Internal capital markets of multinational corporations: What role for multinationality?*

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Abstract

This paper is about the implications of multinationality for the internal allocation of funds within a multinational corporation. Multinationality comes in two respects. First, it may create diversity with regard to asset tangibility because institutions that provide for, e.g., the enforceability of contracts differ across countries. Second, cross-border integration of projects may result in a higher degree of firm opacity, which potentially hampers financiers to cope with additional contractual problems that arise in the presence of diversity in terms of tangibility. We analyze the respective optimum financial contracts and draw some conclusions regarding the international capital allocation.

Keywords: Internal capital markets, multinational corporations, incomplete contracts, asset tangibility

JEL Classification: G31, F23, D82

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Abstract

This paper is about the implications of multinationality for the internal allocation of funds within a multinational corporation. Multinationality comes in two respects. First, it may create diversity with regard to asset tangibility because institutions that provide for, e.g., the enforceability of contracts differ across countries. Second, cross-border integration of projects may result in a higher degree of firm opacity, which potentially hampers financiers to cope with additional contractual problems that arise in the presence of diversity in terms of tangibility. We analyze the respective optimum financial contracts and draw some conclusions regarding the international capital allocation.

1 Introduction

Theories of internal capital markets investigate the determinants of the allocation of funds across different businesses within a multi*divisional* firm. They build on several contractual problems between headquarters and external financiers as well as between headquarters and the firm's divisions.[1] While these theories may in principle also apply to multi*national* corporations (henceforth MNCs), there is unfortunately barely anything that pertains exclusively to internationally operating companies: In the contemporary world of finance issues as enforceability of contracts and laws as well as accountability are central to financial and investment decisions. Yet, to the best of our knowledge, no theory deals with those issues in the way in which they manifest themselves to corporations investing abroad. Put differently, existing multidivisional firm theories cannot differentiate between investment in Brazil and Germany, while real-world MNCs (and their financiers) very much see a difference between those two countries.

[1] Papers in this theoretical literature include, among others, Gertner, Scharfstein and Stein (1994), Stein (1997), Scharfstein and Stein (2000), Laux (2001), Stein (2002), Inderst and Müller (2003), and Brusco and Panunzi (2005).

This paper proposes a framework that provides a rationale for multidivisional decision-making in an international context. We start from the observation that MNCs tend to be firms with a fairly high share of intangible assets (Markusen 1995) and we argue that the tangibility of assets depends on legal provisions for the enforceability of contracts and laws in the countries where these assets are located.[2] For example, when assets are to be liquidated, lacking property rights and unpredictable legal decisions require additional costly safeguarding measures to enforce the claims specified in the sales contract. Furthermore, in a country with an inadequately developed financial system potential purchasers of assets may be heavily credit constrained and, therefore, opportunities to collect high prices can be limited. All in all, one might expect MNCs to exhibit a low degree of tangibility if assets were primarily bound to a subsidiary located in a country where financiers encounter particular difficulties in finding a potent and reliable buyer for the assets.[3]

A second aspect of multinationality is related to the degree of opacity of internationally operating firms. In our view opacity mainly refers to whether external financiers of MNCs are able to control the allocation of funds across its subsidiaries. In this sense, an opaque company hampers such attempts and external financiers may have to bear additional inefficiencies brought up by the creation of a cross-border internal capital market. And it appears to us that opacity becomes more important when diversity in terms of tangibility increases. Regarding this second aspect of multinationality, we make a case for the role of creditor protection rights adopted in the country in which the MNC is headquartered. We presume that weakly protected financiers cannot control the allocation of resources within the firm, that is to say MNCs based in less developed countries are, in principle, more likely to be opaque. To give an example, when accounting standards are low courts cannot verify whether the firm-internal allocation of funds is as required by a covenant. When in addition the interests of financiers regarding the internal allocation diverge from those of headquarters (and we show that this is the case when tangibility

[2] As in Campello (2005), for example, the term tangibility reflects the external financiers' valuation of a firm's hard, transferable assets in liquidation.

[3] Studies like Lins and Servaes (1999) and Fauver, Houston and Naranjo (2003, 2004) seem to support the view that institutions matter regarding (in-)efficiencies in internal capital markets of multidivisional firms.

differs across subsidiaries), financiers cannot enforce their wanted allocation. In countries where external financiers can reap the benefits of well developed creditor protection rights, however, a financial contract governs the use of funds. In these countries, opacity is almost never an issue even if tangibility of assets differs strongly across subsidiaries. Multinationals headquartered there can thus commit themselves to pursuit not only own interests but also those of financiers.

Having in mind these two aspects of multinationality – diversity and opacity – two fundamental questions arise. First, how do they influence the internal capital allocation within MNCs? And second, what determines the financiers' willingness to provide funds? These questions are addressed in this paper from a theoretical perspective.[4] We apply an incomplete contracting model to the investment and financing problem of an MNC where headquarters has an incentive to default strategically in order to renegotiate on the terms of the debt contract. Financiers cope with this problem by restricting the face value of debt to the liquidation value of tangible assets. In a nutshell, when the MNC is opaque and financiers are thus not able to control the internal allocation of funds, headquarters may be inclined to invest funds strategically biased to improve her relative bargaining position in renegotiations, i.e. in a way which restrains financiers to some extent from liquidating assets when the firm defaults. But anticipating this behavior, financiers tighten the borrowing constraint sharply. As a result an MNC will mainly use own funds and invest such that marginal returns on investment are balanced across its subsidiaries. On the other hand, when the MNC's investment policy is transparent owing to, e.g., reliable disclosure rules, headquarters may commit to favoring subsidiaries in countries where assets are highly tangible – in some respects fairly unconcerned about balancing marginal returns on investment. With this policy headquarters primarily strives for loosening the borrowing constraint since financiers tend to reward this behavior.

[4] There are some empirical papers that refer to internal capital markets of MNCs (e.g. Desai and Foley 2004, Desai, Foley and Hines 2004, Desai, Foley and Forbes 2004, Klein, Peek and Rosengren 2002, Peek and Rosengren 2000, and Stevens and Lipsey 1992). But none of them attributes its findings to multinationality.

The arguments in this paper add to the findings regarding the allocation mechanisms inside a multidivisional firm.[5] A common basic assumption in this literature is that headquarters exerts control rights in terms of Grossman and Hart (1986) over the resources pooled in a multidivisional firm.[6] In accordance with Hart (1995), these rights allow headquarters to pursuit own interests while deciding on the allocation of funds – as long as it is not contrary to existing law or enforceable contractual agreements. One motive which drives her decision is to channel resources to the most productive projects or, put differently, to pick up winners (Stein 1997).[7] Albeit this strategy aims at improving on the efficiency of capital allocation, it also generates additional adverse incentives on the divisional level. For example, managers who fear of loosing some of their funds under control may have lower incentives to exert effort in order to improve the prospects of their respective projects. This destroys value even though reallocation of funds by headquarters is efficient ex post (Brusco and Panunzi 2005). Winner picking may be also associated with adverse incentives on the part of headquarters. For example, investing in highly productive projects and pooling their cashflows afterwards improves headquarters' opportunities to finance follow-up investments internally, in which case she has not necessarily to return to the external market. But if headquarters can only be disciplined by the threat of refusing any follow-up finances, the rising ability to self-funding weakens her incentives to meet her debt obligations (Inderst and Müller 2003).

