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Multinational Ownership and Subsidiary Investment

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ABSTRACT

Global financial integration raises questions as to how foreign ownership affects host economies. This paper investigates one such question: how investment in subsidiaries is affected by the investment opportunities of parent firms. We create a new panel dataset of almost 5,000 parents and subsidiaries in more than 60 countries, for which we can separately observe necessary financial and operating information because they are independently listed on national exchanges. We find that improvements in the investment opportunities of parent firms have a negative effect on the investment of their subsidiaries, after controlling for the investment opportunities of the subsidiary, which can be independently observed. This provides evidence of internal capital markets in multinationals that reallocate funds towards units with better investment opportunities. We also find that the negative effect of the parent's investment opportunities on subsidiary investment is greatest where the relationship is more arms-length, i.e. where parents have modest ownership stakes, are distant from their subsidiaries or when subsidiaries – as well as parents – operate in well developed financial markets.

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1. Introduction

The pace of global financial integration has raised questions about the impact of foreign ownership on host country economies. Some see multinationals as bringing much needed capital and financial stability to underdeveloped economies, while others emphasize the volatility produced by footloose foreign investors.[1] Underlying these issues are fundamental questions related to the investment behaviour of related firms within multinational networks.

These questions have been explored in the recent literature on how heterogeneous firms in an industry choose the contractual basis on which their activities are organized and where they are located (e.g. Melitz, 2003, Helpman, Melitz and Yeaple, 2004, Antras, 2005). Grossman and Helpman (2004) model the firm's choice of whether to source inputs from the manager of a local division or one who operates a foreign subsidiary within a firm and from a domestic or foreign supplier outside the firm. They show how industry characteristics and monitoring problems interact with country differences in the contracting environment to influence the choice of organizational form and location of production.

We examine how fixed investment responds to changes in the investment opportunities of different divisions of a firm in the context of multinational firms. Maksimovic and Phillips, 2002 demonstrate that positive demand shocks in one segment of a firm lead to an expansion of that segment at the expense of others in the firm. Grossman and Helpman, 2004 predict that the substitution effect within a multinational towards better investment opportunities will depend on how the monitoring ability of the parent is affected by the distance between parent and subsidiary and the contracting environment.

[1] For example, Rodrik (1997), Radelet and Sachs (1998).

We investigate how investment in subsidiaries is affected by the investment opportunities of parent firms by creating a new panel dataset of almost 5,000 parents and their subsidiaries around the world for which we can separately observe financial and operating information. Since both parents and subsidiaries are independently listed we are able to identify the investment opportunities available to both the parent and subsidiary firm. This allows the influence of the opportunities available to the parent on the subsidiary firm to be determined controlling for those available to the subsidiary.

As we describe below, there are several existing literatures to which this is relevant. However, the issue of how investment opportunities available in one part of an organization pertain to those in another is in itself of fundamental importance. In the absence of resource constraints (financial or managerial), the opportunities available to the subsidiary should be a sufficient statistic for describing its investment activities and the opportunities available elsewhere in the organization should be irrelevant. However, if the financial or managerial resources available to the subsidiary are limited then enhanced opportunities elsewhere in the organization may have one of two effects. They may expand the resources available to the subsidiary and thereby increase investment in the subsidiary or they may divert the scarce resources elsewhere and reduce investment in the subsidiary. They may therefore be complementary to or substitutes for investment in the subsidiary.

We find that increased investment opportunities in the parent firm have a negative effect on the investment of the subsidiary after controlling for the subsidiaries' investment opportunities, i.e. they are substitutes for investment in the subsidiaries. We further analyze how financial decisions are affected by the characteristics of the parent-subsidiary relationship. We find that reallocation is strongest when parents are distant from their subsidiaries and have modest ownership stakes and when subsidiaries operate in well developed financial markets. This

suggests that internal competition is strongest where the scope for "influence activities" of the parent on the subsidiary is weakest.

The investment behaviour of firms inside multinational networks relates to two distinct debates in the literature – on the existence and effects of internal capital markets and on the impact of foreign ownership on parent and host economies. The existing literature on intrafirm financial relationships suggests ambiguous predictions of the effect of an increase in the multinational parent's investment opportunities on the investment of the subsidiary. On the one hand, parents may impose discipline on subsidiaries by reallocating funds from those with greater access to those with greater need of resources (Stein, 2003). In the presence of capital market imperfections, subsidiaries benefit from the access to external markets that parents provide (Inderst and Muller, 2003) or are able to access finance from other units within the multinational network (Stein, 2003). This is the 'bright' side of the internal capital market referred to in the literature as 'internal Darwinism'. On the other hand, headquarters may support their poorly performing entities. Brusco and Panunzi (2005) claim that redistribution of capital between divisions weakens managerial incentives and Milgrom (1988), Milgrom and Roberts (1988) and Meyer, Milgrom and Roberts (1992) point to the wasteful influence activities – rent-seeking and power struggles – in which managers of large organizations engage.[2] This leads to soft budget constraints that cause internal capital markets to allocate too many resources to low value divisions and too few to high value divisions (Lamont 1997, Rajan, Servaes and Zingales, 2000, Scharfstein, 1998, Scharfstein and Stein, 2000, Shin and Stulz, 1998). This is the 'dark side' of the internal capital market, referred to as 'internal socialism'.

[2] Diversified conglomerates generally trade at lower value than comparable portfolios of specialized firms (Bhagat, Shleifer and Vishny, 1990, Berger and Ofek, 1996). Maksimovic and Phillips (2002) show that a diversification discount is consistent with 'bright side' profit maximization in a model where industries differ in their fundamentals and firms are heterogeneous.

The first contribution of the paper is to extend this literature to the context of separate firms within multinational networks. We analyze investment in a sample of subsidiary firms in more than 60 countries, which are more than 50 per cent owned by a parent firm, and which are also separately listed on stock markets. We choose *listed* multinational subsidiaries to overcome the primary identification problem in the literature on diversified firms: inadequate proxies for the investment opportunities of individual divisions of conglomerates. Since both our parents and subsidiaries are quoted we can separately observe their investment opportunities as proxied by their separate Tobin's *Q*. By contrast, in studies of diversified conglomerates, the investment opportunities of the division are proxied by the Tobin's *Q* of the industry segment in which it operates. We find that increases in the parent's investment opportunities (proxied by its *Q*) are associated with reductions in the subsidiary's investment, after controlling for the subsidiary's *Q*. We interpret this as evidence of a substitution effect that multinational parents reallocate funds towards units with better investment opportunities.

These results bear on the debate on the impact of foreign capital on host economies. On the one hand, foreign direct investment may bring various technology and productivity advantages that spill over to domestic firms and it may be more stable than other forms of foreign capital. On the other hand, FDI may crowd out domestic firms and may be more volatile than domestic investment. Understanding how internal capital markets operate in multinational firms is relevant to the question of whether foreign owners support their subsidiaries through down-turns as suggested by the 'bail out' hypothesis or whether they are the first to withdraw their investment in the face of negative shocks (Lipsey, 2001, Desai, Foley and Forbes, 2007).

To motivate our investigation with an example, consider the Asian crisis of 1997-98 – an event that generated considerable interest in the potential macroeconomic impact of the presence of foreign-owned firms on host economies. We find in our data that during the crisis foreign

owned firms decreased their investment by significantly more than domestically owned firms (Table 1). Moreover, amongst the foreign-owned firms, investment was cut back by more in subsidiaries with parents located outside the region than by those with parents in Asia. As shown in Table 1, the investment opportunities (measured by their Tobin's *Q*) of the parent firms with headquarters outside the region rose whilst they fell for the Asian-based parents. This pattern – of a negative correlation between the change in a parent's investment opportunities and the change in the investment of their subsidiaries – is consistent with multinational firms reallocating capital to more profitable investment opportunities within their international network.

[Table 1 here]

Our investigation of the pattern of reallocation of investment in multinational firms adds to the literature on the behaviour of 'footloose' MNEs. It complements recent findings on plant closures in *host* countries where a number of studies report that once plant characteristics are controlled for, plants with some foreign ownership are more likely to close than purely domestically owned firms (e.g. Gibson and Harris, 1996, Görg and Strobl, 2003, Bernard and Sjöholm, 2003). Bernard and Jensen (2007) show that this effect is also found for plant shutdowns by US MNEs in the *home* country.

