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No. 7958

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Discussion Paper No. 7958
August 2010

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August 2010

ABSTRACT

Creditor Rights and Debt Allocation within Multinationals*

We analyze the optimal debt structure of multinational corporations choosing between centralized or decentralized borrowing. We identify how this choice is affected by creditor rights and bankruptcy costs, taking into account managerial incentives and coinsurance considerations. We find that partially centralized borrowing structures are optimal with either weak or strong creditor rights. For intermediate levels of creditor rights fully decentralized (centralized) borrowing structures are optimal if managers have strong (weak) empire building tendencies. Decentralized borrowing is more attractive for companies focussing on short-term profitability. Credits are rather taken in countries with better creditor rights and more efficient insolvency systems.

JEL Classification: F23 and G32

Keywords: capital structure, coinsurance, creditor rights, internal capital markets and multinational corporations

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* Financial support through SFB-TR 15 is gratefully acknowledged.

Submitted 26 July 2010

1 Introduction

Multinational companies (MNCs) have a wide range of financing options when they set up a foreign subsidiary. They can rely on capital transferred from the parent company, but they can also raise local credits. How do multinational firms finance their foreign subsidiaries? To what extent do they rely on local financing and why? Empirical evidence suggests that only part of the subsidiaries is financed internally, with capital from the parent company (Desai, Foley and Hines (2004), Hooper (2004)). Furthermore, multinationals seem to choose a different financing strategy depending on where their foreign subsidiary is located. Kang et al. (2004) report that in industrial countries 29 percent of the financing of subsidiaries come from parents and 42 come from host residents, while in developing countries 45 percent of the financing come from U.S. parents and 34 percent come from host country residents.

In this paper we focus on one particular aspect of a multinational's financing decision: the credit financing.¹ If (at least) part of the financing has to be done through credits, the question arises whether these should be raised locally in the foreign subsidiary's host country or via the parent company. The aim of our paper is to determine the optimal debt allocation within a multinational corporation. For this purpose we develop a model of multinational borrowing that explicitly considers agency problems in internal capital markets, the existence of bankruptcy costs and the role of creditor rights.

In our model the trade-off between decentralized (local) and centralized (parent) debt financing is driven by two main effects, the incentive and the coinsurance effect. Centralizing the borrowing structure allows the multinational corporation to realize a so-called coinsurance effect.² In this case the CEO of a MNC can use the net profits of all its

¹Note that the focus of this paper is on the location choice of borrowing. How the choice of debt vs. equity is determined for multinational corporations is studied elsewhere (see Kesternich and Schmitzer (2010)).

²This coinsurance capacity has also been recognized by a different strand of the literature dealing with the boundary of the firm and the optimality of conglomeration. Lewellen (1971) was among the first to focus on this coinsurance aspect in view of the large mergers wave in the US of the 1960s. Even though this strand of the literature has thoroughly investigated the differences between stand-alone firms and conglomerates (e.g. Inderst and Müller (2003), Berkovitch et al. (2006), Li and Li (1996) and Faure-

subsidiaries to repay debt and avoid costly bankruptcy. Only if the sum of net profits is not sufficient to cover all debt repayments, bankruptcy occurs. Thus, one subsidiary “coinsures” another subsidiary and bankruptcy becomes less likely. This is the positive effect associated with debt centralization.

However, debt centralization also entails negative incentive effects. These arise because the coinsurance of the subsidiaries attenuates the disciplining effect of debt. Consider a multinational with two subsidiaries F and H . If, say, the manager of subsidiary F borrows locally, he is directly liable to his debtors. This gives him strong immediate incentives to work hard and avoid the bankruptcy of his subsidiary – at least if he enjoys private benefits of control and does not want to lose his job (Aghion and Bolton (1992)).³

Centralizing the borrowing for subsidiary F weakens manager F 's incentives because it reduces the direct link between his success and the liquidation of his subsidiary: Even if he fails, subsidiary F will not be liquidated as long as subsidiary H is successful because he “is coinsured” by subsidiary H .