A second motive driving the allocation of resources is referred to as socialism or cross-subsidization. Here, headquarters is inclined to support the weakest divisions in the capital budgeting process at the expense of stronger ones. This phenomenon arises when headquarters is not willing to provide

[5] See Hellwig, Laux and Müller (2002) and Stein (2003) for comprehensive surveys on this literature.

[6] Headquarters can then be seen as a central financing agency for divisions. Assigning these rights to a single agent prevents free-riding among financiers as almost all types of intermediated financing do. A seminal paper on financial intermediation as an institution solving a coordination failure among financiers is Diamond (1984). However, in contrast to a bank, headquarters possesses these rights unconditionally, while banks can exert pressure on borrowers only in the case of default.

[7] Channeling resources should be understood broadly. It may concern cashflows (as in Stein 1997) as well as real assets that are already in place (as in Gertner et al. 1994).

necessary incentives for division managers by paying them higher wages but bribes them by assigning higher capital budgets (Scharfstein and Stein 2000). Rajan, Servaes and Zingales (2000) add on this mechanism arguing that socialism may result from internal power struggles within highly diversified firms.[8]

In this paper there is neither room for winner picking nor socialism since projects are assumed to be identical in terms of productivity. Instead we highlight two additional, so far unconsidered motives, which rest on the notion of multinationality as specified above: commitment and strategic investment. The paper is organized as follows. Section 2 introduces a simple model of debt renegotiations. In section 3 we consider an MNC headquartered in a well developed financial system while section 4 deals with an opaque MNC based in a financial system with inadequately developed creditor rights. The implications of the analysis are subsequently presented in section 5. The final section consists of concluding remarks.

2 The basic structure of the model

The model is a contracting model with a long-term investment where pledgeability of cashflows is limited. It is therefore related to papers like Bolton and Scharfstein (1990), Hart and Moore (1998) and Campello (2005), but particularly to Hart and Moore (1994) from which we adopt the main assumption that an entrepreneur can quit at some date before the returns are due and withdraw his human capital from the project. This potential behavior puts an upper bound on total indebtness if the entrepreneur cannot costlessly replaced by the financiers. For the same reason as in Hart and Moore (1994) the optimal contract is a debt contract where the entrepreneur owes a repayment which is constant across states and where financiers assume control over the project's assets when the entrepreneur does not meet his obligations.

[8] In summary, evidence for dysfunctional internal capital markets in the context of multidivisional firms is provided by Berger and Ofek (1995), Lamont (1997), Shin and Stulz (1998) and Rajan et al. (2000), among others.

Consider an internationally operating entrepreneur who has at date $T = 0$ two investment opportunities (projects) in different countries. Let I_n denote capital investment in country $n = 1, 2$ and suppose that each project yields a nonverifiable but safe return $R(I_n)$ at date $T = 2$ if the entrepreneur contributes his specific knowledge at some intermediate date $T = 1$. The production function R is twice continuously differentiable with $R(0) = 0$ and satisfies the Inada conditions.

If the entrepreneur does not provide his human capital the physical assets can generate returns only by means of liquidation. The proceeds of liquidation depend on the respective tangibility of assets. Assets that are more tangible are associated with higher liquidation proceeds than assets that are less tangible. We assume that liquidation will yield βI_1 or $\mu\beta I_2$, respectively. By this, tangibility of assets in country 1 is reflected by β while the relation of the degrees of tangibility of both countries is captured by $\mu \in [0, 1]$. For the sake of avoiding trivialities we further assume that $\beta < \gamma$ with γ being the marginal gross return on an alternative investment.

First-best investment I_n^{fb} in country n is implicitly defined by $R'(I_n^{fb}) = \gamma$. When internal funds W of the entrepreneur do not suffice to finance these first-best investments, i.e. when $I_1^{fb} + I_2^{fb} > W$, the entrepreneur may raise a loan from external financiers to fill this gap. According to Hart and Moore (1994) financial contracts may be unenforceable, however, when the entrepreneur cannot commit himself at $T = 0$ to contribute his specific human capital to the project at $T = 1$. Hence, even though at $T = 0$ funds are invested and repayments payable to the financiers at $T = 2$ are agreed upon, the entrepreneur might initiate renegotiations at $T = 1$ to beat down repayments by the threat of withdrawing his specific skills. Assuming that the entrepreneur has all the bargaining power he can offer a new payment equal to the liquidation value of assets and the financiers can do nothing better but accept. The entrepreneur therefore has an incentive to renege on the repayments to financiers when the promised repayment H exceeds the liquidation value of assets. Put differently, actual repayments P are bounded above by the total liquidation proceeds $\beta I_1 + \mu\beta I_2$:

$$P = \min\left\{H, \beta I_1 + \mu\beta I_2\right\}. \tag{1}$$

To complete the model setup, we need to pin down two further restrictions generally known as the participation constraints. First, financiers are willing to supply funds only if P satisfies

$$P \geq \max\{\gamma(I_1 + I_2 - W), 0\} \tag{2}$$

where $I_1 + I_2 - W$ is the size L of the loan when it is positive. Assuming that financiers are competitively organized, condition (2) holds with strict equality. Second, the entrepreneur will accept a contract when the sum of the projects' returns net of repayments to the financiers cover at least the opportunity costs of internal funds, which could also be invested in the alternative investment yielding a marginal return γ:

$$R(I_1) + R(I_2) - P + \max\{\gamma(W - I_1 - I_2), 0\} \geq \gamma W \tag{3}$$

Note that an entrepreneur who does not raise a loan could also invest any dollar out of his internal funds not only in the projects but also in the alternative asset; this is accounted for in the fourth summand on the left-hand side. However, since there are no other costs than I for projects to be carried out, participation constraint (3) will not be binding in equilibrium and we henceforth neglect it in our formal analysis.

3 Transparency and commitment

Having set up the general structure of the model we proceed with an MNC that is always transparent irrespective of how diverse (in terms of asset tangibility) it is. As already noted in the introduction, this is the case whensoever the MNC is headquartered in a country with a well developed financial system where institutions exist that enforce financial contracts whatever happens. This may apply to countries with market-based financial systems where accountability and legal creditor protection are well developed such that financiers can effectively control the internal allocation of funds. But it will also be the case in countries with well developed banking systems where entrepreneurs maintain strong lending relationships with banks. The main characteristic of such a lending relationship is that a banker not only supplies

funds but also controls the allocation of funds within the firm.[9] Monitoring activities allow her to gather internal information about the firm, and based on this knowledge she can directly exert influence on the internal capital allocation.[10] Although it is not a priori clear which system is more efficient in terms of enforcing contracts (see discussion in Allen and Gale 2000), we call financiers who are able to control the internal capital markets of their borrowers as banker – irrespective whether the financial system is bank-dominated or not.