Our second contribution is to examine how the parent-subsidiary financing relationship is affected by their proximity and by the characteristics of the host country. Proximity has an a priori ambiguous effect on the extent of reallocation within the multinational network. On the one hand, more proximate owners may have more control over their subsidiaries and thus be in a stronger position to reallocate. On the other hand, proximity may increase the potential for influence activities on the part of the managers of under-performing units. To examine these effects we consider various concepts of proximity. We use geographical distance between the two (physical proximity), differences in the level of financial development between the parent and

subsidiary countries (institutional proximity), and the size of the parent's stake in the subsidiary (concentration of ownership) as proxies for the proximity of the parent-subsidiary relationship.

There is no consensus in the existing theoretical or empirical literature as to whether a more arms-length relationship along these dimensions is likely to enhance or reduce the responsiveness of subsidiary investment to the parent's investment opportunities. Concentrated owners may be able to exercise stronger governance (Allen and Gale, 2000) than dispersed owners but may intervene excessively and undermine the autonomy of local management (Burkhart, Gromb and Panunzi, 1997). Financial relationships and the quality of information about subsidiaries may weaken with distance between parents and subsidiaries (Portes and Rey, 2001 and Wei and Wu, 2002) but so too may influence costs. Foreign affiliates may be able to substitute internal for external borrowing when operating in poorly developed financial markets (Desai, Foley and Hines, 2004) but may also be particularly prone to adverse influence costs.[3] We find that reallocation is strongest when parents are distant from their subsidiaries and have modest ownership stakes and when subsidiaries operate in well developed financial markets. This suggests that internal competition is strongest where the scope for influence activities is weakest.

The paper is organized as follows. Section 2 explains how the dataset was created and Section 3 reports our results on parent investment opportunities and subsidiary investment. In Section 4 we investigate whether more distant parents are less strict on their subsidiaries and in Section 5 whether parents reallocate more when subsidiaries are located in weaker financial markets. Section 6 summarizes our findings placing them within the broader context of the macro-economic effects of globalization.

[3] See, for example, the discussion of the behaviour of MNEs in India toward their listed subsidiaries in 2000 ('Why Bombay's Blue Chips are down: Local investors suspect multinationals give them a raw deal' Business Week Online October 30th 2000).

2. Investment by Listed Multinationals

Our sample is obtained from the OSIRIS database provided by Bureau van Dijk Electronic Publishing, which gathers its information from several sources including World'Vest Base, Fitch, Thomson Financial, Reuters, and Moody's. This database is a "comprehensive database of listed companies … around the world" and provides information on 28,915 firms listed on the world's stock exchanges. Table 2 presents the distribution of these firms by country. The 69 countries in the data base include 23 'old' OECD countries including Japan (19,576 firms), ten former Soviet bloc transition countries (281 firms), eleven Asian countries (6,456 firms), 467 firms from African countries, 910 from the Middle East and 1,225 from Central and Latin America. The US accounts for approximately one quarter of the global population of listed firms and Japan for one eighth.

[Table 2 here]

A. Ownership data

The OSIRIS data base records a firm as having a parent if another entity has financial and legal responsibility for it, i.e. it holds more than 50 per cent and less than 100 per cent of the subsidiary's equity. This is a strong definition of ownership, which enables us to observe situations in which the parent firm has enough authority to control the financial decisions of its subsidiaries and operate an internal capital market. Table 2 indicates the distribution of listed firms in each country across ownership categories (subsidiary, parent, and the remaining stand alone firms). Several European countries including the transition countries have a high proportion of subsidiaries on their stock exchanges and some countries, such as Argentina, have a high proportion of foreign owned subsidiaries. The Netherlands has a particularly high proportion of

parents of (mainly foreign) subsidiaries and some countries, such as Switzerland and the UK, are both homes and hosts to a high proportion of foreign owned subsidiaries.

We discard firms from the sample if they experienced a change in ownership over the period, or if their ownership information is unavailable, or if key financial information (matched to and collected from Datastream) is missing over the period 1994 to 2005. OSIRIS only reports ownership at one point in time, 2005, but we have older ownership data from Dun and Bradstreet, which enables us to identify ownership in 1994. After matching these data we exclude firms from the sample if the location of their owner is different in these two datasets; we cannot make use of the subsample of firms for which ownership changes since we have no information on when the change occurred. This leaves us with 4,886 subsidiaries which have been continuously owned and controlled by 1,028 distinct global ultimate firms over the period. By excluding subsidiaries that were spun off or acquired between 1994 and 2005 we reduce the selection problem, discussed further in Section 2, which characterizes the use of spin-offs to test for the operation of an internal capital market.

Table 3 presents basic descriptive data for the sample firms. Foreign owners are the largest firms, with median employees of 74,598, foreign-owned firms have 7,252, and stand-alone domestic firms have an average number of 8,023. The size of the shareholding of the largest foreign owner is around 60% in the owned firms and less than 10% in the stand-alone firms. In addition to the size of ownership, we also observe the country in which parent firms are located. The average distance of foreign-owned firms from their parents is 40% of half the circumference of the world. The foreign-owned firms operate in economies in which stock markets are significantly smaller and which have lower financial development than is the case for stand-alone or owner firms in the sample (see Table 3).

[Table 3 here]

B. Financial and investment data

The OSIRIS data-base reports a unique identification number for each parent firm that enables us to match firms with financial data on their parents. This was merged with market and financial data from Datastream. We have time series observations on firms over the period from 1994 to 2005. The average number of observations per firm is six.

Capital expenditure measures funds used to acquire fixed assets including expenditures on plant and equipment, structures and property but excluding any expenditures associated with mergers or acquisitions. To account for differences in size and for inflation over time and to avoid heteroscedasticity we divide investment by total assets at the beginning of the period.

We use a measure of Tobin's *Q* as a proxy for the assessment by the market of the investment opportunities available to the parent firm. Theoretically, marginal *Q* should be used as the approximation of present and expected future investment opportunities but since marginal *Q* is unobservable, we use average *Q* as a proxy. We measure average *Q* as the firm's market-to-book ratio at the end of the prior fiscal year. The parent's data is given in consolidated form, so we take out the effect of the subsidiary to extract the parent's *Q* – in essence we are measuring the *Q* of all the other units in the consolidated firm except the subsidiary.[4]

We use financial information about the subsidiary (sales growth, cash flow, and Tobin's *Q*) as controls alongside our variable of interest. These variables are subject to endogeneity concerns in the empirical *Q* model, so we are careful about our interpretation of their coefficients. Liquidity can be calculated in two different ways, either as a stock of cash or as cash flow. The flow measure has proved to be the empirically more successful proxy for liquidity in the past (Devereux and Schiantarelli, 1989). Hence, we use cash flow as a proxy for the liquidity

[4] We use the employment in the subsidiary *Ei* and the total consolidated employment, E_T to determine the firm's Q_j which we call parent's *Q*, but really refers to the *Q* of the entire entity except the subsidiary. The firm's consolidated *Q* is $Q_T = ((Q_i*E_i + Q_j*E_j)/E_T)$ so parent's *Q* is $Q_j = (Q_T*E_T - Q_i*E_i)/E_j$.

constraints of the firm. In accordance with our procedure with respect to investment, we adjust for size and inflation by dividing cash flow by total assets at the start of the year.[5]

C. The sample of listed subsidiaries

We are concerned that our results for listed firms may not be easily generalized to the broader population of multinational subsidiaries. Table 4 provides summary information about the characteristics of listed and unlisted subsidiaries of a sub-sample of the firms in our sample. The subsample comprises all of the firms – a total of 51 – that are parents of at least one of the top 2,000 listed companies and at least one of the top 2,000 unlisted companies in Western Europe. These data show that parents typically have over 50% more unlisted than listed subsidiaries. The listed subsidiaries are larger in terms of both assets and employment. The median ownership stake of the parent of unlisted subsidiaries is 100% and 57% for listed subsidiaries. In general the comparison suggests that listed subsidiaries are larger and more independent than their unlisted counterparts. This indicates that our choice of sample makes it less likely that we would observe an effect of parental control on the investment decisions of the subsidiary – so any bias introduced by our sample is likely to make it harder for us to identify an effect.