Similarly, centralizing the borrowing for subsidiary H , thus “coinsuring” subsidiary H entails negative incentive effects for the subsidiary manager F as well. Now, internal capital market considerations come into play: If subsidiary H is coinsured and fails but manager F is successful, the profits generated by manager F are used to meet the debt repayments of subsidiary H . As managers are typically interested in having large empires, taking away these funds reduces a manager's benefits and hence his incentives. This is the downside of reallocating funds within internal capital markets (see for example Brusco and Panunzi (2005)). To summarize, both “being coinsured” by and “coinsuring” the other subsidiary entail adverse incentive effects. These negative incentive effects countervail the

Grimaud and Inderst (2005)), the authors mainly focus on the effects on investments in internal capital markets and the valuation of conglomerates. These articles neither consider the debt allocation within the multi-entity firm nor the possibility of employing mixed borrowing structures nor the relevance of creditor rights explicitly.

³The disciplining effect of bankruptcy is especially important in countries in which it is difficult or very costly to write contracts with subsidiary managers about a performance-based dismissal. For example, this might be the case in countries with very strong employer rights, like Germany and other Western European countries. Furthermore, managerial entrenchment might reduce the credibility of contract enforcement.

positive risk-reducing effect of coinsurance.

The trade-off between coinsurance and incentive effects differs for various host countries depending on the strength of creditor rights.⁴ Stronger creditor rights imply more control rights for the creditor in case of insolvency. As creditors are interested in liquidating insolvent firms, the liquidation of unsuccessful firms becomes more likely when creditor rights are stronger.⁵ When creditor rights are weak, the threat of liquidation in case of insolvency and hence the disciplining effect of debt is less present than with strong creditor rights. This affects the overall trade-off.

We determine the optimal debt structure depending on firm characteristics and the specific legal and institutional settings. In the first part of our analysis we disregard differences in the legal environment of host and home countries. In the second part of the paper we introduce these differences and derive how they affect the optimal borrowing structure.

Our main findings are as follows: For MNCs operating in countries with very weak or very strong creditor rights, mixed borrowing structures are optimal. A “mixed borrowing structure” indicates a borrowing structure with centralized borrowing for one subsidiary and decentralized borrowing for the other subsidiary. The optimality of the borrowing structure for intermediate ranges of creditor rights depends on managerial incentives: If managerial empire-building tendencies are weak, a fully centralized borrowing structure is optimal. If empire-building tendencies are strong, a fully decentralized borrowing structure is optimal because it becomes more attractive to provide incentives.

⁴In practice insolvency regimes and bankruptcy procedures are very complex. For example, often, an insolvent firm does not have to file for bankruptcy but can reach an out-of-court settlement with its creditors. Even if an insolvent firm is declared bankrupt, it can still be either liquidated or reorganized. Overall, there are a multitude of possible outcomes for an insolvent firm depending on the specific institutional environment and bankruptcy legislation. It is beyond the scope of our paper to include the multitude of insolvency regimes. We only focus on the link between creditor rights and the probability of liquidation in case of insolvency.

⁵See also Dewatripont and Tirole (1994). We do not know of any empirical paper directly investigating the relationship between creditor rights and firm liquidation. However, a recent paper by Claessens and Klapper (2005) finds a positive relationship between the strength of creditor rights and bankruptcy. Based on the plausible assumption that more bankruptcy filings are associated with more liquidation, this paper provides support for our modeling. See also Acharya et al. (2010) for the positive relationship between creditor orientation and liquidation. This aspect requires further investigation.

Stronger creditor rights increase the attractiveness of substituting parental borrowing with local debt in the foreign affiliate's country. Furthermore, we find that, due to agency problems, weak creditor rights are associated with higher probability of bankruptcy and higher interest rates for foreign affiliates' local borrowing. Higher bankruptcy costs increase the attractiveness of centralized borrowing.

If the two countries in which the multinational operates differ with respect to bankruptcy costs, the CEO prefers to borrow in the country with a more efficient bankruptcy system. Differences in creditor rights do not have any direct effect on expected profits under any of the borrowing structures. However, as they affect the disciplining effect of debt, they influence managerial incentives and indirectly expected profits. More specifically, weaker creditor rights in the foreign country decrease the attractiveness of a (partially) decentralized borrowing structure. Finally, if the two countries have different growth opportunities and, say, the foreign country exhibits a higher growth potential, centralized borrowing for the foreign affiliate becomes more attractive, whereas it becomes less attractive for the home country affiliate.