The contracting problem can be seen as a situation where the entrepreneur and the banker jointly maximize total surplus with respect to the investment profile (I_1, I_2) taking (1) and (2) simultaneously into account. Combining these two restrictions yields that the face value of debt γL is bounded above by the respective liquidation value of the acquired assets, and the borrowing constraint arising from a limited pledgeability of income streams reads as

$$\beta I_1 + \mu\beta I_2 \geq \max\left\{\gamma(I_1 + I_2 - W), 0\right\}. \tag{4}$$

The optimization problem can then be written as

$$\begin{aligned} &\max_{I_1, I_2} R(I_1) + R(I_2) - \gamma(I_1 + I_2) \qquad (5)\\ &s.t.\\ &\beta I_1 + \mu\beta I_2 \geq \max\left\{\gamma(I_1 + I_2 - W), 0\right\} \end{aligned}$$

and the associated FOC are given by

$$R'(I_2^C) - \frac{\gamma - \mu\beta}{\gamma - \beta} R'(I_1^C) + \frac{\gamma\beta\,(1-\mu)}{\gamma - \beta} = 0 \tag{6}$$

$$\beta I_1^C + \mu\beta I_2^C - \gamma(I_1^C + I_2^C - W) \geq 0 \tag{7}$$

$$\lambda \geq 0 \tag{8}$$

[9] Though the basic model setup corresponds to that in Diamond and Rajan (2001) we do not consider a banker as an agent who has superior liquidation skills but as someone who actively controls how funds are used by the entrepreneur.

[10] Ergungor (2004) shows that banks emerge as institutions that enforce contracts by monitoring or screening borrowers when the legal system is not sufficiently flexible. With flexibility, courts enforce contracts effectively and banks do not play a significant role.

with (6) being the marginal condition, (7) the borrowing constraint, λ the Lagrangian multiplier, and I_n^C the investment in country n of a transparent firm. In what follows the upper index C stands in for commitment.

These conditions leads us to

Proposition 1 *Define a critical value of internal funds*

$$W_{crit}^C := \left(2 - \frac{\beta(1+\mu)}{\gamma}\right) I^{fb}. \tag{9}$$

The optimum investment is then characterized by:

1. *If $W \geq W_{crit}^C$, there are first-best investments in both projects, i.e. $I_1^C = I_2^C = I^{fb}$.*

2. *If $W < W_{crit}^C$, there is underinvestment in both projects with underinvestment being more severe in country 2 where tangibility of assets is worse, i.e. $I_2^C < I_1^C < I^{fb}$.*

Proof. See Appendix. ■

The results of proposition 1 are driven by the entrepreneur's need to trade off not only the marginal returns on investments but also to take into account the different effects these investments have on the strength of the borrowing constraint. Since assets in country 2 are less tangible and therefore less valuable to a banker than assets bound to country 1, her willingness to grant a loan is even more restricted when the entrepreneur uses funds for investment in country 2. Thus, when the financial constraint is binding, i.e. when $W < W_{crit}^C$, an entrepreneur is willing to forgo investment returns in country 2 in favor of financial easing.

4 Opacity and strategic allocation

The financial contract derived in the previous section requires that the entrepreneur can credibly commit himself to the investment profile (I_1^C, I_2^C), i.e. once the contract is concluded the entrepreneur is not able to use funds (including the loan) in any way different from what is stated in the contract. Financiers may, however, not be able to control the internal allocation of

resources when this allocation is not verifiable – a situation which refers to what we term opacity.

When projects differ regarding the degree of asset tangibility, this deficiency generates an additional problem at the entrepreneurial level since, in principle, the entrepreneur can henceforth allocate funds strategically. By strategic allocation we mean that the entrepreneur's investment strategy aims at a weakening of the bargaining position of financiers in renegotiations. And he can do so when the tangibility of assets differs across countries. In what follows we consider in a first step the entrepreneur's investment decision for a given amount of funds available. Subsequently, in a second step we endogenise the loan size and ask how the optimum loan contract looks like when the firm is opaque.

4.1 Investment decision

The entrepreneur decides on capital investment when the loan L is already granted. He knows that the allocation of funds may affect what he has to pay back to financiers because liquidation proceeds depend on the capital allocation and any promised payments higher than the liquidation proceeds can be in principal renegotiated later on. While renegotiation-proof payments $P = \min\{H, \beta I_1 + \mu\beta I_2\}$ look identical to those in the case of a transparent corporation, their implications are fairly different now. The reason is that the entrepreneur is able to implement a self-interested investment profile when the allocation of funds is not verifiable. Note that owing to the budget constraint it suffices to consider investment in one country only and the incentive constraint reads as

$$I_1^S \in \arg\max_{I_1} \left[R(I_1) + R(L + W - I_1) - \min\{H, \beta I_1 + \mu\beta(L + W - I_1)\}\right]. \tag{10}$$

In what follows the upper index S stands in for an opaque MNC which can invest strategically. The optimum strategic investment in country 1 (I_1^S) can be further specified:

Lemma 1 *An investment*

$$\hat{I}_1^S : R'(\hat{I}_1^S) = R'(L + W - \hat{I}_1^S)$$

is called symmetric as the entrepreneur does not care about asset tangibility, i.e. $\hat{I}_1^S = \frac{1}{2}(L+W)$*, whereas an investment*

$$\bar{I}_1^S : R'(\bar{I}_1^S) = R'(L+W-\bar{I}_1^S) + \beta(1-\mu)$$

is called strategically biased as the entrepreneur attaches a larger weight on that project with assets that are less tangible and a smaller weight on the other, i.e. $\bar{I}_1^S < \frac{1}{2}(L+W)$*. Define* H^* *as the largest promised repayment for which it does not pay to invest strategically biased and to renegotiate. Then* H^* *and the optimum investment* I_1^S *simultaneously fulfill the following conditions*

$$\begin{aligned} H^* &= \left[R(\hat{I}_1^S) + R(L+W-\hat{I}_1^S)\right] \\ &\quad - \left[R(\bar{I}_1^S) + R(L+W-\bar{I}_1^S)\right] \\ &\quad + \left[\beta\bar{I}_1^S + \mu\beta(L+W-\bar{I}_1^S)\right], \end{aligned} \tag{11}$$

$$I_1^S = \begin{cases} \bar{I}_1^S & \text{if} \quad H > H^*, \\ \hat{I}_1^S & \text{if} \quad H \leq H^*, \end{cases} \tag{12}$$

where $\beta\bar{I}_1^S + \mu\beta(L+W-\bar{I}_1^S) < H^* < \beta\hat{I}_1^S + \mu\beta(L+W-\hat{I}_1^S)$*.*

Proof. See Appendix. ■

Lemma 1 is a reformulation of the incentive constraint (10). It reflects that the entrepreneur is generally inclined to allocate funds strategically biased unless either the projects have identical liquidation values ($\mu = 1$) or promised repayments do not exceed some critical value H^*. This critical value depends itself on the investment profiles in the two regimes and lies in the open interval between the respective liquidation proceeds.