[Table 4 here]

[5] There is an active debate as to whether the significance of cash flow terms in investment equations can be interpreted as evidence of financing constraints. Based on firms' annual reports and managements' discussions of liquidity requirements, Kaplan and Zingales (1997) conclude that it cannot while Fazzari, Hubbard and Petersen (2000) contend that Kaplan and Zingales' methodology is flawed. Gomes (2001) argues that the presence of cash flow variables in investment equations is neither a necessary nor sufficient condition for capital market imperfections. They are not necessary since financial constraints should be reflected in firm valuations and therefore in marginal *Q* and they are not sufficient because non-linearities may be captured by cash flow in linear investment equations. Cooper and Ejarque (2001) demonstrate that the inclusion of profit variables may reflect market power rather than capital market imperfections in investment equations that use average in place of marginal *Q*. For this reason we are cautious in the following analysis about interpreting cash flow variables as evidence of financing constraints. We return to these issues in the discussion of our econometric strategy in Section 3.

Affiliate firms may benefit from liquidity spillovers in their internal capital markets. Improved access to internal capital markets may increase financing flexibility. There may be 'more money' available if integration leads to a larger total entity, which can raise more external finance than could the individual entities themselves. Table 5 compares a number of characteristics of subsidiaries and their parents in the sample of firms used in this analysis. Although cash flow and investment relative to total assets are virtually identical in parent firms and their subsidiaries, the total assets of parent firms are more than ten times as large.

[Table 5 here]

3. Subsidiary Investment and Parent Investment Opportunities

We examine whether the parent's investment opportunities influence the investment of the subsidiary. To do this, we use the following specification

$$(1) \qquad Inv_{it} = a_0 + a_1 Q_{jt} + a_2 X_{it} + a_3 X_{jt} + u_i + v_t + e_{it}$$

where the parent firm of subsidiary i is designated by subscript j and where Inv_{it} is capital expenditure divided by total assets for subsidiary i, *i.e.* $Inv_{it} \equiv I_{it} / K_{i,t-1}$; X_{it} is a vector of financial variables for the subsidiary including Q_{it}, Tobin's Q ratio, i.e. market value of assets divided by the book value; CF_{it} denotes firm i's cash flow divided by its total assets; SG_{it} is the sales growth for firm i.[6] X_{jt} is a vector of financial variables for the parent including CF_{jt} denotes firm j's cash flow divided by its total assets. The firm fixed effect is u_i and the time dummy is v_t.

Our coefficient of interest is a_1 which describes the role of parent investment opportunities in the investment of the subsidiary. We use firm fixed effects estimation, which means that the experiment we are considering is how a shock to the parent firm's Q affects its

[6] Since firms typically operate under conditions of imperfect competition in the product market, it is appropriate to augment the usual Q equation with sales growth to capture the impact on investment of a shift in the demand curve. The firm fixed effect is u_i and the time dummy is v_t.

subsidiary's investment, controlling for the subsidiary's investment opportunities. If the subsidiary can borrow at a lower cost of capital from the parent firm, this will already be incorporated in the subsidiary's *Q*. Given that we can control for Q_i, we can identify the impact on subsidiary investment of new information that affects Q_j making investment outcomes for the parent more attractive.

Thus if the internal capital market actively reallocates funds across related entities then we expect the affiliate's investment to be decreasing in the parent's *Q*, holding the affiliate's *Q* and other financial variables constant. Since we observe the cash flow and *Q* of both parent and subsidiary, we are able to test directly for effects consistent with the presence of a financing relationship between them.

Table 6 indicates that the parent's *Q* has a significant negative effect. As predicted by the 'internal Darwinism' argument and contrary to the 'internal socialism' argument, an increase in the parent's *Q* leads to a reduction in the subsidiary's investment. This result is statistically and economically significant. For example, in Column 2, a shift in parent's *Q* from the 25th percentile (0.81) to the 75th percentile (2.63) involves a change in the subsidiary investment/total assets of -0.0018. This represents a reduction of 5% over the median subsidiary investment/total assets (0.036). As we shall see, this is likely to be an underestimate of the true size of the effect because of the presence of measurement error in *Q*.

[Table 6 here]

A. Endogeneity

There is scope for concern that parent's *Q* is affected by the investment of the subsidiary or that both are affected by some third variable for which we have not controlled. We take the following steps to mitigate this potential endogeneity problem. First, as described in Section 2,

we measure parent's *Q* by subtracting the subsidiary component from consolidated *Q*. In this way we remove the direct effect of the subsidiary from parent *Q*.

Nevertheless, it is still possible for changes in the investment of the subsidiary to be *indirectly* correlated with parent's *Q*. For example, the investment of the subsidiary may be a leading indicator of a shock that could affect the investment opportunities of the whole multinational network. However, there are several reasons to believe that our results are not invalidated by such effects. First many of the conceivable shocks that may jointly affect parent's *Q* and subsidiary investment would be likely to affect them in the same direction, making it less likely that we would find a negative relationship in our results. Second, there is little correlation between subsidiary and parent cash flow, *Q* or investment (see Table 7). Had there been a correlation then the negative relation between parent *Q* and subsidiary investment might have reflected the effect of omitted variables. Third as reported in Table 4, the average size of parents is an order of magnitude larger than that of subsidiaries.

[Table 7 here]

Whilst these arguments suggest that any bias is likely to attenuate our estimate of a 'negative parent *Q* effect', our data allows us to carry out a series of more systematic checks for the presence of omitted variable and endogeneity problems. In Column 3 of Table 6 we approach the issue in another way by running the regression from Column 2 augmented by interactions between the 2-digit industry of the firm and the year. The inclusion of the additional dummies does not affect the results. In addition, following the work of Abel and Eberly (1996) on non-convex adjustment costs, we checked to see if higher orders of *Q* are significant in the investment equation but we found that they are not.

In Column 4 we examine whether the relationship between the parent's performance and the subsidiary's investment reflects general influences (for example macroeconomic conditions)

on the total population of subsidiaries and parents rather than specific internal market relations between the parents and subsidiaries in question. We do this by constructing a matched sample of surrogate parent firms in the same industry and country as the actual parents that are closest in size to the real parents.[7] In Column 4 of Table 6 we find that there is no significant influence of the surrogate parent *Q* on the subsidiary's investment.

In Column 5 we instrument parent's *Q* using a binary variable indicating the presence of a recession in the parent's country on the assumption that a macro shock in the parent country will affect the parent firm's *Q* but will not directly affect the subsidiary's investment.[8] As explained in the Data Appendix, we use quarterly GDP data to identify recession periods in our data. The validity of the instrument is supported by the first stage results: the coefficient on the recession variable in the first stage indicates that a recession in the parent country reduces the parent *Q* by 0.16. The first stage F test of the significance of the excluded instrument is 18.96.[9] Column 5 reports that the coefficient on parent's *Q* in the IV specification remains negative and significant. The (absolute) value of the coefficient is significantly larger than in the OLS estimation, which is consistent with the presence of measurement error in *Q*.[10] This suggests that the economic significance of the parent *Q* effect reported above based on the OLS estimates is likely to be a lower bound.

In Table 8 we do some additional robustness checks to test whether particular sub-samples of firms are driving the result, we repeat the base-line regression (Col. 2 of Table 6) for

[7] Our matching exercise was conducted simply by ordering the parent firms by their country, industry, and size. We then matched each subsidiary to the parent firm which was nearest its own parent.
[8] Note that the correlation between our parent recession variable and subsidiary investment is low (0.018).
[9] This exceeds the critical value of 16.38 for the Stock and Yogo (2003) weak-instrument test for 2SLS with exact identification and one endogenous regressor. The hypothesis of a weak instrument is rejected using their most stringent criterion.
[10] Previous studies that correct for measurement error in *Q* find that the size of the coefficient goes up substantially as compared with the OLS estimate. The increase that we find lies within the range reported for own *Q* estimates in Cummins, Hassett and Hubbard (1996), Erickson and Whited (2000) and Bond and Cummins (2001).

the sample of foreign-owned firms excluding US firms both as owners and as subsidiaries (reported in Col. 1 of Table 8). The results remain unchanged. We also split the sample between firms whose principal activity is in manufacturing and those with a non-manufacturing core. The results for manufacturing firms were similar to those for the full sample (Col. 2).

