only in countries with high private credit.[16]

Legal Environment

The quality of the host country's legal system may affect a firm's creditors' ability to exercise their rights. Since the firms examined herein are all U.S.-headquartered and U.S.-incorporated, these firms usually raise equity in the U.S. but raise debt around the world.

[15] The level of a host country's financial development is measured in two additional ways for use in robustness tests not reported herein. First, we use the average ratio of stock market capitalization held by small shareholders to gross domestic product in the period 1996-2000 (MKT; La Porta, Lopez-de-Silanes, and Shleifer, 2006). In addition, we use the logarithm of the ratio of the average number of domestic firms listed in a given country's financial exchanges to its population (in millions) in the period 1996-2000 (DOM; La Porta, Lopez-de-Silanes, and Shleifer, 2006).

[16] Since most firms are present in a range of countries that encompasses both weak and strong financial and legal systems, we use the data on whether a firm has any presence – not exclusive presence – in a country with weak or strong systems.

Accordingly, we use an index of creditors' rights (CRED), as developed by LLSV (1998), as a proxy for the strength of the legal system. The construction of this index is described in LLSV (1998); it ranges from zero to four with higher values indicating greater protection of creditors' rights.[17]

Almost all MNEs (96.8%) have a presence in countries with low protection of creditors' rights, and 82.9% of MNEs are present in countries with high protection of creditors' rights. 17.1% of MNEs are only present in countries with low protection of creditors' rights, and 3.2% of MNEs are only present in countries with high protection of creditors' rights.

4.3 Corporate Governance

Three measures of corporate governance are used in the regression analyses to explain the efficiency of capital budgeting decisions: managerial entrenchment, insider ownership, and institutional investment.

Board of Directors

One frequently used corporate governance measure is whether a company has staggered boards. CEOs' entrenchment is allegedly more likely in firms with a staggered board. The Investor Responsibility Research Center (IRRC) has information on corporate board composition for 170 firms in the dataset for 1997-2000. For firms not covered by IRRC, we retrieve information from corporate proxy statements and annual reports. 61% of firms examined herein

[17] In robustness tests not reported herein, we also use the International Country Risk Guide's (ICRG) assessment of the law and order environment as a measure of the legal system's transparency and efficiency. We use the average value of ICRG's rule of law (ROL) measure for each month for the period examined. These data are recorded on a scale of zero to six, at half-point intervals, such that a lower score indicates a weaker legal environment. (LLSV used the average value of the April and October ratings between 1982 and 1995, and rescaled the index to range from zero to ten.) Alternatively, an MNE may be more concerned with the efficiency of a country's judicial system. We therefore use Business International Corp.'s assessment of the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms". This efficiency measure (EFF), as developed by LLSV, is the average value from 1980-1983 and is scaled from zero to ten so that lower values indicate weaker efficiency.

had staggered boards (STAGBD) where our dummy variable takes the value 1 if a firm has a staggered board and 0 otherwise.

Another popular entrenchment measure is the Gompers index (Gompers *et al.* (2003)), which is the sum of twenty-four indicators of restrictions on investor protection. Bebchuk *et al.* (2004) concluded that the observed findings regarding the relationship between the Gompers index and firm performance can be entirely explained by six variables that reflect managerial entrenchment, which would be inversely related to investor ability to exercise their control rights. We therefore use this sub-index (herein, the Bebchuk index).[18]

Corporate capital budgeting may be less effective when managerial entrenchment is stronger. We use the presence of a staggered board and the Bebchuk index as separate measures of managerial entrenchment. We note, however, that we have more firms in our sample when we use the staggered board variable. All results reported herein are robust to the use of the Gompers index instead.

Insider and Institutional Ownership

Data on insider and institutional ownership were obtained from Thomson Financial Network (TFN). When TFN had no data on insider or institutional ownership, we set the variable to be zero. Twenty-seven annual observations reported institutional ownership exceeding 100%, and an additional six annual observations reported insider plus institutional ownership exceeding 100%; these thirty-three annual observations were excluded. Insider (INSIDER) and institutional (INSTIT) ownership data were therefore available for 327 firms in

[18] The Gompers index ranges in value from 1 to 24, a lower number indicates higher protection for shareholder rights. The IRRC provided the required data for the construction of the Gompers index for 172 firms for 1993, 1995, and 1998. The average firm in the dataset for which the Gompers index could be constructed had a Gompers index of 8.6 (median of 8.4), and the range was 2 to 15 (versus 2 to 18 in Gompers et al. (2003)). It is not possible to create the Gompers index for the 160 firms in the dataset that are not tracked by the IRRC.

the dataset (out of 332). Among these firms, insiders owned an average of 2.0% of outstanding shares (median of 0.2%), and institutional investors owned an average of 35.2% of outstanding shares (median of 37.9%). Effective capital budgeting decisions should be associated with higher institutional and insider investments.

4.5 Control Variables

We incorporate five control variables to mitigate heteroscedasticity due to missing variables and also to avoid making spurious inferences. These controls are standard and have been used in Durnev *et al.* (2004), Villalonga (2004), and others.

First, we control for firm size. Larger firms are more likely to be multinational. In addition, larger firms have higher sales, and are therefore likely to have greater internal financing capabilities. They may also have already explored most of the profitable investment opportunities and are therefore more likely to over-invest (Jensen, 1986). Firm size is measured as the log of average property, plant, and equipment (PPE) over the time period, to reflect the firm's investment decisions.