A graphical representation may help to interpret lemma 1 (figure 1): Consider the entrepreneur's profits. With H being small it never pays to renege on promised repayments. This is because the liquidation value of assets is higher than what is promised to repay irrespective of the capital allocation. With repayments being independent from the investment policy, however, the entrepreneur always invests symmetrically (i.e. marginal returns are balanced) as this implies maximum total returns.

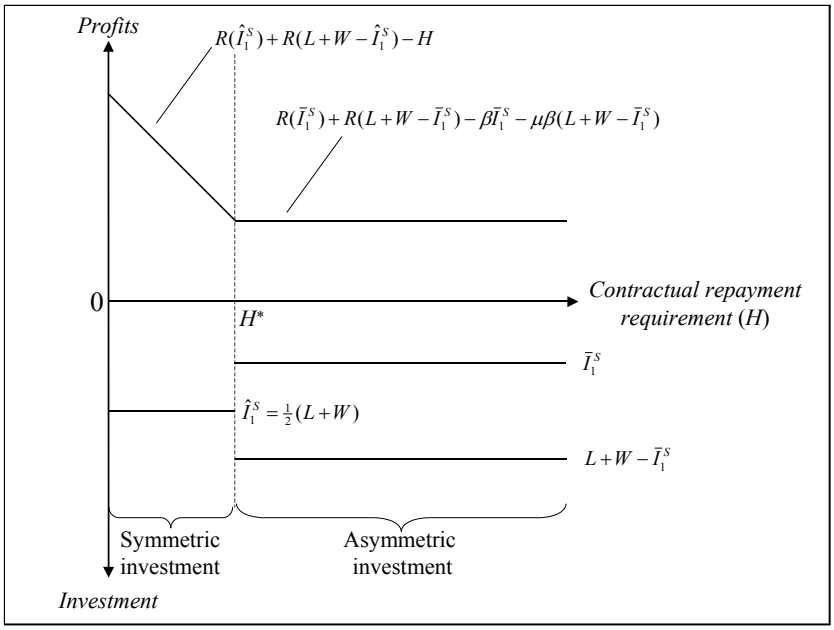

Figure 1: Debt and investment

When promised repayments exceed the liquidation value of assets associated with a strategically biased investment (which is the optimum investment policy when the entrepreneur wants to renegotiate), the entrepreneur would in principle prefer to renege on H if he would invest strategically biased. However, investing strategically biased has not only a benefit as repayments can be beaten down. Its downside is that it implies a deviation from a return maximizing investment policy. Symmetric investment and observing the contract are therefore still advantageous as long as the profits of a symmetric investment along with keeping the contractual repayments are higher than investing strategically biased and entering into renegotiations afterwards. The investment decision changes if the repayment obligation exceeds H^* for which profits of investing symmetrically and complying with the contract's promises are just equal to the profits of investing strategically biased and breaking the contract: For any $H > H^*$ it does not pay to observe the contract and the entrepreneur is better off by a policy where investment is higher in that project where assets are less tangible. To summarize, profits are a decreasing and

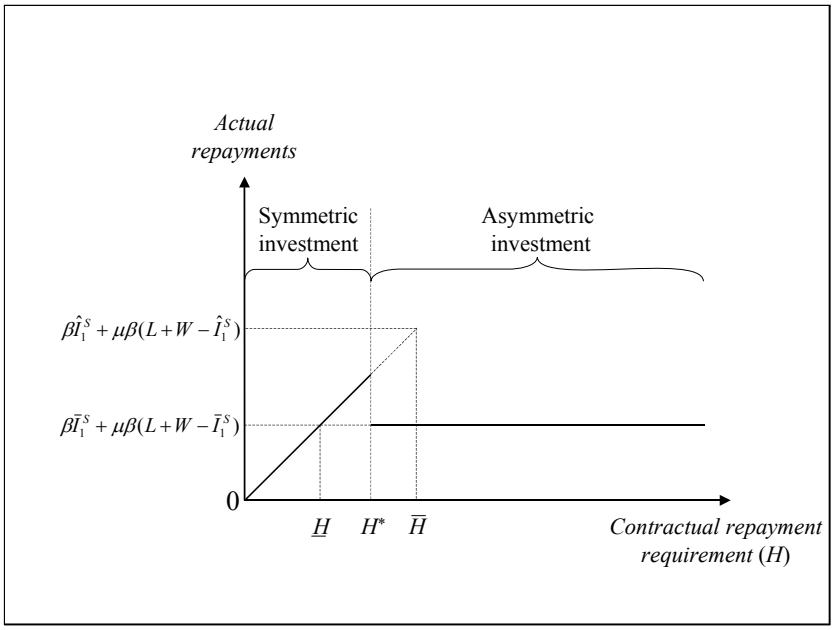

Figure 2: Repayments and repayment obligation

convex function of the promised repayment as shown in the first quadrant in figure 1.

On the other hand, actual repayments are a convex (non-monotonic) function of the promised repayment (figure 2). As raising the promised repayments does not impair the incentives for symmetric investment as long as they remain below H^*, actual repayments P are increasing one-to-one in H. However, if the entrepreneur promises to repay more than H^* he certainly will both invest strategically biased and renege on the promised repayments afterwards. A marginal increase in H above H^* therefore implies that the amount actually paid by the entrepreneur will drop once and for all, and will not change anymore when H further increases.

The following proposition summarizes the main result obtained so far.

Proposition 2 *For an opaque MNC the maximum enforceable repayments to financiers P^* are given by H^* according to lemma 1, and investment will always be symmetric.*

Proof. The proof follows directly from lemma 1. ■

One important implication of proposition 2 is that even if a repayment smaller than H^* is promised the investment profile differs from optimum investment under commitment. As already shown in section 3, symmetric investment is – given the holdup problem and $\mu < 1$ – efficient only if the financial constraint is not binding. With an entrepreneur having an opportunity to invest strategically biased, however, there will always be symmetric investment irrespective whether the borrowing constraint is binding or not. Compared to a transparent MNC, there is thus a tendency to invest more in assets which are less tangible (however, compared to the first best allocation there is no such bias but only underinvestment). The reason is that financiers and an opaque MNC can agree upon a contract that specifies only a repayment. If capital allocation were verifiable, the parties would instead stipulate both the repayment *and* the investment profile, and the entrepreneur could not deviate from what would be agreed upon regarding the allocation of funds. But with capital allocation being nonverifiable nothing can be made contingent on the investment policy, and from an entrepreneur's perspective it is best to split funds such that marginal returns are counterbalanced.

4.2 The optimum loan contract

Having analyzed the entrepreneur's investment policy for an exogenously given amount of funds, let us turn to the question, what effect opacity has on the strength of the borrowing constraint. Put differently, we now ask how many funds can be borrowed by the entrepreneur when the capital allocation is not verifiable. Assume that the entrepreneur is to make a take-it-or-leave-it offer to financiers at $T = 0$ and proposes both a loan size L^S and a repayment H^S. But which combination of L^S and H^S does maximize the entrepreneurs profits? While answering to this question one has to recognize that financiers anticipate what the entrepreneur will do with the funds and that they will only agree upon a loan contract when the proposed size of the loan and the offered repayments ensure that they are not worse off than investing in the alternative asset.