[Table 8 here]

In addition we compare our sample of subsidiaries (owned firms) with the remaining (stand-alone) firms in the population of listed firms. We repeat our basic regression excluding the parent variables on the main sample of subsidiaries (Col. 3) and compare this both with the group of stand-alone firms (Col. 4) and with a matched sample of stand-alone firms (Col. 5).[11] We find evidence that the stand-alone firms are less responsive to their own investment opportunities than are the subsidiaries, as reflected by the smaller coefficient on their Tobin's *Q* variable. The coefficient on Q_i in column 3 for subsidiaries is statistically different at the 1% level from that in column 4 and from that in the matched sample of stand-alone firms in column 5, a difference that remains when parent control variables are included in the regression as in Table 6 (Col. 2). The comparison between subsidiaries and stand-alone firms also suggests that investment by stand-alone firms is more sensitive to their cash-flow than is the case for subsidiaries. Both of these results point toward a role for parents in easing the financing constraints faced by their subsidiaries. However, we are reluctant to over interpret this because firms are not randomly allocated between subsidiary and stand-alone status.

B. Interpretation

The above results on multinationals are consistent with the view that parents respond to shifts in investment opportunities across subsidiaries in the multinational network as reflected in a change in the parent's *Q* holding the subsidiary's *Q* constant. The positive response of

[11] The propensity score matching exercise is described in the Appendix.

subsidiary investment to a fall in parent *Q* is consistent with a substitution effect of the reallocation of funds globally across subsidiary entities. Limited financial or managerial resources are being allocated to their highest value location.

Our finding of reallocation of investment in response to profitability differences as reflected in parent and subsidiary *Q* stands in contrast to much of the evidence in the literature on diversified firms, which suggests that, on average, diversified firms engage in internal socialism among their divisions (Shin and Stultz, 1998, Scharfstein, 1998, Rajan, Servaes and Zingales, 2000, surveyed in Stein, 2003).[12] For example, Shin and Stultz diagnosed inefficient cross-subsidization within conglomerates from the presence of a positive coefficient on the cash-flow of one division in a firm on the investment of another. Parent cash-flow is not significant in the regressions reported in Tables 6 and 8. We return to this issue in Section 4 when we allow the relationship between parent and subsidiary to vary according to their proximity.

However, doubt was cast on the interpretation of Shin and Stulz's results[13] as providing evidence of 'internal socialism' by the finding that in *financially unrelated* firms known to have merged later a similar relationship between the cash flow of one firm and the investment of the other was found (Chevalier, 2004). This suggests that the correlation between cash flows was associated with complementarity between the firms that led to their merger and indicates that such a correlation inside a conglomerate could also be independent of a financial relationship. More generally, the cross-subsidisation conclusion emerged from a methodology that is vulnerable to two related problems. It assumes that the divisions of conglomerate firms are allocated randomly to parent firms and that they are drawn randomly from the same distribution

[12] Rajan, Servaes and Zingales (2000) compare the investment of divisions of diversified conglomerates with investment by stand-alone firms. They find that divisions in industries with low investment prospects (measured by average industry *Q* ratios) invest more than stand-alone firms in the same industry, and divisions with high investment prospects invest less than their stand-alone counterparts. Scharfstein (1998) shows that the sensitivity of investment to industry *Q* is much lower for conglomerate divisions than for stand-alone firms.

[13] Industry-segment *Q* is used to control for the division's investment opportunities.

as stand-alone firms. On the basis of these assumptions, the average industry (segment) *Q* serves as a reliable proxy for the division's investment opportunities.[14] However if the diversification decision is endogenous, then conglomerate divisions are systematically different from stand-alone firms and industry *Q*'s may not be good proxies for the opportunities of conglomerate divisions (Whited, 2001).[15] Equally Chevalier's investigation of the investment activity of firms in the period before they merge into a single entity where she finds that investment patterns that have been attributed to cross-subsidisation are visible in the behaviour of pre-merger firms, suggests that some of the cross-subsidisation results in the literature are attributable to selection bias.[16]

In the sample of conglomerate firms we investigate in this paper, the divisions (or 'subsidiaries' in this context) are separately listed firms so we observe the Tobin's *Q* of each entity directly. We therefore avoid the central empirical problem of the previous literature that the observed differences in the investment of divisions and stand-alone firms are the consequence of their different investment opportunities rather than their different financing options. Evidence that contradicts the cross-subsidization hypothesis comes from Maksimovic and Phillips (2002),

[14] The average Tobin's *Q* of stand-alone firms in an industry provides a reasonable proxy for the investment opportunities of a division of a conglomerate in the same industry if, as has been suggested, industry effects account for much of the variation in Tobin's *Q* (Stein 2003).

[15] Maksimovic and Phillips (2002) argue that a firm's diversification is an endogenous decision determined by the underlying characteristics of the pre-merger firms. Graham, Lemmon and Wolf (2002) argue that stand-alone firms are systematically different from divisions of conglomerate firms in the same industry.

[16] In an attempt to circumvent this problem, Gertner, Powers and Scharfstein (2002) investigate the investment behaviour of firms that are spun off from a conglomerate. They observe that once a division is spun off from its parent, its investment responds more sensitively to industry *Q*, from which they infer inefficiency in the conglomerate. Çolak and Whited (2005) take issue with this approach and demonstrate that contrary to claims that it provides a clean test of the efficiency of internal capital markets, the results are contaminated by the presence of selection bias and measurement error. The decision to spin off a division is not a random one: a division is likely to be spun off only in cases where the combined entity is less valuable than the sum of its parts. Thus while the results in the 'spin off' papers provide evidence of inefficient overinvestment in their samples, it almost certainly presents a biased picture of the efficiency of internal capital markets in the population of conglomerates. Similar methodological problems have plagued the parallel literature on the costs or benefits of group membership of Japanese keiretsu. Early studies such as Hoshi, Kashyap and Scharfstein, 1991 and Prowse 1992 identified benefits of membership whereas more recent ones (e.g. Weinstein and Yafeh, 1998 and Morck and Nakamura, 1999) have identified costs. In a recent study of Korean chaebols, Ferris, Kim and Kitsabunnarat (2003) argue in favour of the inefficiency of the chaebol using a methodology similar to that criticized by Çolak and Whited.

who use a measure of plant-level segment total factor productivity to capture the investment opportunities of the divisions of conglomerate firms. Their procedure proxies investment opportunities by an estimate of the TFP of the plants in a particular industry in the conglomerate, but this does not correspond to its true divisional structure. Our data allows us to provide a more direct test of their 'neoclassical' model by using a forward-looking measure of investment opportunities, recorded for both subsidiary and parent.

Of course the financing relationship between a domestic owner or a multinational headquarters and its listed subsidiaries is different from the relationship between a conglomerate and its divisions. As noted in Section 2, we drop from our sample subsidiaries that changed ownership during the sample period, mitigating the selection problem associated with the use of spin-offs. Listed subsidiaries are, by their nature, not wholly owned by their parents; and this lower concentration of ownership may cause managers of listed subsidiaries to have a higher degree of autonomy than divisional managers. We may therefore be less likely to observe evidence consistent with an internal capital market than would be the case in less independent subsidiaries. To minimise this difference, we restrict our sample to listed subsidiaries which report a 'global ultimate' – a particularly strong parental relationship, which requires an ownership stake of the parent of more than 50%. Our result that there is a financial relationship between parent and subsidiary extends the evidence on the presence of an internal capital market within divisional firms to listed multinational firms.

In the next section we exploit variations in our sample to investigate whether those foreign subsidiaries that are most like divisions of domestic conglomerates in the existing literature exhibit more evidence of internal socialism than our results on average. Since the firms in our sample encompass a range of ownership stakes of the parent between 50% and 100% and

varying degrees of geographic proximity, we can see whether the financing relationship changes as a foreign listed subsidiary becomes more like a wholly owned domestic division.

4. Does a More Arms-length Relationship Enhance or Diminish Reallocation in the Multinational Network?

The results above suggest that internal capital markets operate in our sample of multinational firms to allocate finance in response to the relative profitability of projects within the group. Our sample provides a convenient setting in which to analyse the operation of these internal capital markets in more depth. In particular we are interested in how the extent of reallocation is affected by characteristics of the parent-subsidiary relationship and whether our results are diminished in settings that are more likely to invite influence activities.