Second, we control for corporate diversification. Segment diversification and geographic diversification are often correlated. Diversified firms are more likely to have stable earnings (Lewellen, 1971), and are thus more likely to have access to external financing (Durnev, Morck, and Yeung, 2001). More diversified firms are more likely cash rich and have internal capital markets of their own (Stein, 1997). Yet, more diversified firms are more complex and present greater agency and information asymmetry problems to managers and investors. Firm diversification is measured as the average number of different two-digit segments that are reported in Compustat Industry Segment Data (SSIC2).

Third, the argument in Jensen 1986 implies that firms with high cash flow may be more prone to over-invest, while firms with low cash flow may conserve resources for future usage (Himmelberg, Hubbard and Love, 2002). Cash flow, which is measured as the ratio of income and depreciation to tangible assets, is therefore included as a control variable.

Fourth, firms that rely more heavily on intangible assets may have more information asymmetry between managers and investors and thus face more severe liquidity constraints. The ratio of research and development to tangible assets (RD) is used to proxy for this aspect of firm-specific information asymmetry that would affect capital budgeting.

Fifth, highly leveraged firms may face greater financing constraints and yet be subject to greater corporate governance oversight and therefore make more firm-value enhancing investments (Jensen, 1986).[19] Leverage, the ratio of long-term debt to total assets, is therefore used as a control variable (LEV).

In addition, industry-specific volatility may cause marginal q to be estimated with greater noise in some industries. This should be addressed through the use of random parameters estimation of marginal q. Moreover, industry-specific characteristics may cause firms in certain industries systematically to make more or less effective capital budgeting decisions. Two-digit industry fixed effects, S_{SIC}, are therefore included.

In robustness tests, not reported herein, we use firm sales (in lieu of PPE), the ratio of advertising to tangible assets (in lieu of RD), liquidity (in lieu of LEV), and prior diversification at the three-digit segment level (in lieu of SSIC2). All results reported herein are robust to the use of these control variables instead.

[19] On the other hand, highly leveraged firms may have less leeway to invest because they might be operating under bankruptcy protection (Myers, 1977). However, the dataset used in this paper does not include any firm-years in which a firm was operating under Chapter 11 of the bankruptcy code, so this theoretical possibility does not pertain.

4.6 Summary

Table 1 lists the definition and univariate statistics of the above variables and also comparisons between multinational and purely domestic firms. We observe that on average all firms appear to over-invest relative to the theoretical benchmark marginal q, 1.0. The raw data indicate that MNEs over-invest less than do their domestic counterparts, and that this difference is highly statistically significant.

MNEs and PDEs differ strongly in terms of most measures of corporate governance. MNEs have significantly higher Bebchuk indices; have boards of directors that are more likely to be staggered; have lower insider ownership (but this is not statistically significant); and have higher institutional ownership. MNEs and PDEs are strikingly different across the board when we examine the controls, these differences are well known. Relative to PDEs, the MNEs are larger, more diversified firms with higher investment in intangible assets. The MNEs have lower leverage but higher cash flow (although this is not significantly different).

5. RESULTS

In this section, we report our results on whether MNEs and PDEs are systematically different in the value-enhancing quality of their capital budgeting decisions, as we described in Sections 3.3 and 3.4. We also report results on how the characteristics of the firms' corporate governance structures and the subsidiaries' host countries' capital market development and creditors' rights affect the value enhancing quality of MNEs' capital budgeting decisions. In addition, we also further our examination into how multinationality and other firm characteristics are related to the over and under investing.

5.1 Do MNEs make more efficient capital budgeting decisions than PDEs?

Our regression analysis is as specified in equation [6]. We regress the deviation of the estimated firm level marginal *q*s from the MNE or PDE benchmark value for optimality. We use weighted non-linear least squares to estimate the MNE and PDE benchmark values, and then use the Saxonhouse correction to deal with heteroscedasticity in the second stage regressions. We allow the MNEs and PDEs to each have a benchmark for optimality because the marginal *q* estimates could be systematically biased away from 1.0, e.g., due to taxes, and the degree of such bias may be different for MNEs and PDEs. The independent variables include a dummy indicating the host countries' banking development or a dummy capturing the degree of creditors rights, corporate governance measures (staggered board or Bebchuk index, insider ownership, and institutional ownership), and the control variables.

These results are reported in Table 2. The first obvious result is that the estimated benchmarks for the optimal marginal *q*, $\hat{h}_{MNE}$ and $\hat{h}_{PDE}$, really do not appear to be different from one another. Still, we use these "best" estimates of the optimal marginal *q* in subsequent analyses.

As explained in section 3.3, we can use the estimated residuals from eq. [6], $|\hat{\varepsilon}_i|$ and $\hat{\varepsilon}_i^2$, as measures of the quality of MNEs' and PDEs' capital budgeting decisions. To examine the difference among the two groups of firms, we partition the sample into MNEs and PDEs and compare their respective average estimated residual, $|\hat{\varepsilon}_i|$, as well as their respective average estimated squared residual, $\hat{\varepsilon}_i^2$. These comparisons are reported at the bottom of Table 2. The results indicate that MNEs have statistically significantly smaller average absolute residuals, $|\hat{\varepsilon}_i|$, and average squared residuals, $\hat{\varepsilon}_i^2$, than do PDEs. These results suggest that MNEs make more value enhancing capital budgeting decisions than do PDEs, after controlling for corporate

governance, the financial and legal strength of the foreign countries in which they are present, and the usual including size, intangibles, leverage, cashflow, and diversification.