From our analysis so far, we are able to specify the incentive-compatible relationship between the size of the loan L and the maximum enforceable repayment P^*:

Lemma 2 *For $W > 0$ the maximum the entrepreneur can commit to paying (P^*) is a continuous and monotonously increasing function of the loan size L satisfying*

$$\frac{\partial P^*}{\partial L} < \beta \quad \text{if } \mu < 1, \tag{13}$$

$$\frac{\partial P^*}{\partial L} = \beta \quad \text{if } \mu = 1, \tag{14}$$

and

$$P^*|_{L=0} > 0. \tag{15}$$

Proof. See Appendix. ■

As an increase in the loan size allows the entrepreneur to accumulate more assets, and since assets' returns can only be pledged up to their liquidation value, any additional dollar lent to the entrepreneur increases the maximum enforceable repayment by the projects' marginal liquidation value, which is at most as large as the marginal liquidation value β of the most tangible assets. Moreover, with $W > 0$ the maximum enforceable repayment is strictly positive since any investment has a positive liquidation value to be pledged even if investments are financed solely by internal funds.

Besides, the financiers' participation constraint defines another relationship between P^* and L that has to be taken into account:

Lemma 3 *According to (2) financiers are willing to extend lending by γ^{-1} when the enforceable repayments P^* increase by one dollar.*

Figure 3 illustrates the interplay between these two relationships assuming $\mu < 1$. The dashed line represents the financiers' participation constraint. It depicts the maximum size of the loan as dependent on what financiers can extract from the entrepreneur such that they are just willing to accept the contract. Its intercept is zero and its slope in the (L, P^*)-space is γ. The solid line represents the maximum the entrepreneur can credibly commit to

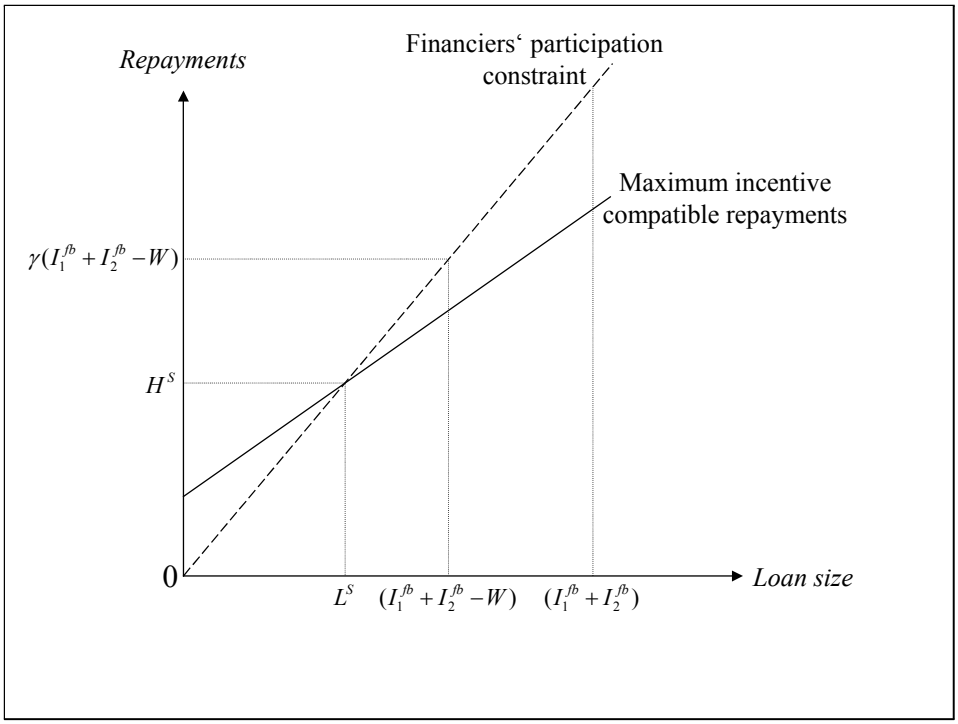

Figure 3: The optimum loan contract

pay as a function of the loan size. It has a positive intercept and its slope is positive but smaller β and hence also smaller γ.

The intersection point of the two relationships represents the combination of the maximum loan size L^S and a promised repayment H^S such that the associated maximum enforceable repayments make financiers marginally willing to accept the contract. Any loan larger than L^S is not feasible since this calls for higher repayments to financiers than the entrepreneur is able to commit to pay. Hence, when internal funds W do not suffice to finance the first-best investments $I_1^{fb} + I_2^{fb}$ and when in addition the respective needs for external finance $I_1^{fb} + I_2^{fb} - W$ exceed the maximum loan size L^S, the borrowing constraint is binding. Consequently, a financially constrained entrepreneur raises a loan L^S and offers a repayment H^S, and he will invest

symmetrically and will not renege on H^S afterwards.[11] On the other hand, when $I_1^{fb}+I_2^{fb}-W$ is smaller than L^S, the borrowing constraint is not binding and the entrepreneur raises a loan of a size just to fill his gap $I_1^{fb}+I_2^{fb}-W$. The following proposition summarizes the results regarding the optimum loan contract:

Proposition 3 *For $W < I_1^{fb}+I_2^{fb}$ the optimum loan contract is given by a pair (L^S, H^S) where*

$$L^S = \min\left\{L^*, I_1^{fb}+I_2^{fb}-W\right\} \tag{16}$$

and

$$H^S = \gamma L^S, \tag{17}$$

with L^* being implicitly defined by the intersection of the financiers' participation constraint (2) and the entrepreneur's incentive constraint (10). The optimum investment is then given by

$$I_n^S = \frac{1}{2}(L^S+W) \quad \textit{for all } n=1,2. \tag{18}$$

Proof. The proof follows from lemmata 1 through 3 and proposition 2. ■

5 Further results and implications

Our results obtained so far suggest that internal funds are not always perfect substitutes for loans, i.e. the entrepreneur may not simply raise more money from financiers when internal funds melt down. Consequently, lower internal funds may imply lower total investment (there will be perfect substitutability between internal and external funds and therefore no effects on investment only when the financial constraint does not bind). This is of course not a novelty but relates to almost any finance theory where capital markets

[11] Note, raising a loan that is smaller than L^S is not efficient here. This is because the entrepreneur then forgoes net investment returns since marginal returns on investment are higher than γ due to general underinvestment as a result of a binding borrowing constraint.

are imperfect owing to informational or enforcement problems.[12] What is interesting in our setting, however, is that we can draw also some conclusions regarding the consequences that multinationality has on the structure of investments within multinationals, which is particularly important for an economy where these corporations contribute significantly to country-wide gross fixed capital formation. Moreover, we can also study the presumable effects of international diversity (meaning diversity across countries in terms of tangibility).