Much of the theoretical work on the 'dark side' of internal capital markets considers the presence of influence activities that may arise in the relationship between managers and the CEO. Several papers have addressed the question of why such behaviour may distort the CEO's capital budget decision, rather than just affect the distribution of managerial compensation.[17] Scharfstein and Stein (2000) consider the case where the CEO is herself an agent and finds it more attractive to compensate the managers of poorly performing divisions with greater investment rather than with cash, which the CEO would prefer to reserve for alternative uses. Stein (2003) cites the example of the successful diversified conglomerate, General Electric, whose policy of rotating its managers between divisions has the benefit of reducing managers' incentives to lobby for excess capital. By contrast, theories that emphasize the 'bright side' of internal capital markets focus on the information and control advantages afforded to the CEO as a provider of internal finance over

[17] Rajan, Servaes and Zingales (2000) suggests that 'socialism', i.e. a more equal allocation of resources among divisions, might increase incentives for division managers to cooperate and reduce rent-seeking behaviour.

the providers of external finance. This theory rests on the superior ability of the CEO to pick winners from among her business units as discussed in Gertner, Scharfstein and Stein (1994) and Li and Li (1996) and suggests that proximity may enhance reallocation in line with relative profitability.

The potential for influence costs suggests that when the relationship between subsidiaries and their parents is less arms-length, we may expect the profitability-oriented reallocation observed in our main results to be weaker. We identify proxies for how arms-length the relationship is between parent and subsidiary: the first is the geographical distance between them and the second is the strength of the control relationship, which we proxy by the size of the parent's stake in the subsidiary. If influence costs are present then proximity may inhibit the extent to which internal capital markets allocate funds to subsidiaries with more attractive investment projects. However as noted above, there may be countervailing forces at work: proximity may improve the information on which reallocation is based (as in Grossman and Helpman, 2004, Ozbas, 2005), or strengthen the control with which it is mandated (Allen and Gale, 2000). There is a substantial literature pointing toward the role of physical distance in hampering financial relationships and we can test whether these problems dominate the effect of influence activities inside multinational firms.[18]

Thus the effect of proximity on internal capital markets involves a trade-off between the potentially positive effects of information and control and the deleterious effects of undue influence. If parents in close proximity are able to overcome capital market imperfections better

[18] Grinblatt and Keloharju (2001) find that investors are more likely to trade the stocks of firms that are proximate, communicate in the investor's native tongue, and have similar cultural attributes. Guiso, Sapienza and Zingales (2004) find that even in a country with uniform regulatory and institutional structures (Italy) access to finance for small firms depends on local financial development: distance matters. Buch (2005) finds that banks hold significantly lower assets in distant markets. In a study of loans in Pakistan, Mian (2005) finds that foreign banks do not lend to 'informationally difficult' yet fundamentally sound firms. Lending declines as geographical and cultural distance between the bank's headquarters and its local branches rises.

than parents at a distance then more concentrated ownership and closer parents should be associated with a more negative relationship to parents' *Q*. If the influence of the parent is to the detriment of the subsidiary, and this increases more with proximity than do the beneficial effects of increased information, then we would expect proximity to decrease the effect of parent's *Q* on the investment of the subsidiary.

[Table 9]

Column 1 of Table 9 reports the effects of concentration of ownership of the parent on the investment of the subsidiary for the sample of foreign-owned firms. The interactive effect of the ownership stake of the largest owner on the owner's *Q* and cash flow are reported. The negative *Q* effect of the parent diminishes with the size of the largest foreign ownership. Thus the internal capital market exhibits more reallocation in response to changes in investment opportunities when the parent less tightly controls its subsidiary.[19]

In Column 2, we report the impact of distance from the parent on the investment of its subsidiary for the sample of foreign-owned firms. We find that the effect of the parent's *Q* becomes more negative as distance increases. Consistent with influence effects dominating information effects this suggests that investment in subsidiaries of more distant firms is more sensitive to their parent's investment opportunities. Increased investment opportunities for the headquarters are more likely to result in reduced investment by the subsidiary when the subsidiary is located further from the parent. We interpret this as evidence that the loss of information is outweighed by the benefits of reduced influence. The CEO is less susceptible to influence activities from more remote managers, with whom she has a more arms-length relationship as a result of greater geographical distance or a smaller ownership stake.

[19] We find the same results for ownership concentration for the sample of subsidiaries with domestic rather than foreign owners.

The results in Table 9 suggest that the failure to find a significant effect of parent cash flow on subsidiary investment in the basic regressions in Table 6 and 8 reflects heterogeneity in the sample. We find that controlling for parent and subsidiary investment opportunities, a positive shock to parent cash flow boosts subsidiary investment but this effect only emerges once the proximity measures are introduced. Although only weakly significant, as the ownership stake of the parent rises so that the relationship becomes less arms-length, the positive parent cash-flow effect diminishes. The opposite is found as geographical distance falls.

To summarize, there is more reallocation in response to changes in investment opportunities when the firms are more distant or the owner's stake is smaller (although above 50%). We interpret this as supporting the primacy of influence costs over information effects. The presence of other owners or lower geographical proximity serves to distance the CEO of the parent firm from the managers of the subsidiary. The costs of lower information appear to be outweighed by the benefits of reduced influence effects.

The fact that distance and dispersal of ownership promote reallocation based on profitability in internal capital markets may help to explain differences in results in multinational firms from those in conglomerates more generally. Our results predict that the lower levels of ownership concentration and the greater distance between parent and subsidiary in our sample of firms will be associated with more reallocation on a competitive basis than in wholly owned divisions of domestic firms.

5. Do Parents Reallocate Capital More When their Subsidiaries are in Weak Financial Markets?

We explore whether the quality of the institutional environment of the country in which the subsidiary is located relative to that of the parent affects the 'competition for funds' effect. There

is evidence suggesting that foreign affiliates often substitute internal borrowing for external borrowing when operating in environments with poorly developed financial markets (Desai, Foley, and Hines, 2004). Table 10 indicates that in our sample, over 50% of pairs of firms are 'high-high' with both subsidiaries and their parents listed in a country with a high level of financial development. In 40% of the sample, subsidiaries but not their parents are located in countries with low financial development.

[Table 10 here]

Do subsidiaries in countries with relatively poor financial institutions benefit more from the availability of an internal capital market than those in countries with institutional quality closer to that of the parent, i.e. do we observe more reallocation? Or are they more vulnerable to influence costs? If the former, we predict a stronger effect of parent *Q* on subsidiary investment when interacted with a measure of weakness of the financial institutions in the subsidiary's country. If information benefits outweigh excessive control and influence costs, we would predict enhanced Tobin's *Q* effects in subsidiaries operating in countries with weaker domestic financial markets.

We test whether the sensitivity of investment to parent *Q* in subsidiaries is responsive to the level of financial development broadly defined by the ratio of credit to the private sector to GDP. In Column 3 of Table 9, we look at foreign-owned firms and at whether the *relative* level of financial development between the country in which the subsidiary is located and that of its parent affects the role of the parent's *Q* in the subsidiary's investment. Column 3 records that as the gap between the level of financial development in the subsidiary country and the owner country narrows (as reflected by an increase in the index) the negative effect of parent *Q* intensifies and reallocation within the MNE is enhanced. There is a smaller effect of parent *Q* on investment in subsidiaries operating in weak financial markets. This is consistent with the

hypothesis that influence effects are more likely to prevail when the subsidiary is in a weaker financial environment.

We note that allowing for heterogeneity in financial development brings out the significant positive effect of parent cash flow on subsidiary investment – a phenomenon we saw earlier when distance and ownership concentration were introduced. As financial development in the subsidiary country rises the effect of parent cash flow shrinks.

6. Conclusions

This paper investigates how the presence of a parent affects the investment behaviour of subsidiary firms. The study is relevant to several different but related literatures on internal capital markets, foreign direct investment and the macroeconomic experience of countries in financial crisis.

The approach we have taken is to examine the influence of foreign ownership in two stages. First in the context of internal versus external capital markets, we present evidence supporting the existence of internal capital markets that reallocate resources to members of multinational networks with superior investment opportunities. Second, we explore how various characteristics of the relationship between the subsidiary firm and its parent affect this reallocation. A new data set is employed that allows the investment opportunities of the subsidiary firm to be observed independently of those of the parent.

The results reported in this paper point to the reallocation of resources across subsidiaries in multinationals in response to changes in relative investment opportunities – a substitution effect. The effects of foreign ownership in this regard are particularly in evidence when the ownership stake of the foreign parent is relatively modest and when the parent is distant from the

subsidiary. The possible loss of information associated with smaller ownership stakes and greater distance appears to be outweighed by the potential influence drawbacks that arise from large ownership stakes and close proximity of a parent. The lower levels of parental ownership and greater distance between parents and listed subsidiaries of multinationals may explain the stronger evidence on the operation of internal capital reallocation to more profitable projects that we find in multinationals than has been previously reported in divisions of domestic conglomerates.