5.2 Impact of Corporate Governance and Host Country Characteristics

The regressions reported in Table 2 also shed light on the impact of corporate governance measures on the efficiency of capital budgeting decisions. We observe that stronger capital budgeting decisions are associated with managerial entrenchment, as captured by the presence of a staggered board or a high Bebchuk index. However, we find no relationship between effective capital budgeting and insider ownership. Moreover, we find that percent institutional ownership is associated with less value-enhancing capital budgeting decisions.

As explained in Section 2.3, the subsidiaries' host countries' capital market development and creditors' rights could affect the value-enhancing quality of MNEs' capital budgeting decisions. As MNE's often raise debt world-wide, local financiers' monitoring could press MNEs to make more firm value-enhancing capital budgeting decisions. Also, MNEs are more footloose than are purely domestic firms. They may be more able than are PDEs to resist pressures from special interest groups against firm value maximization (e.g., labor unions and politicians). The results in Table 2 show that these conjectures are not supported.

Finally, we note that our control variables are all insignificant except investment in intangible assets (research and development), which has statistically significant positive regression coefficients. Thus, firms with high level of intangibles appear to make less value enhancing capital budgeting decisions.

5.3 Under- and Over-Investing Firms

We believe that we can garner more information by conducting separate examinations of the firms that under- and over- invest (i.e., those firms with $(\hat{q}_i - \hat{h})$ greater than and less than zero, respectively). The empirical specification uses weighted truncated regressions as depicted in eq. [7] to explain $(\hat{q}_i - \hat{h})^+$ and $(\hat{q}_i - \hat{h})^-$ where $\hat{h}$ is $\hat{h}_{MNE}$ or $\hat{h}_{PDE}$ depending on the status of firm *i*. The independent variables include the location presence indicators, corporate governance variables, and control variables (as in Table 2) plus dummy variables that identify the extent of a firm's multinational network of affiliates (e.g., presence in only 1 to 5, 6 to 10, or more than 10 countries). These regressions are weighted using the standard deviation of the estimated marginal *q* (ref. equation [4]) because of expected heteroscedasticity. The results, reported in Tables 3A and 3B, reveal that there are behavioral asymmetries between the firms that under- and over-invest.

The most important observation is that, after controlling for a firm's corporate governance, other characteristics, and the institutional characteristics of where it invests, MNEs consistently make more effective capital budgeting decisions regardless of whether they under- or over-invest. Thus we conclude that the MNE advantage does not result from mitigating liquidity constraints.

Alternatively, we might conjecture that an MNE advantage could stem from extra monitoring by agents in the host countries or greater bargaining with parties in the host countries. However, again, the estimated coefficients for the dummy variables indicating a company's presence in countries with high or low capital market or legal system development do not support these conjectures. Specifically, we observe either that these coefficients are statistically insignificant or have the incorrect sign (models 1, 2, 3, and 5). Thus we conclude that the

observed MNE advantage in capital budgeting does not stem from better liquidity, monitoring or bargaining capabilities.

Superior corporate governance could mitigate agency and informational asymmetry problems, and thus be associated with more effective capital budgeting. Our results here are consistent with those reported in the previous section. However, the Bebchuk index seems to be a better indicator of managerial entrenchment than is the staggered board in the current more detailed investigation. Our results show that in both the under- and over-investment subgroups there is no relationship between effective capital budgeting and the presence of a staggered board of directors. However, in both groups we observe that stronger capital budgeting decisions are associated with managerial entrenchment when we use the Bebchuk index (models 2, 4, and 8).

Second, we find that insider ownership mitigates over-investment (models 3, 4, 7 and 8) but is also weakly associated with *more extensive* under-investment (model 2). When insider ownership is high, insiders may want to curtail further corporate investment. One possible motive is to minimize personal risk exposure to the firm. Another possible motive is control: if the firm continues to expand, it will need to raise more equity, thus diluting insider's control.

Finally, we look at institutional investment. However, we find that less effective capital budgeting is associated with institutional investment whether the firm under-invests (models 2 and 6) or over-invests (models 4 and 8). Given that our larger dataset (used in models 1, 3, 5, and 7) did not show any relationship between capital budgeting and institutional investment, we are unclear whether to place much stock in this result. We therefore conclude that our measure of institutional investment may be insufficiently refined.

6. CONCLUSION

In this paper we examined the relationship between the quality of a firm's capital budgeting and multinationality. This is an important topic because of the role that MNEs play in allocating capital globally. By their sheer size and presence in multiple markets, MNEs likely face more liquidity constraints than do purely domestic firms. Yet, compared to purely domestic firms, MNEs could have greater agency and information asymmetry problems. At the same time, they may be subject to close scrutiny by institutional investors and investors in multiple capital markets. Finally, MNEs are more "footloose" than are purely domestic firms, and are therefore more able to resist pressures from special interest groups in pursuing firm value maximization. In our empirical investigation, we therefore explicitly control for corporate governance measures such as managerial entrenchment, insider ownership, and institutional investment. We also explicitly link the quality of capital budgeting decisions with the capital market development and creditor protection system of locations in which a multinational invests.