To begin with, our model implies that the borrowing constraint is tighter when financiers suffer from opacity. Consider the critical amount of internal funds, which according to (9) would just enable the transparent entrepreneur to invest first-best optimally:

$$W = W^{C}_{crit} := \left(2 - \frac{\beta(1+\mu)}{\gamma}\right) I^{fb}. \tag{19}$$

Would it still be possible for the entrepreneur to make first-best investments when opacity forms an obstacle for financiers to control the allocation of funds? Recall, with total funds of $I_1^{fb} + I_2^{fb}$ available the entrepreneur will invest symmetrically only if promised repayments do not exceed that H^* which is associated with the respective total funds. Otherwise the entrepreneur aims at renegotiations for which a strategically biased investment policy is advantageous. From lemma 1, however, we already know that H^* is strictly smaller than the liquidation value of a symmetric investment. Hence, since investing first-best optimally is a special case of a symmetric investment policy, a promised repayment of $\beta(1+\mu)I^{fb}$, which just suffices to make financiers accepting the contract if capital allocation were contractible, is higher than the associated critical H^*. Accordingly, the entrepreneur will certainly invest strategically biased. But with investing relatively more funds

[12] See, for example, Hart (1995) who analyzes in a dynamic incomplete contracting framework with a single project the effects of varying internal funds on the relative bargaining position in renegotiations of debt and its implications for the premature liquidation of assets. Holmstrom and Tirole (1997) specify the role of internal funds for the relative advantage of intermediated to direct finance in an overlapping moral hazard model of banking. And last but not least, Bernanke, Gertler and Gilchrist (2000) disclose the interdependence between variations in internal funds and the business cycle on the basis of a costly state verification approach.

into that country with a lower asset tangibility, financiers would not be able to extract sufficiently high repayments from the entrepreneur in the course of renegotiations. Consequently, financiers are ex ante not willing to provide funds amounting to $\beta(1+\mu)I^{fb}/\gamma$ when the entrepreneur contributes own funds just equal to W^C_{crit}. Put differently, when financiers cannot control the internal allocation of funds, minimum internal funds W^S_{crit} required for first-best investments must be higher than W^C_{crit}, i.e. the borrowing constraint is tighter when the MNC is opaque.

Additionally, the effects of variations in internal funds on investments differ depending on whether the entrepreneur is able to pursuit a commitment policy or not. Consider firstly a transparent MNC where headquarters commits to an investment policy as specified in proposition 1. The results for exogenous changes in internal funds can then be summarized as follows:

Proposition 4 *If* $\frac{\gamma-\mu\beta}{\gamma-\beta} > \frac{R''(I_2^C)}{R''(I_1^C)}$ *a financially constrained but transparent MNC reduces investment in country 2 by more than investment in country 1 in response to declining internal funds.*

Proof. See Appendix. ■

The condition in proposition 4 is most likely to hold if both μ and $\gamma-\beta$ are small, i.e. when diversity of projects in terms of tangibility is pronounced and when the collateral value of the most tangible assets is not too small compared to the opportunity costs of funds. Under these circumstances the response of headquarters to a further financial tightening due to decreasing internal funds has a simple rationale: Since the financial constraint is only slightly affected by investment variations in country 1 when $\gamma-\beta$ is small, headquarters will primarily reduce the investment in that country where asset tangibility is worst. As the banker honors smaller investments in country 2 by a substantially eased financial constraint, this behavior absorbs most of the initial impact of a tightening of the borrowing constraint. Note this strategy is to some extent irrespective of its opportunity costs, which may come from additional differences in the marginal returns on investment.

When the entrepreneur, on the other hand, cannot commit to an investment policy, changes in internal funds have fairly different implications. We

already know from proposition 3 that contracts will always be designed such that the entrepreneur invests symmetrically. In contrast to the commitment case variations in internal funds do therefore not affect the relative distribution of funds but only total investment spending.

Next, what happens when diversity in terms of tangibility becomes more severe, i.e. when μ decreases? For a start, consider an entrepreneur whose capital allocation cannot be governed by a contract, i.e. opacity is grave. Here, any (changes in the) differences in the tangibility of assets are also irrelevant regarding the *relative* distribution of funds among different projects. This is again a straightforward implication of proposition 3, according to which the entrepreneur always invests symmetrically irrespective of the degree of diversity. However, the strength of the borrowing constraint and therefore total investment heavily depends on diversity. Not only the liquidation value of assets falls when μ decreases such that for given investments the willingness of financiers to grant a loan dwindles. It also provides an additional incentive for the entrepreneur to invest strategically biased and the financiers' propensity to lend ebbs therefore further away.

The results change substantially when the entrepreneur resides in a country where creditors are strongly protected. As can be seen from (6) to (8) variations in μ do not only affect the borrowing constraint but also the marginal condition. On the one hand, a deterioration of asset values in country 2 makes the financiers to provide less funds because total assets become less valuable to the banker when investments would not change. Through this effect the entrepreneur has to curtail both investment projects. On the other hand, when investments in country 2 decrease relative to those in country 1 the financiers and the entrepreneur agree upon a capital allocation which favors investment in country 1. Thereby the effect of a deterioration of asset values on the financial constraint can be mitigated as financiers ease the borrowing constraint when fewer funds are invested in those projects which were subject to the collateral damage. Hence there is a shift of funds towards that country where the degree of asset tangibility is higher.

6 Concluding remarks

This paper has focused on the implications of two aspects of multinationality on the internal allocation of funds within multinational corporations. Multinationality may be associated with differences in the tangibility of assets across subsidiaries, which stem from differences in the development of institutions that provide for the enforceability of contracts and laws on a country level. The flip side of multinationality is that it may also be associated with opacity. Firms that are headquartered in countries with weak creditor protection can conceal how they allocate funds internally. And when subsidiaries differ with respect to tangibility of assets headquarters has an incentive to favor subsidiaries in those countries where the degree of tangibility is lowest.

This approach can in principle be applied to a broader set of question. First, when does it pay for firms to go abroad? Integrating projects that are diverse in terms of tangibility is presumably only worthwhile when the corporation does not become too opaque. The benefit of integrating projects differing with respect to the degree of asset tangibility is that some projects may obtain external finance which would not as stand-alones (because liquidation is severely limited there). On the other hand, the dark side of integration is that diversity may be associated with opacity, which creates additional disincentives on the part of headquarters.

A related question is, given the state of financial development at home, what countries may come into consideration for a firm that wants to establish a subsidiary abroad. According to the approach proposed in this paper one would perhaps presume that MNCs headquartered in developing economies may favor other developing countries in order to keep diversity within a narrow range. Otherwise, opacity becomes a real obstacle for those firms owing to a tightening of borrowing constraints.

Last but not least, what implications do diversity and opacity of MNCs have for macroeconomic issues such as the international transmission of business cycles, growth, and the effects of currency crisis. A deeper analysis of these and related questions is still required and left for future research.