We also find that reallocation within MNEs in response to changes in relative investment opportunities is more in evidence as the gap between the level of financial development in subsidiary and owner country diminishes. This may reflect lower influence costs over subsidiaries that operate in better developed financial environments and a capital allocation process that comes closer to an arms-length 'market' relation.

Our results contribute new evidence to the ongoing debate about the macroeconomic role of the presence of multinational firms in the economy. It has been well-documented that in financial crises in host economies, foreign direct investment flows are less volatile as compared with other foreign capital flows in the form of portfolio investment and debt. Nevertheless, although FDI flows may be less volatile than other external capital flows the evidence of a negative parent *Q* effect shows why foreign-owned firms may cut back investment by more than do domestic stand-alone firms in the face of a negative host-country shock. Returning to the initial puzzle presented by investment behaviour of sample firms in the Asian crisis, our results suggest that the larger decline in investment in foreign than domestic-owned listed firms during the East Asian crisis is a consequence of the more extensive investment opportunities available to

foreign-owned firms.[20] Aguiar and Gopinath (2005) provide evidence that a component of the stability of the FDI flows in the Asian crisis relates to the merger and acquisition activity of MNEs as they were able to purchase domestic firms at 'fire-sale' prices. Distant parents with small ownership stakes may have been particularly well placed to make objective commercial assessments – including substituting M&A purchases for local fixed investment – without being subject to the same degree of local influence as domestic firms and those in close proximity to their subsidiaries.

[20] Although we cannot check explicitly for this, our findings are not inconsistent with those of Desai, Foley and Forbes (2007) – we would predict a rise in investment in those subsidiaries in East Asia in the wake of the crisis that benefited specifically from increased profitability associated with the currency devaluations. This should have been reflected in a rise in subsidiary relative to owner *Q*. Our aggregate results suggest that such firms are not dominant in our sample of listed subsidiaries.

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Tables

Table 1: Change in Investment in East Asian Firms in 1996-1998

	by foreign-owned firms		by domestic firms
Change in investment/total assets (Inv./TA)	-0.031		-0.022**
Change in Inv./TA (%)	-68%		-48%
	where parent is		
	in Asia	outside Asia	
Change in parent's Q	-0.35	0.12***	
Change in subsidiary's Inv./TA	-0.021	-0.035*	

Notes: This table reports summary statistics for listed firms operating in Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand, which reported their capital expenditure as a proportion of total assets. The table shows the average change in investment on total assets over the period 1996-1998. Parent's Q is the Tobin's Q of the parent firms divided into those parents located in the same region and those located outside the region. The data source is described in Section 2 and the Data Appendix. For each row ***, **, * indicates the significance of the difference with previous column at 1%; 5% and 10% level.

Table 2: Firm Ownership Data: Summary Statistics on Listed Firms by Country

Country	Firms	Subsidiaries	Parent of subsidiaries	Stand-alone	Foreign-owned subsidiaries	Parent of foreign subsidiaries
	Number	(% firms)	(% firms)	(% firms)	(% firms)	(% firms)
	(1)	(2)	(3)	(4)	(5)	(6)
Argentina	92	45%	1%	54%	20%	1%
Australia	1362	16%	3%	81%	13%	3%
Austria	90	31%	3%	66%	7%	3%
Bahrain	28	32%	4%	64%	21%	4%
Belgium	137	42%	4%	54%	13%	4%
Brazil	401	36%	1%	63%	14%	1%
Canada	1356	22%	3%	76%	15%	2%
Chile	232	26%	2%	72%	12%	2%
China	1316	15%	0%	85%	14%	0%
Colombia	77	22%	3%	75%	12%	3%
Costa Rica	17	12%	0%	88%	6%	0%
Croatia	23	48%	0%	52%	17%	0%
Czech Republic	49	45%	0%	55%	14%	0%
Denmark	147	26%	3%	71%	10%	3%
Egypt	364	14%	0%	86%	11%	0%
Estonia	13	54%	0%	46%	15%	0%
Finland	127	28%	5%	68%	8%	5%
France	699	56%	6%	38%	9%	6%

Country	Firms	Subsidiaries	Parent of subsidiaries	Stand-alone	Foreign-owned subsidiaries	Parent of foreign subsidiaries
	(1)	(2)	(3)	(4)	(5)	(6)
Germany	756	47%	4%	48%	13%	4%
Greece	233	58%	3%	39%	11%	3%
Hong Kong	269	19%	3%	78%	7%	3%
Hungary	28	18%	7%	75%	7%	7%
Iceland	14	21%	7%	71%	7%	7%
India	736	21%	1%	78%	9%	1%
Indonesia	297	19%	0%	81%	13%	0%
Ireland	64	25%	9%	66%	11%	9%
Israel	169	17%	1%	82%	8%	1%
Italy	229	53%	6%	41%	11%	6%
Jamaica	30	43%	3%	53%	3%	3%
Japan	3598	14%	2%	83%	8%	2%
Jordan	31	16%	0%	84%	6%	0%
Kazakhstan	15	27%	0%	73%	13%	0%
Kenya	13	38%	0%	62%	0%	0%
Korea, Rep. Of	1460	39%	1%	60%	8%	1%
Kuwait	49	10%	2%	88%	4%	2%
Latvia	23	35%	0%	65%	9%	0%
Lithuania	10	60%	0%	40%	20%	0%
Luxembourg	37	41%	5%	57%	14%	5%
Malaysia	941	13%	1%	86%	7%	1%

Country	Firms	Subsidiaries	Parent of subsidiaries	Stand-alone	Foreign-owned subsidiaries	Parent of foreign subsidiaries
	(1)	(2)	(3)	(4)	(5)	(6)
Mauritius	37	11%	0%	89%	8%	0%
Mexico	141	26%	8%	66%	4%	8%
Morocco	13	46%	0%	54%	8%	0%
Netherlands	175	22%	14%	65%	6%	14%
New Zealand	110	18%	1%	81%	8%	1%
Nigeria	32	16%	0%	84%	9%	0%
Norway	136	27%	5%	68%	6%	5%
Pakistan	140	21%	2%	76%	2%	2%
Panama	15	20%	0%	80%	13%	0%
Peru	162	26%	0%	74%	6%	0%
Philippines	226	16%	1%	83%	8%	1%
Poland	64	59%	0%	41%	13%	0%
Portugal	72	44%	7%	50%	10%	7%
Russia	45	42%	0%	58%	7%	0%
Saudi Arabia	16	31%	0%	69%	13%	0%
Singapore	516	19%	2%	79%	8%	2%
Slovakia	11	45%	0%	55%	0%	0%
South Africa	319	20%	6%	73%	1%	6%
Spain	148	45%	8%	48%	11%	8%
Sri Lanka	135	10%	3%	87%	4%	3%
Sweden	242	35%	9%	57%	3%	9%
Switzerland	224	48%	8%	44%	12%	8%

Country	Firms	Subsidiaries	Parent of subsidiaries	Stand-alone	Foreign-owned subsidiaries	Parent of foreign subsidiaries
	(1)	(2)	(3)	(4)	(5)	(6)
Thailand	420	13%	1%	86%	6%	1%
Tunisia	40	28%	3%	70%	5%	3%
Turkey	242	14%	1%	84%	4%	1%
United Arab E.	11	36%	0%	64%	9%	0%
United Kingdom	1869	20%	10%	71%	9%	9%
United States	7751	20%	4%	76%	3%	4%
Venezuela	58	19%	0%	81%	3%	0%
Zimbabwe	13	31%	8%	62%	0%	8%

Notes: This table provides summary statistics on listed countries around the world. Firms refer to the number of listed firms in each country. Subsidiaries are the number of these that report parents, i.e. they report that they are more than 50% and less than 100% owned by another entity. Parents of subsidiaries are firms which own more than 50% of another listed firm in their own country or around the world. Stand-alone firms have neither a parent nor subsidiary relationship. Foreign owned subsidiaries are owned by another listed firm in another country. Parent of foreign subsidiaries are firms which own a listed subsidiary in another country.