We find that more effective capital budgeting decisions are associated with managerial entrenchment as measured using the Bebchuk index but less so with indicators of staggered boards. Insider ownership generally is linked to restraints on investment. Institutional ownership is not related to more effective capital budgeting decisions.

After controlling for these corporate governance factors, we still find that MNEs make more value enhancing capital budgeting decisions than do purely domestic firms. Moreover, their better capital budgeting decisions are not due to just their conceivably lower liquidity constraints. Relative to purely domestic firms, MNEs exhibit not just less under-investment, but also less over-investment.

The puzzle is what may explain the greater efficacy of multinationals' capital budgeting decisions. We could not find support for the idea that the advantage stems from the possibility that multinationals are monitored by agents in countries with more developed capital markets and with high creditor rights. Nor can we find any support for the idea that multinationals are more footloose and better able to hold special interest groups at bay, thus enabling the corporation to better pursue firm value maximization.

Our results thus suggest that multinationals may be intrinsically better managed firms. The implication is that they are good conduits for directing international real investment flows. Still, future research may allow us and/or others to explore further whether multinationals are intrinsically better managed firms and whether the implication is justified.

APPENDICES

A. Construction of the Dataset

A.1 Procedure for Estimating Marginal Tobin's *q*

Marginal q is the unexpected change in firm i's value during period t, $V_{i,t,}$ relative to the unexpected change in the firm's assets during period t, $A_{i,t}$. This is calculated as:

$$\dot{q}_i = \frac{V_{i,t} - E_{t-1}V_{i,t}}{A_{i,t} - E_{t-1}A_{i,t}} = \frac{V_{i,t} - V_{i,t-1}\left(1 + \hat{r}_{i,t} - \hat{d}_{i,t}\right)}{A_{i,t} - A_{i,t-1}\left(1 + \hat{g}_{i,t} - \hat{\delta}_{i,t}\right)}, \qquad \text{[A1]}$$

where $\hat{r}_{i,t}$ is the expected return from owning the firm and disbursements to investors, $\hat{d}_{i,t}$ is the expected level of disbursements from the firm (dividends, share repurchases, and interest expenses), $\hat{g}_{i,t}$ is the rate of expected expenditures on capital goods, and $\hat{\delta}_{j,t}$ is the expected rate of depreciation of the firm's assets.

The terms in equation [A1] are cross-multiplied, rearranged and simplified as:

$$\frac{V_{i,t} - V_{i,t-1}}{A_{i,t-1}} = -\dot{q}_i\left(g_i - \delta_i\right) + \dot{q}_i \frac{A_{i,t} - A_{i,t-1}}{A_{i,t-1}} + r_i \frac{V_{i,t-1}}{A_{i,t-1}} - \xi_i \frac{div_{i,t-1}}{A_{i,t-1}} + u_{i,t}, \qquad \text{[A2]}$$

where $div_{i,t-1} \equiv d_{i,t}V_{i,t-1}$, representing the firm's cash disbursements. In equation [A2] the time subscripts have been dropped on the terms g_i and δ_i to indicate that they are averaged over the time period. The coefficient of lagged average Tobin's q, r_i, can be interpreted as an estimate of the firm's weighted average cost of capital. Similarly, the coefficient on lagged disbursements, ξ_i, can be interpreted as a tax correction factor.

To estimate $V_{i,t}$ and $A_{i,t}$, the terms are rewritten as:

$$V_{i,t} = P_t(CS_{i,t} + PS_{i,t} + LTD_{i,t} + SD_{i,t} - STA_{i,t}) \qquad \text{[A3]}$$

$$A_{i,t} \equiv K_{i,t} + INV_{i,t} + P_t STA_{i,t}, \qquad \text{[A4]}$$

where

$CS_{i,t}$ = the market value of the outstanding common shares.

$PS_{i,t}$ = the estimated market value of preferred shares (the preferred dividends paid over the Moody's Baa preferred dividend yield).

$LTD_{i,t}$ = estimated market value of long-term debt.

$SD_{i,t}$ = book value of short-term debt.

$STA_{i,t}$ = book value of short-term assets.

P_t = inflation adjustment using the GDP deflator.

$K_{i,t}$ = estimated market value of property, plant and equipment.

INV = estimated market value of inventories.

$STA_{i,t}$ is included in the estimation of firm assets, $A_{i,t}$, in order to reflect the possibility of corporate spin-offs or divestitures.

In robustness tests, $V_{i,t}$ and $A_{i,t}$ are rewritten as:

$$V_{i,t} = P_t(CS_{i,t} + PS_{i,t}) \qquad \text{[A3']}$$

and

$$A_{i,t} \equiv K_{i,t} + INV_{i,t} + P_t STA_{i,t} + RD_{i,t} + ADV_{i,t}, \qquad \text{[A4']}$$

where

$RD_{i,t}$ = book value of research and development expenditure.

$ADV_{i,t}$ = book value of advertising expenditure.

[A3'] is used to estimate firm value based only on firm equity, while [A4'] includes intangible assets in estimation of firm assets.