Appendix

Proof of Proposition 1

The critical value of internal funds W^C_{crit} is obtained from (7) where it holds with equality for $I^C_n = I^{fb}$. When the entrepreneur invests first-best optimally in project n, i.e. $R'(I^{fb}_n) = \gamma$, the marginal condition (6) requires for project $m \neq n$ that $R'(I^{fb}_m) = \gamma$ also holds, i.e. first-best investment in project m is optimal too. When $W < W^C_{crit}$, the borrowing constraint is binding and from (6) we have $R'(I^C_1) < R'(I^C_2)$ so that $I^C_1 > I^C_2$ for all $W < W^C_{crit}$.

Proof of Lemma 1

Reconsider (10)

$$I^S_1 \in \arg\max_{I_1} \left[R(I_1) + R(L + W - I_1) - \min\left\{H, \beta I_1 + \mu\beta(L + W - I_1)\right\}\right]$$

and assume that H is sufficiently large such that the entrepreneur always enters into renegotiation. He then chooses $I^S_1 = \bar{I}^S_1$ according to the FOC

$$R'(\bar{I}^S_1) - R'(L + W - \bar{I}^S_1) - \beta(1 - \mu) = 0.$$

On the other hand, with H being very small renegotiations are never worthwhile and $I^S_1 = \hat{I}^S_1$ according to

$$R'(\hat{I}^S_1) - R'(L + W - \hat{I}^S_1) = 0$$

is optimal. Furthermore, because of

$$R(\hat{I}^S_1) + R(L + W - \hat{I}^S_1) - H > R(\bar{I}^S_1) + R(L + W - \bar{I}^S_1) - H,$$

which holds for all H since total returns associated with $\bar{I}^S_1$ are strictly lower than those associated with $\hat{I}^S_1$, it is never worthwhile to invest strategically biased when the entrepreneur will certainly observe the contract and pay H. Accordingly, because of

$$\begin{aligned} R(\hat{I}^S_1) + R(L + W - \hat{I}^S_1) - \beta\hat{I}^S_1 - \mu\beta(L + W - \hat{I}^S_1) < \\ R(\bar{I}^S_1) + R(L + W - \bar{I}^S_1) - \beta\bar{I}^S_1 - \mu\beta(L + W - \bar{I}^S_1), \end{aligned}$$

which holds since $\bar{I}_1^S$ already maximizes profits given that renegotiations take place, it is never worthwhile to invest symmetrically when the entrepreneur will pay exactly the liquidation value of assets. Combining these two results yields that the entrepreneur will never invest strategically biased without entering into renegotiations and, at the same time, he will never invest symmetrically without observing the contract's rules.

To conclude, the entrepreneur will invest strategically biased ($\bar{I}_1^S$) and reneges on H if and only if profits are then strictly higher than for investing symmetrically ($\hat{I}_1^S$) and observing the contact's rules:

$$R(\hat{I}_1^S)+R(L+W-\hat{I}_1^S)-H < R(\bar{I}_1^S)+R(L+W-\bar{I}_1^S)-\beta\bar{I}_1^S-\mu\beta(L+W-\bar{I}_1^S).$$

Hence there is a critical $H = H^*$ (given by (11)) for which the entrepreneur is just indifferent and (12) follows immediately.

Finally, we have $H^* > \beta\bar{I}_1^S+\mu\beta(L+W-\bar{I}_1^S)$ because of (11) and because $R(\hat{I}_1^S) + R(L + W - \hat{I}_1^S) > R(I_1^S) + R(L + W - I_1^S)$ holds for all $I_1^S \neq \hat{I}_1^S$ as $\hat{I}_1^S$ already maximizes the sum of the projects' returns. Additionally, $H^* < \beta\hat{I}_1^S + \mu\beta(L + W - \hat{I}_1^S)$ holds, which can be proved by contradiction: Suppose the opposite to be true, i.e. $H^* > \beta\hat{I}_1^S + \mu\beta(L + W - \hat{I}_1^S)$. Then it would be also true that

$$\begin{aligned} & R(\hat{I}_1^S) + R(L + W - \hat{I}_1^S) - \left[\beta\hat{I}_1^S + \mu\beta(L + W - \hat{I}_1^S)\right] \\ > \; & R(\hat{I}_1^S) + R(L + W - \hat{I}_1^S) - H^* \\ = \; & R(\bar{I}_1^S) + R(L + W - \bar{I}_1^S) - \left[\beta\bar{I}_1^S + \mu\beta(L + W - \bar{I}_1^S)\right]. \end{aligned}$$

However, this is false since $\bar{I}_1^S$ already maximizes profits taking into account its effects on repayments.

Proof of Lemma 2

Taking into account that maximum enforceable repayments P^* are equal to H^* and reconsidering the investment choice of the entrepreneur (10) gives

us:

$$\begin{aligned} 0 &= P^* - R(\hat{I}_1^S) - R(L+W-\hat{I}_1^S) \\ &\quad +R(\bar{I}_1^S) + R(L+W-\bar{I}_1^S) - (1-\mu)\beta\bar{I}_1^S - \mu\beta(L+W) \\ 0 &= R'(\bar{I}_1^S) - R'(L+W-\bar{I}_1^S) - \beta(1-\mu) \\ 0 &= R'(\hat{I}_1^S) - R'(L+W-\hat{I}_1^S) \end{aligned}$$

Since the last condition implies $\hat{I}_1^S = \frac{1}{2}(L+W)$ (symmetric investment) we obtain

$$\begin{aligned} 0 &= P^* - 2R(\frac{1}{2}(L+W)) \qquad (20) \\ &\quad +R(\bar{I}_1^S) + R(L+W-\bar{I}_1^S) - (1-\mu)\beta\bar{I}_1^S - \mu\beta(L+W) \\ 0 &= R'(\bar{I}_1^S) - R'(L+W-\bar{I}_1^S) - \beta(1-\mu) \qquad (21) \end{aligned}$$

This system of two equations and two endogenous variables P^* and $\bar{I}_1^S$ defines P^* as an implicit function of L according to

$$\begin{aligned} \frac{\partial P^*}{\partial L} &= R'(\frac{1}{2}(L+W)) - R'(L+W-\bar{I}_1^S) + \mu\beta \qquad (22) \\ &> 0. \end{aligned}$$

The sign is positive since we know that $\hat{I}_1^S > \bar{I}_1^S$ implying $R'(\frac{1}{2}(L+W)) > R'(L+W-\bar{I}_1^S)$. But we also know from (20) that $R'(L+W-\bar{I}_1^S) = R'(\bar{I}_1^S) - \beta + \mu\beta$. Hence we can substitute $R'(\bar{I}_1^S) - \beta + \mu\beta$ for $R'(L+W-\bar{I}_1^S)$ in (22) yielding

$$\begin{aligned} \frac{\partial P^*}{\partial L} &= R'(\frac{1}{2}(L+W)) - R'(\bar{I}_1^S) + \beta \\ &< \beta \end{aligned}$$

if $\mu < 1$ and

$$\frac{\partial P^*}{\partial L} = \beta$$

if $\mu = 1$. Finally, from (11) it follows $P^*|_{L=0} > 0$ for $W > 0$ and any $\mu \in [0,1]$.