Table 3. Descriptive Characteristics of Sample Firms

		Subsidiaries	Parent of subs.	Stand-alone	Foreign-owned subs.	Parent of foreign subs.
Firms		4,886	1,028	16,272	2,833	969
Date of Incorporation		1969	1963	1974	1968	1961
Employees		6,643	63,208	8,023	7,252	74,598
Investment/Assets	Mean	0.051	0.051	0.045	0.05	0.051
	S.d.	0.052	0.045	0.051	0.053	0.044
	Median	0.036	0.042	0.032	0.035	0.042
Cash Flow / Assets	Mean	0.07	0.075	0.063	0.066	0.075
	S.d.	0.074	0.062	0.076	0.073	0.06
	Median	0.069	0.074	0.061	0.065	0.074
Sales growth	Mean	0.068	0.092	0.07	0.069	0.094
	S.d.	0.244	0.233	0.25	0.252	0.233
	Median	0.069	0.085	0.071	0.074	0.086
Q	Mean	1.6	1.96	1.58	1.59	1.96
	S.d.	1.06	1.05	1.06	1.08	1.05
	Median	1.33	1.74	1.32	1.31	1.74
Shareholding of Largest Owner		61.91		9.02	57.45	
Dist. to owner/(π.r) %	Mean	35.8	34.5		38.3	35
	S.d.	23.7	25.1		22.4	24.9
	Median	36.1	32		40.4	32
Stock Market/GDP %	Mean	49.6	58.6	60.3	53.2	58.1
	S.d.	30.9	27.7	32	34	28
	Median	53.2	53.2	53.2	53.2	53.2
Private Credit/GDP %	Mean	129	143	145	129	141
	S.d.	61.5	56.6	69.1	70.6	56.3
	Median	104	121	139	104	121

Notes: These data are for the firms for which we have ownership and location and financial data (i.e. the regression sample). Investment on total assets is Datastream item 08416 Asset Utilization Ratio measured as the annual item Capital Expenditures / (Total Assets - Customer Liabilities on Acceptances). Cash-flow is Datastream item 04860 (Net cash flow from operating activities) divided by total assets. Q is the share price divided by the book value per share (Datastream PTBV). Sales growth is the log difference in sales in US$ from Datastream item number 07240. Distance to owner is the great circle distance between capital cities of the two countries measured as a percentage of half the earth's circumference (i.e. max is 100). Employees is Datastream item WC07011. S.d. is standard deviation.

Table 4. Comparison between Listed and Unlisted Subsidiaries

		Listed Subsidiaries	Unlisted Subsidiaries
Number of subsidiaries in this sample	Mean	1.37	2.16
Total Assets (USD millions)	Mean	12	5
	S. d.	29	5
	Median	4	3
Employment	Mean	31,583	13,995
	S. d.	54,700	9,175
	Median	13,352	11,143
Share of ownership (%)	Mean	55.2	95.9
	S. d.	22	14.1
	Median	57	100

Notes: The sample includes all listed and unlisted subsidiaries of a subsample of parent firms (51 of them), where those parents are all the firms whose subsidiaries include at least one of the top 2,000 listed companies and at least one of the top 2,000 unlisted companies in Western Europe only. Employees is Datastream item WC07011. Share of ownership is the % stock held by the largest owner reported by the subsidiary. S.d. is standard deviation.

Table 5. Comparison between Subsidiaries and Their Owners

	Parent	Subsidiary
Investment/Total Assets	0.0555	0.0581
Cash flow/Total Assets	0.0924	0.0928
Total Assets (USD millions)	23	2
Cash flow (USD)	938,883	107,047
Stock Market Size in Parent or Subsidiary Country (% GDP)	58.2	55

Notes: Investment on total assets is Datastream item 08416 Asset Utilization Ratio measured as the annual item Capital Expenditures / (Total Assets - Customer Liabilities on Acceptances). Cash-flow is Datastream item 04860 (Net cash flow from operating activities) divided by total assets. Stock Market Size is the ratio of the total market value of listed companies to GDP from the World Bank.

Table 6. Regression of Investment by Subsidiaries on Parent's Tobin's *Q*

Variable	All subsidiaries	All subsidiaries	All subsidiaries	Matched to surrogate parent	IV
	(1)	(2)	(3)	(4)	(5)
Q_j	-0.0008	-0.0010	-0.0006	0.0001	-0.0101
	[0.0004]**	[0.0005]**	[0.0003]***	[0.0005]	[0.007]**
Subsidiary controls					
SG_i		0.0058	0.0082	0.0053	0.004
		[0.001]***	[0.001]***	[0.0011]***	[0.000]***
CF_i		0.0445	0.041	0.0452	0.047
		[0.0046]***	[0.0046]***	[0.0054]***	[0.002]***
Q_i		0.0082	0.0066	0.0084	0.0083
		[0.0003]***	[0.0003]***	[0.0004]***	[0.000]***
Parent controls					
CF_j		0.0068	0.0072	0.0039	0.018
		[0.0119]	[0.0111]	[0.0124]	[0.013]
Constant	0.0512	0.0346	0.0436	0.0345	0.0334
	[0.0006]***	[0.0006]***	[0.0009]***	[0.0007]***	[0.001]***
Firm effects	Y	Y	Y	Y	Y
Time effects	Y	Y	Y	Y	Y
Industry x Time effects			Y		
No. obs.	29878	29878	29878	24040	23813
R^2	0.012	0.035	0.062	0.033	0.01
First stage:					
Recession in parent country					-0.159
					[0.006]***
F-Test on exclusion:					18.96

Notes: This table reports the results from regressions of the subsidiary's capital investment / total assets on the indicated explanatory variables. Columns 1 to 4 are estimated by OLS with

firm fixed effects and year dummies. Column 3 also includes 2-digit industry dummies interacted with time. R2 is the 'within' R2. Column 5 uses IV with parent Q instrumented with a binary variable indicating the existence of a recession in the parent country. Robust standard errors are reported beneath the coefficients. *** 1%; ** 5% and * 10% level of significance.

Table 7. Correlation between Subsidiaries and their Parents

	Inv/TA (Subs.)	Cash Fl./TA (Subs.)	Sales gr. (Subs.)	Cash Fl/TA (Parent)	Q (Subs.)
Investment/TA (Subsidiary)	1				
Cash Flow/TA (Subsidiary)	0.3261	1			
Sales growth (Subsidiary)	0.0978	0.2009	1		
Cash Flow/TA (Parent)	0.0146	0.0033	-0.0011	1	
Q (Subsidiary)	0.1649	0.1994	0.135	-0.0043	1
Q (Parent)	0.0119	0.0034	0.0017	0.5691	0.0073

Notes: This table reports correlations between the listed variables. Investment on total assets is Datastream item 08416 Asset Utilization Ratio measured as the annual item Capital Expenditures / (Total Assets - Customer Liabilities on Acceptances). Cash-flow is Datastream item 04860 (Net cash flow from operating activities) divided by total assets. Q is the share price divided by the book value per share (Datastream PTBV). Sales growth is the log difference in sales in US$ from Datastream item number 07240.

Table 8. Robustness: Non-US Firms and Manufacturing Firms and Stand-Alone Firms

Variable	Non-US firms	Manufacturing firms	All subsidiaries	All stand-alone firms	Matched sample of stand-alone firms
	(1)	(2)	(3)	(4)	(5)
Q_j	-0.001	-0.0016			
	[0.0005]***	[0.0005]***			
Subsidiary controls					
SG_i	0.0065	0.0037	0.0057	0.0039	0.0055
	[0.001]***	[0.0015]***	[0.0009]***	[0.0005]***	[0.0007]***
CF_i	0.0446	0.0516	0.0446	0.0488	0.0542
	[0.0048]***	[0.0064]***	[0.0046]***	[0.0025]***	[0.0032]***
Q_i	0.0082	0.0082	0.0081	0.0075	0.0075
	[0.0003]***	[0.0005]***	[0.0003]***	[0.0001]***	[0.0002]***
Parent controls					
CF_j	0.0184	-0.0047			
	[0.0147]	[0.0182]			
Constant	0.0344	0.0379	0.034	0.032	0.033
	[0.0007]***	[0.0009]***	[0.001]***	[0.000]***	[0.0004]***
Firm effects	Y	Y	Y	Y	Y
Time effects	Y	Y	Y	Y	Y
No. obs.	28152	13798	29878	100330	30381
R^2	0.0356	0.0382	0.0348	0.0337	0.0361

Notes: This table reports the results from regressions of the subsidiary's capital investment / total assets on the indicated explanatory variables. Columns 1 to 4 are estimated by OLS with firm fixed effects and year dummies. R2 is the 'within' R2. Robust standard errors are reported beneath the coefficients. *** 1%; ** 5% and * 10% level of significance.