The market value of property, plant and equipment (PP&E) is calculated using a recursive algorithm. This is necessary because historical cost accounting does not adjust

properly for inflation. All PP&E figures are converted to 1982 dollars.[20] We assume straight-line depreciation of 10% per annum. PP&E in year $t+1$ is PP&E from year t less 10% depreciation plus current capital spending, denoted $\Delta X_{i,t+1}$, which is deflated to 1982 dollars. In converting the data to 1982 dollars we use π_t, the fractional change in the seasonally adjusted producer price index (PPI) for finished goods published by the U.S. Department of Labor, Bureau of Labor Statistics.[21] More generally, we use the recursive equation:

$$K_{i,t+1} = (1-\delta)K_{i,t} + \frac{\Delta X_{i,t+1}}{\prod_{\tau=0}^{t+1}(1+\pi_\tau)}, \qquad \text{[A5]}$$

When fewer than ten years of historical observations are available per firm, we begin the calculation with the first available year of data. We exclude all firms for which we are unable to obtain at least five historical observations. This procedure is necessary because historical cost accounting can cause firm valuations of PP&E to be inaccurate if simple deflators are used to adjust for inflation.

When the firm reports inventory using FIFO accounting, the market value of inventory is the same as book value. However, when a firm uses LIFO accounting, Compustat reports a LIFO adjustment, which can be added to inventory to derive the market value of inventory.

We then estimate

$$\frac{\Delta V_{i,t}}{A_{i,t-1}} = \beta_{i,0} + \beta_{i,1}\frac{\Delta A_{i,t}}{A_{i,t-1}} + \beta_{i,2}\frac{V_{i,t-1}}{A_{i,t-1}} + \beta_{i,3}\frac{D_{i,t-1}}{A_{i,t-1}} + u_{i,t} \qquad \text{[A6]}$$

such that $q_i \approx \hat{\beta}_{i,1}$ for each firm i. To mitigate heteroscedasticity problems, all variables in equation [A6] have been scaled by the lagged assets of the firm, $A_{i,t-1}$. All of the asset variables

[20] If the first observation for a firm is a different year we use that as the firm's base year instead.
[21] These data are available online at http://research.stlouisfed.org/fred/data/ppi/ppifgs.

in [A6] are already deflated to 1982 dollars. To ensure consistency in estimation, all other variables are also deflated to 1982 dollars.

Six versions of [A6] are estimated using each of the definitions of $V_{i,t}$ and $A_{i,t}$, and the empirical results reported herein are qualitatively similar to those obtained with the alternate specifications of $V_{i,t}$ and $A_{i,t}$.

A.2 Procedure for Constructing the Dataset

We use data from the CRSP/Compustat Merged Database, CRSP Daily Stocks Database (CRSP), and the Directory of Corporate Affiliations (DCA) for 1992-2000. We discard duplicate entries for preferred stock, class B stock, and the like by discarding entries whose CRSP CUSIP issue number begins with numbers other than 10 or 11. We retain only those firms that are both U.S.-headquartered and U.S.-incorporated.

We retain only manufacturing firms (i.e., SIC codes 2000-3999). We include only those firms that have annual sales of at least US$25 mn in each year in our sample. Moreover, we include only those firms that report all the variables we need for each year in our sample. When Compustat reports a value as 'insignificant' we set it to zero. To ensure that the equity market variables ($CS_{i,t}$) are representative, all firms whose stock was traded on fewer than 60 days per year are excluded from the dataset.[22] Firms are included in the dataset if and only if they were included in the DCA for at least five consecutive years in the period 1993-1999. We also exclude firms with an average estimated Tobin's q greater than 5.0 over the period 1992-1999.[23]

The variables that comprise a firm's value in equation [A3] are calculated as follows:

$CS_{i,t}$ is the market value of common shares outstanding (CRSP's SHROUT) multiplied by the end of fiscal year price (CRSP's PRC).

[22] The results are robust to higher minimum thresholds.
[23] The results are robust to dropping this rule.

$PS_{i,t}$ is the market value of preferred shares outstanding (Data19) over the Moody's Baa preferred dividend yield. The Moody's Baa preferred dividend yield is available online at http://research.stlouisfed.org/fred/data/irates/baa.

$LTD_{i,t}$ is total long-term debt (Data9).

$SD_{i,t}$ is debt in current liabilities (Data34), the total amount of short-term notes and the current portion of long-term debt that is due in one year, less the total amount of short-term notes (Data206).

$STA_{i,t}$ is total current assets (Data4).

P_t is the inflation adjustment using the GDP deflator, which is available online http://research.stlouisfed.org/fred/data/ppi/ppifgs.

$K_{i,t}$ is the market value of the firm's PP&E, which is calculated using current and historical data on capital spending (Data7).

INV is calculated using total inventory (Data3) and LIFO reserve (Data240). When a firm uses FIFO accounting, inventory is Data3. However, when a firm uses LIFO accounting, inventory is Data3 + Data240.

d is total cash disbursements, which are estimated as the sum of cash dividends on common and preferred stock (Data21 and Data19), purchases of common and preferred stock (Data115),[24] and interest expense (Data15).

$G_{i,t}$ is goodwill (Data204).

$RD_{i,t}$ is the ratio of research and development (Data45) to tangible assets (Data7 plus inventory).

$ADV_{i,t}$ is the ratio of advertising (Data46) to tangible assets (Data 7 plus inventory).

A.3 Control Variables

[24] This is to capture share repurchases.