Proof of Proposition 4

Proposition 4 results from some comparative statics: By applying the general implicit function theorem to (7) and (6) for $W < W_{crit}$ it follows

$$\frac{\partial I_1^C}{\partial W} = \gamma(\gamma-\beta)\frac{R''(I_2^C)}{(\gamma-\beta)^2R''(I_2^C)+(\gamma-\mu\beta)^2R''(I_1^C)} > 0$$

$$\frac{\partial I_2^C}{\partial W} = \gamma(\gamma-\beta)\frac{R''(I_1^C)}{(\gamma-\beta)^2R''(I_2^C)+(\gamma-\mu\beta)^2R''(I_1^C)}\frac{\gamma-\mu\beta}{\gamma-\beta} > 0$$

where

$$\frac{\partial I_2^C}{\partial W} > \frac{\partial I_1^C}{\partial W} \Longleftrightarrow \frac{\gamma-\mu\beta}{\gamma-\beta} > \frac{R''(FDI_{sb})}{R''(I_{sb})}$$

which is likely to hold true for any $W < W_{crit}$ if both μ and $\gamma-\beta$ are small.

References

Allen, F. , Gale, D. (2000). *Comparing Financial Systems*, MIT Press, Cambridge MA.

Berger, P. G. , Ofek, E. (1995). Diversification's effect on firm value, *Journal of Financial Economics* **37**: 39–65.

Bernanke, B. S., Gertler, M. , Gilchrist, S. (2000). The financial accelerator in a quantitative business cycle framework, *in* J. B. Taylor , M. Woodford (eds), *Handbook of Macroeconomics*, Vol. 1C, North-Holland, Amsterdam, pp. 1341–1393.

Bolton, P. , Scharfstein, D. S. (1990). A theory of predation based on agency problems in financial contracting, *The American Economic Review* **80**: 93–106.

Brusco, S. , Panunzi, F. (2005). Reallocation of corporate resources and managerial incentives in internal capital markets, *European Economic Review* **49**: 659–681.

Campello, M. (2005). Debt financing: Does it boost or hurt performance in product markets?, *Journal of Financial Economics* . (forthcoming).

Desai, M. A. , Foley, F. C. (2004). The comovement of returns and investment within the multinational firm. NBER Working Paper No. 10785.

Desai, M. A., Foley, F. C. , Forbes, K. J. (2004). Financial constraints and growth: Multinational and local firm responses to currency crisis. NBER Working Paper No. 10545.

Desai, M. A., Foley, F. C. , Hines, J. R. (2004). A multinational perspective on capital structure choice and internal capital markets, *The Journal of Finance* **59**: 2451–2487.

Diamond, D. W. (1984). Financial intermediation and delegated monitoring, *Review of Economic Studies* **51**: 393–414.

Diamond, D. W. , Rajan, R. G. (2001). Liquidity risk, liquidity creation, and financial fragility: A theory of banking, *Journal of Political Economy* **109**: 287–327.

Ergungor, O. E. (2004). Market- vs. bank-based financial systems: Do rights and regulations really matter?, *Journal of Banking and Finance* **28**: 2869–2887.

Fauver, L., Houston, J. F. , Naranjo, A. (2003). Capital market development, international integration, legal systems, and the value of corporate diversification: A cross-country analysis, *Journal of Financial and Quantitative Analysis* **38**: 135–157.

Fauver, L., Houston, J. F. , Naranjo, A. (2004). Cross-country evidence on the value of corporate industrial and international diversification, *Journal of Corporate Finance* **10**: 729–752.

Gertner, R. H., Scharfstein, D. S. , Stein, J. C. (1994). Internal versus external capital markets, *The Quarterly Journal of Economics* **109**: 1211–1230.

Grossman, S. J. , Hart, O. D. (1986). The costs and benefits of ownership: A theory of vertical and lateral integration, *The Journal of Political Economy* **94**: 691–719.

Hart, O. D. (1995). *Firms, Contracts, and Financial Structure*, Oxford University Press, Oxford et al.

Hart, O. D. , Moore, J. (1994). A theory of debt based on the inalienability of human capital, *The Quarterly Journal of Economics* **109**: 841–879.

Hart, O. D. , Moore, J. (1998). Default and renegotiation: A dynamic model of debt, *The Quarterly Journal of Economics* **113**: 1–41.

Hellwig, M. F., Laux, C. , Müller, H. M. (2002). Conglomeration. good, bad, or unavoidable?, *Schmalenbach Business Review. Special Issue on German Financial Markets and Institutions* pp. 55–78.

Holmstrom, B. , Tirole, J. (1997). Financial intermediation, loanable funds, and the real sector, *The Quarterly Journal of Economics* **112**: 663–691.

Inderst, R. , Müller, H. M. (2003). Internal versus external financing: An optimal contracting approach, *The Journal of Finance* **58**: 1033–1062.

Klein, M. W., Peek, J. , Rosengren, E. S. (2002). Troubled banks, impaired foreign direct investment: The role of relative access to credit, *The American Economic Review* **92**: 664–682.

Lamont, O. A. (1997). Cash flow and investment: Evidence from internal capital markets, *The Journal of Finance* **52**: 83–109.

Laux, C. (2001). Limited-liability and incentive contracting with multiple projects, *RAND Journal of Economics* **32**: 514–526.

Lins, K. , Servaes, H. (1999). International evidence on the value of corporate diversification, *The Journal of Finance* **54**: 2215–2239.

Markusen, J. R. (1995). The boundaries of multinational enterprises and the theory of international trade, *Journal of Economic Perspectives* **9**: 169–189.

Peek, J. , Rosengren, E. S. (2000). Collateral damage: Effects of the japanese bank crisis on real activity in the united states, *The American Economic Review* **90**: 30–45.

Rajan, R. G., Servaes, H. , Zingales, L. (2000). The cost of diversity: The diversification discount and inefficient investment, *The Journal of Finance* **55**: 35–80.

Scharfstein, D. S. , Stein, J. C. (2000). The dark side of internal capital markets: Divisional rent-seeking and inefficient investment, *The Journal of Finance* **55**: 2537–2564.

Shin, H.-H. , Stulz, R. M. (1998). Are internal capital markets efficient?, *The Quarterly Journal of Economics* **113**: 531–552.

Stein, J. C. (1997). Internal capital markets and the competition for corporate resources, *The Journal of Finance* **52**: 111–133.

Stein, J. C. (2002). Information production and capital allocation: Decentralized versus hierarchical firms, *The Journal of Finance* **57**: 1891–1921.

Stein, J. C. (2003). Agency, information, and corporate investment, *in* G. M. Constantinides, M. Harris , R. M. Stulz (eds), *Handbook of the Economics of Finance*, Vol. 1A, North-Holland, Amsterdam, pp. 111–165.

Stevens, G. V. G. , Lipsey, R. E. (1992). Interactions between domestic and foreign investment, *Journal of International Money and Finance* **11**: 40–62.