Table 9: Ownership Concentration, Distance and Financial Development

	Foreign-owned × ownership concentration (1)	Foreign-owned × distance (2)	Foreign-owned × financial development (3)
Q_j	-0.0012	0.0001	0.0008
	[0.0004]***	[0.0001]	[0.0008]
$Q_j \times Conc_j$	0.0003		
	[0.0001]***		
$Q_j \times Dist_j$		-0.0019	
		[0.0007]***	
$Q_j \times PrivCred_{ij}$			-0.0017
			[0.0006]**
Subsidiary controls			
SG_i	0.0069	0.0067	0.0057
	[0.0022]***	[0.0018]***	[0.0018]***
CF_i	0.0457	0.0443	0.0444
	[0.0115]***	[0.0089]***	[0.0088]***
Q_i	0.0097	0.0086	0.0087
	[0.0007]***	[0.0006]***	[0.0006]***
Parent controls			
CF_j	0.0232	0.0463	0.0585
	[0.0139]*	[0.0226]***	[0.0263]**
$CF_j \times Conc_j$	-0.0029		
	[0.0015]*		
$CF_j \times Dist_j$		-0.0011	
		[0.0005]***	
$CF_j \times PrivCred_{ij}$			-0.0377
			[0.0177]**
Constant	0.0354	0.0348	0.0352
	[0.0016]***	[0.0013]***	[0.0012]***

Firm effects	Y	Y	Y
Time effects	Y	Y	Y
N	6798	9087	6283
R2	0.0464	0.0378	0.0323

Notes: This table reports the results from regressions of the subsidiary's capital investment / total assets on the indicated explanatory variables. Columns 1 to 3 are estimated by OLS with firm fixed effects and year dummies. Investment on total assets is Datastream item 08416 Asset Utilization Ratio measured as the annual item Capital Expenditures / (Total Assets - Customer Liabilities on Acceptances). Cash-flow is Datastream item 04860 (Net cash flow from operating activities) divided by total assets. Q is the share price divided by the book value per share (Datastream PTBV). Sales growth is the log difference in sales in US$ from Datastream item number 07240. Distance to owner is the great circle distance between capital cities of the two countries measured as a percentage of half the earth's circumference (i.e. max is 100). Private Credit is the ratio of private credit to GDP from the World Bank. R2 is the 'within' R2. Robust standard errors are reported beneath the coefficients. *** 1%; ** 5% and * 10% level of significance.

Table 10. Location of Parents and Subsidiaries by Level of Financial Development

	Parent in High Financial Development Country	Parent in Low Financial Development Country
	% Parent-subsidiary pairs:	
Subsidiary in High Financial Development Country	53.70%	1.03%
Subsidiary in Low Financial Development Country	40.50%	5.64%

Notes: This table describes the distribution of subsidiaries across categories which describe both their and their parent's home country financial development, where "High Financial Development" indicates countries with above median ratios of Private Credit to GDP as measured by the World Bank. Data is from 4,200 parent-subsidiary pairs.

Appendix: Construction of the data-set

A. Primary source

We begin with the population of firms listed on the world's stock exchanges provided by the OSIRIS database published by Bureau van Dijk Electronic Publishing which gathers its information from several sources including World'Vest Base, Fitch, Thomson Financial, Reuters, and Moody's. For 2005, there are 28,915 firms listed on the world's stock exchanges. Table 1 presents the distribution of these firms by country.

B. Identifying stand-alone, owned and owner firms in the data-set.

The OSIRIS data records a firm as having a parent if another entity has financial and legal responsibility for it, i.e., it holds more than 50 per cent and less than 100 per cent of the subsidiary's equity.

The OSIRIS data only reports ownership at one point in time 2005, but we have older ownership data from Dun and Bradstreet which enables us to identify ownership in 1994. After matching these data we exclude firms from the sample if the location of their owner is different in these two datasets.

We discard subsidiary firms from the sample if they experienced a change in ownership over the period, or if their ownership information is unavailable, or if key financial information (matched to and collected from Datastream) is missing over the period. This leaves us with 4,886 subsidiaries which have been continuously owned and controlled by 1,028 distinct global ultimate firms over the period.

C. Sources and definitions of variables

The OSIRIS data-base reports a unique identification number for each parent firm that enables us to match firms with financial data on their parents. This was merged with the market and financial data from Datastream.

The parent's data is given in consolidated form, so we take out the effect of the subsidiary to extract the parent's pure data.[21]

Capital expenditure: funds used to acquire fixed assets including expenditures on plant and equipment, structures and property but excluding any expenditures associated with mergers or acquisitions. To account for differences in size and for inflation over time and to avoid heteroscedasticity we divide investment by total assets at the beginning of the period. Datastream item 08416 Asset Utilization Ratio measured as the annual item Capital Expenditures / (Total Assets - Customer Liabilities on Acceptances).

Average *Q*: the firm's market-to-book ratio at the end of the prior fiscal year. To calculate parent's *Q*, we took the effect of subsidiary variables out of consolidated data in order to get parent's data, i.e. Total *Q* = asset-weighted sum of parent and subsidiary *Q*; from which we calculate unconsolidated *Q*. *Q* is the share price divided by the book value per share (Datastream PTBV).

Liquidity. Cash flow divided by total assets at the start of the year. Datastream item 04860 (Net cash flow from operating activities) divided by total assets. *Q* is the share price divided by the book value per share (Datastream PTBV).

Sales growth. Sales growth is the log difference in sales in US$ from Datastream item number 07240.

[21] For example we use the employment in the subsidiary E_i and the total consolidated employment, E_T to determine the firm's Q_j which we call parent's *Q*, but really refers to the *Q* of the entire entity except the subsidiary. The firm's consolidated *Q* is $Q_T = ((Q_i*E_i + Q_j*E_j)/E_T)$. So parent's *Q* is $Q_j = (Q_T*E_T - Q_i*E_i)/E_j$.

Distance to owner is the great circle distance between capital cities of the two countries measured as a percentage of half the earth's circumference (i.e. max is 100).

Employees is Datastream item WC07011.

Ratio of credit to the private sector to GDP and size of the stock market to GDP.

Recession year dummy. Quarterly GDP data from the IMF's International Financial Statistics (IFS). The recession dummy variable indicating whether a country is experiencing a recession in a particular year is constructed following Braun and Larrain (2005). For each country 'troughs' are identified as years when the current log of real local currency GDP (from World Bank, 2005) deviates by more than one standard deviation from its trend level (computed using the Hodrick-Prescott filter with a smoothing parameter of 100). A local peak is then defined as the most recent year for which cyclical GDP (the difference between actual and trend values) is higher than the previous and posterior years. The recession variable is one for the years between the peak and trough (excluding the peak year), and zero for other years.

Appendix: Propensity Score Matching Results

We use matching techniques to account for the possibility that membership of the sample of owned firms is endogenous. In particular we are concerned that the levels of our variable of interest (Q_{it}) may jointly determine the likelihood of a firm being a subsidiary and the relationship between its investment opportunities and its actual investment. We use the propensity score matching method of Rosenbaum and Rubin (1983). We identify the probability that a firm is a subsidiary using a probit model.

$$P(Sub_{ihc}=1) = F(Z_{ihc}, D_{hc}),$$

where F is the normal cumulative distribution function, Z_{ihc} is a vector of firm characteristics including Q, cash flow, and sales growth, and D_{hc} is a full set of country and industry dummies,

where the subscript h is industry and c is country. We use the predicted probability, P_{ikc}, as a monotone function to select comparison stand-alone observations for each subsidiary observation. The nearest neighbour, k, to each subsidiary observation is selected such that

$$| P_{ihc} - P_{khc} | = \min\{ P_{ihc} - P_{khc} \}$$

over all k in the set of stand-alone firms. Matches are only accepted if $\min\{ P_{ihc} - P_{khc} \}$ is less than a caliper which we vary. The strength of this method also relies on our ability to identify the variables that determine firm ownership. While our model has only weak predictive power it does allow us to check that sample selection is not driven by our key variables of interest (see Table A1). We find no significant difference between our results for the whole sample of stand-alone firms and the matched sample derived from calipers between 0.005 and 0.01.

Table A1.

Matching Regression:	
Qi	0.008
	(0.005)*
SG_i	0.069
	(0.029)**
CF_i	0.012
	(0.003)***
Age	0.006
	(0.001)***
Industry dummies	Yes
Country dummies	Yes
Observations	24982
R^2	0.081

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%