Firm size is measured in two dimensions – log of average sales and log of average PP&E. Sales are Data12 in Compustat and the calculation of PP&E is described in Appendix A.1.

Firm-specific volatility is captured using three measures: the ratio of research and development expenditure to tangible assets, the ratio of advertising to tangible assets, and average Tobin's q. The latter two measures are used in robustness tests that are not reported herein. Research and development is Data45 in Compustat, and advertising expenditure is Data46 in Compustat. Tangible assets are the sum of Compustat's Data7 and inventory using the calculations outlined in Appendix A.1. Average Tobin's q is the ratio of firm value to firm assets using the formulas [A3] and [A4] and operationalized as described in Appendix A.1.

Financing constraints are tested in two methods. Leverage is the ratio of long-term debt (Compustat's Data9) to tangible assets. Alternatively, liquidity is the ratio of average current assets (Compustat's Data4) to average PP&E. Liquidity is used in robustness tests that are not reported.

Prior corporate diversification is measured as the total number of 2-digit SIC segments in which the firm operates. In robustness tests the total number of 3-digit SIC segments in which the firm operates is also used.

Cash flow is measured as the ratio of income (Compustat's Data18) and depreciation (Compustat's Data14) to tangible assets.

Finally, 2-digit industry fixed effects are included.

A.4 Corporate Governance Variables

Three measures of corporate governance are used in the regression analyses. First, the Investor Responsibility Research Center (IRRC) provided data on firm-level governance provisions for 172 firms for 1993, 1995, and 1998. The Bebchuk index was constructed

following the Gompers et al. (2003) and Bebchuk et al. (2004) methodologies. We use the average value of this index for the firm over the period.

Second, the percentage of board directors who are independent (IND) is measured as the average ratio of independent directors to board size over the period. Board size and composition data were obtained from IRRC when possible, and firm proxy statements and annual reports otherwise.

Finally, data on insider and institutional ownership was extracted from Thomson Financial Network. If Thomson had no data on insider or institutional ownership, the variable value was assumed to be zero. Twenty-seven observations had reported institutional ownership exceeding 100%, and an additional six observations reported insider plus institutional ownership exceeding 100%. These thirty-three observations were excluded. As a result insider and institutional ownership data were available for 327 firms in the dataset. Insider ownership (INSIDER) is the average ratio of the sum of all shares owned by the top management of the firm (i.e., CEO, CFO, COO, and CTO) to all shares outstanding over the period. Institutional ownership (INSTIT) is the average ratio of the sum of all shares owned by institutional investors to all shares outstanding over the period.

Table 1: Univariate statistics

*** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level.

		All Firms					MNEs					PDEs					T-test of the means
Variable	**Definition**	**Mean (S.D.)**	**Median**	**Min**	**Max**	**Number of Obs**	**Mean (S.D.)**	**Median**	**Min**	**Max**	**Number of Obs**	**Mean (S.D.)**	**Median**	**Min**	**Max**	**Number of Obs**	**MNE vs. PDE**
Marginal *q*																	
Q_RCM	Random coefficient estimate of marginal *q*	0.765 (0.422)	0.724	-0.299	2.771	332	0.796 (0.398)	0.762	-0.243	2.721	223	0.702 (0.463)	0.686	-0.299	2.771	109	1.821**
Multinationality																	
INTL	Average of annual dummy variable for international	0.622 (0.461)	1.000	0.000	1.000	332	0.926 (0.183)	1.000	0.200	1.000	223						
CTY	Average number of countries in which the firm operates (in addition to the U.S.)	5.791 (8.809)	2.000	0.000	56.286	332	8.621 (9.549)	4.571	0.200	56.286	223						
Host Country Characteristics																	
PRIV1	Average of annual dummy for corporate presence in a country with a low ratio of private credit by deposit money banks to GDP						0.694 (0.462)	1.000	0.000	1.000	222						
PRIV2	Average of annual dummy for corporate presence in a country with a high ratio of private credit by deposit money banks to GDP						0.968 (0.175)	1.000	0.000	1.000	222						
CRED1	Average of annual dummy for corporate presence in a country with a low value of creditors' rights						0.968 (0.175)	1.000	0.000	1.000	222						
CRED2	Average of annual dummy for corporate presence in a country with a high value of creditors' rights						0.829 (0.378)	1.000	0.000	1.000	222						
Corporate Governance																	
STAGBD	Average of annual dummy for staggered board of directors	0.606 (0.483)	1.000	0.000	1.000	330	0.648 (0.472)	1.000	0.000	1.000	223	0.517 (0.496)	1.000	0.000	1.000	107	2.281**
BEBCHUK	Average number of corporate governance provisions in Bebchuk index of managerial entrenchment	1.799 (1.015)	2.000	0.000	4.000	172	1.870 (0.953)	2.000	0.000	4.000	137	1.524 (1.205)	1.500	0.000	4.000	35	1.578*
INSIDER	Average percent of total firm shares outstanding owned by insiders	0.020 (0.053)	0.002	0.000	0.366	327	0.019 (0.050)	0.002	0.000	0.299	220	0.022 (0.060)	0.000	0.000	0.366	107	-0.532
INSTIT	Average percent of total firm shares outstanding owned by institutions	0.349 (0.312)	0.374	0.000	0.940	327	0.412 (0.317)	0.477	0.000	0.940	220	0.221 (0.260)	0.053	0.000	0.879	107	5.771***
Control Variables																	
PPE	Log average property, plant and equipment (PP&E), US$mn	5.407 (1.811)	5.152	1.076	11.122	332	5.836 (1.833)	5.718	1.076	11.122	223	4.530 (1.410)	4.402	1.699	8.471	109	7.156***
RD	Average research and development expenditure (R&D) /tangible assets	0.040 (0.060)	0.017	0.000	0.378	332	0.045 (0.059)	0.026	0.000	0.378	223	0.030 (0.061)	0.000	0.000	0.360	109	2.206**
LEV	Average ratio of long-term debt to tangible assets	1.726 (0.904)	1.609	0.439	8.907	332	1.673 (0.822)	1.607	0.439	8.907	223	1.835 (1.047)	1.619	0.461	6.341	109	-1.418*
CASH FLOW	Average ratio of income and depreciation to tangible assets	0.140 (0.076)	0.138	-0.352	0.491	332	0.143 (0.068)	0.139	-0.090	0.443	223	0.133 (0.091)	0.130	-0.352	0.491	109	1.051
SSIC2	Average number of 2-digit SIC codes in which the firm operates	1.584 (0.761)	1.125	1.000	5.875	332	1.653 (0.809)	1.250	1.000	5.875	223	1.442 (0.631)	1.000	1.000	3.500	109	2.596***

Table 2: Non-linear estimation of benchmark marginal *q*, including firm-level control variables, corporate governance characteristics, and host country characteristics

*** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level.

		A	B	C	D
Benchmark value of marginal *q*					
MNEs: h_{MNE}		0.972***	0.875***	1.022***	0.882***
		(0.093)	(0.135)	(0.096)	(0.145)
PDEs: h_{PDE}		0.899***	0.998***	0.892***	1.002***
		(0.095)	(0.120)	(0.097)	(0.119)
Financial market strength: Private credit/GDP					
- any low		-0.054	0.013		
		(0.050)	(0.060)		
- any high		0.055	-0.026		
		(0.109)	(0.102)		
Legal system strength: Creditors' rights					
- any low				0.143	0.032
				(0.111)	(0.103)
- any high				0.003	-0.060
				(0.047)	(0.058)
Corporate Governance					
Staggered boards		-0.080*		-0.083*	
		(0.044)		(0.044)	
Bebchuk index			-0.068**		-0.070**
			(0.028)		(0.028)
Insider ownership		-0.245	-0.028	-0.212	-0.121
		(0.464)	(0.758)	(0.452)	(0.757)
Institutional ownership		0.094	0.232***	0.091	0.235***
		(0.061)	(0.081)	(0.061)	(0.083)
Control Variables					
PPE		-0.016	-0.030	-0.020*	-0.029*
		(0.011)	(0.019)	(0.011)	(0.017)
Research & development		1.715**	1.331*	1.731**	1.391*
		(0.690)	(0.750)	(0.718)	(0.742)
Leverage		0.040	0.057	0.038	0.054
		(0.026)	(0.036)	(0.026)	(0.037)
Cash flow		0.340	-0.002	0.331	0.049
		(0.287)	(0.488)	(0.288)	(0.489)
Prior diversification (SSIC2)		0.003	-0.001	0.004	0.002
		(0.023)	(0.024)	(0.023)	(0.025)
Industry Fixed Effects?		No	No	No	No
Log-Likelihood		-105.59	-49.25	-105.35	-49.072
Number of Obs.		324	169	324	169
$\frac{1}{N}\sum_i \lvert\hat{\varepsilon}_i\rvert$	MNEs	0.187	0.194	0.189	0.195
	PDEs	0.257	0.332	0.255	0.332
	t-test of the means	-2.042**	-2.400**	-1.937**	-2.393**
$\frac{1}{N}\sum_i \hat{\varepsilon}_i^{\,2}$	MNEs	0.089	0.077	0.089	0.077
	PDEs	0.160	0.212	0.160	0.212
	t-test of the means	-1.037	-1.630*	-1.053	-1.639*

Table 3A: Separate analyses of efficacy of capital budgeting decisions among under- and over-investing firms, including host country financial market strength, corporate governance characteristics, and firm-level control variables

The dependent variable is $(\hat{q}_i - \hat{h})$ split according to whether the firm under-invests (i.e., $\hat{q}_i > \hat{h}$) or over-invests (i.e., $\hat{q}_i < \hat{h}$). *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level. We include industry fixed effects for all industries in which there are at least two firms.

	Under-investment $(\hat{q}_i - \hat{h})^+$				Over-investment $(\hat{q}_i - \hat{h})^-$			
	1		2		3		4	
	MLE	Marginal Effects	MLE	Marginal Effects	MLE	Marginal Effects	MLE	Marginal Effects
<5 country presence	-0.689**	-0.360	-0.297	-0.170	0.192**	0.115	-0.019	-0.011
	(0.297)		(0.308)		(0.085)		(0.108)	
6-10 country presence	-0.696*	-0.363	-0.806**	-0.461	0.093	0.055	-0.191	-0.116
	(0.378)		(0.340)		(0.112)		(0.126)	
>10 country presence	-0.798**	-0.416	-0.852**	-0.487	0.441***	0.264	0.207	0.126
	(0.324)		(0.336)		(0.120)		(0.142)	
Financial Market Strength								
- any low	0.513*	0.268	0.972***	0.556	0.103	0.062	-0.015	-0.009
	(0.275)		(0.284)		(0.076)		(0.090)	
- any high	-0.234	-0.122	-0.554	-0.317	-0.235***	-0.141	0.178	0.108
	(0.288)		(0.374)		(0.089)		(0.114)	
Corporate Governance								
Staggered boards	-0.253	-0.132			0.018	0.011		
	(0.186)				(0.061)			
Bebchuk index			-0.236**	-0.135			0.070*	0.043
			(0.104)				(0.038)	
Insider ownership	1.037	0.541	4.397**	2.515	2.848***	1.701	2.054**	1.247
	(1.846)		(1.955)		(0.849)		(0.965)	
Institutional ownership	0.143	0.074	1.157***	0.662	-0.123	-0.074	-0.358**	-0.217
	(0.331)		(0.388)		(0.112)		(0.145)	
Control Variables								
PPE	-0.037	-0.019	-0.139**	-0.079	0.019	0.012	-0.008	-0.005
	(0.062)		(0.065)		(0.022)		(0.032)	
Research & development	3.223***	1.681	1.819	1.040	-0.909**	-0.543	-0.188	-0.114
	(1.061)		(2.281)		(0.449)		(0.643)	
Leverage	0.129	0.067	0.105	0.060	-0.123***	-0.073	-0.112***	-0.068
	(0.174)		(0.147)		(0.036)		(0.042)	
Cash flow	2.137	1.115	1.501	0.858	-0.074	-0.044	-0.288	-0.175
	(2.279)		(1.622)		(0.427)		(0.746)	
Prior diversification (SSIC2)	-0.024	-0.013	0.003	0.002	-0.055	-0.033	0.054	0.033
	(0.160)		(0.137)		(0.043)		(0.051)	
Industry FE?	Yes		Yes		Yes		Yes	
Log-likelihood	9.319		15.221		37.576		42.475	
Number of Obs.	76		54		249		115	

Table 3B: Separate analyses of efficacy of capital budgeting decisions among under- and over-investing firms, including host country legal system strength, corporate governance characteristics, and firm-level control variables

The dependent variable is $(\hat{q}_i - \hat{h})$ split according to whether the firm under-invests (i.e., $\hat{q}_i > \hat{h}$) or over-invests (i.e., $\hat{q}_i < \hat{h}$). *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level. We include industry fixed effects for all industries in which there are at least two firms.[25]

	Under-investment $(\hat{q}_i - \hat{h})^+$				Over-investment $(\hat{q}_i - \hat{h})^-$			
	5		6		7		8	
	MLE	Marginal Effects	MLE	Marginal Effects	MLE	Marginal Effects	MLE	Marginal Effects
<5 country presence	-0.606**	-0.429	-0.586**	-0.276	0.326***	0.218	0.021	0.013
	(0.242)		(0.290)		(0.083)		(0.119)	
6-10 country presence	-0.359	-0.255	-0.565	-0.266	0.215**	0.144	-0.162	-0.102
	(0.309)		(0.364)		(0.103)		(0.126)	
>10 country presence	-1.340***	-0.950	-1.069***	-0.503	0.621***	0.414	0.216	0.136
	(0.366)		(0.371)		(0.115)		(0.134)	
Legal System Strength								
- any low	-0.260	-0.184	-0.109	-0.052	-0.151	-0.101	0.025	0.016
	(0.227)		(0.362)		(0.094)		(0.149)	
- any high	0.675**	0.479	0.056	0.026	0.061	0.041	0.106	0.066
	(0.280)		(0.464)		(0.089)		(0.134)	
Corporate Governance								
Staggered boards	-0.139	-0.098			0.037	0.025		
	(0.159)				(0.055)			
Bebchuk index			-0.138	-0.065			0.070*	0.044
			(0.115)				(0.037)	
Insider ownership	0.403	0.286	4.876*	2.297	1.783**	1.189	2.093**	1.311
	(1.657)		(2.964)		(0.693)		(0.960)	
Institutional ownership	0.037	0.026	1.185**	0.558	-0.159	-0.106	-0.357**	-0.224
	(0.288)		(0.497)		(0.102)		(0.143)	
Control Variables								
PPE	0.043	0.030	-0.101	-0.048	0.021	0.014	-0.004	-0.002
	(0.055)		(0.071)		(0.019)		(0.032)	
Research & development	2.511**	1.780	1.391	0.655	-0.960**	-0.640	-0.251	-0.157
	(1.000)		(2.881)		(0.399)		(0.640)	
Leverage	0.126	0.089	0.284	0.134	-0.087***	-0.058	-0.104**	-0.065
	(0.162)		(0.182)		(0.031)		(0.042)	
Cash flow	1.615	1.144	1.114	0.525	-0.053	-0.035	-0.285	-0.178
	(1.888)		(2.011)		(0.361)		(0.737)	
Prior diversification (SSIC2)	0.053	0.038	-0.048	-0.022	-0.030	-0.020	0.044	0.027
	(0.160)		(0.185)		(0.041)		(0.052)	
Industry FE?	Yes		Yes		Yes		Yes	
Log-likelihood	10.691		6.727		46.447		40.421	
Number of Obs.	66		54		259		115	

[25] For model 6 we include only those industries in which there are a minimum of four firms.

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