The remainder of this paper is structured as follows: Section 2 gives an overview of the related literature. Section 3 lays out the set-up and basic mechanisms of our model. In section 4 we derive the equilibrium outcome and optimality conditions in a national setting. Section 5 analyzes the comparative statics and introduces differences in the legal environment and growth potential between the affiliate's and the parental country. Section 6 highlights the empirical findings of our model. Section 7 concludes.

2 Related Literature

The borrowing decision of multinational corporations (MNCs) has attracted increasing attention over the last years. A major focus is on the comparison between multinational corporations and national firms on an aggregated level. Several authors investigate whether the overall leverage of MNCs is higher or lower as compared to national corporations (see

for example Doukas and Pantzalis (2003), Fatemi (1988), Lee and Kwok (1988), Mittoo and Zhang (2008) and Burgman (1996)). Another strand of the multinational finance literature explicitly considers the determinants of foreign affiliates' borrowing structures (Hodder and Senbet (1990), Chowdhry and Nanda (1994), Chowdhry and Coval (1998) and Huizinga et al. (2008)). Even though these papers account for the possibility of profit shifting within multinationals and the opportunity to substitute external with internal funds, the primary focus is on tax issues. Empirical evidence suggests that a major determinant of the multinational's and its subsidiaries' borrowing structure is the institutional and legal environment of the host country (Errunza (1979)). The relevance of political risk as a determinant has been investigated extensively over the last years.⁶ Other determinants, like the level of host country inflation or the affiliate's growth potential seems to have only limited influence on the affiliate's leverage and capital structure (Desai, Foley and Hines (2004)). Kolasinski (2009) finds that firms are more likely to use subsidiary debt when their divisions vary more in risk.

The only paper explicitly considering the effect of host country creditor rights on the leverage of multinational affiliates is Desai et al. (2004). The authors find a positive relationship between creditor rights and local borrowing of the affiliate. Their second finding of a negative relationship between creditor rights and interest rates is confirmed by Aggarwal and Kyaw (2008), who also investigate the effects of the host country environment on the capital structure of MNC affiliates. Similarly, Laeven and Majnoni (2005) find that judicial efficiency is negatively correlated with interest rate spreads across countries. Finally, Kang et al. (2004) identify a positive relationship between the degree of financial market development – which, as other authors show, is closely related to creditor rights and their enforcement – and the extend of local borrowing for multinational affiliates. The findings of our model are confirmed by these empirical studies. However, overall

⁶Aggarwal and Kyaw (2008) identify that for US multinational affiliates among others low political risks were associated with high external debt ratios. Hooper (2004) and Desai et al. (2008), on the other hand, find significantly higher (local) debt ratios for affiliates in politically riskier countries. Kesternich and Schnitzer (2007) show, theoretically and empirically, how different forms of political risks affect the multinational capital structure.

there is still very little work done on the effect of creditor rights on multinational capital structure.

In contrast, there is a large and growing body of mainly empirical literature on law and finance. Starting with La Porta et al. (1997, 1998) this strand of the literature provides ample evidence of the central role legal institutions and creditor rights play for capital markets. Both laws and their enforcement matter in credit markets (Safavian and Sharma (2007)). Demircuc-Kunt and Maksimovic (1998, 1999) show that in countries with more efficient legal systems, more firms use long-term external finance (1998) and firms do use more long-term external debt relative to assets (1999). Similarly, also Giannetti (2003) finds that firms in countries with better creditor protection have higher leverage. Safavian and Sharma (2007) provide evidence on how (enforced) creditor rights allow for a better access to bank credit.

The only other theoretical paper which incorporates creditor rights in a multinational finance model is Noe (2000). The author shows how, in a setting with differences in the creditor rights between the parental country and the host country of the subsidiary, bargaining over the debt in case of bankruptcy determines the optimal debt allocation within a multinational. Similar to our work, the author recognizes the trade-off the CEO of a multinational faces between reducing the occurrence of costly bankruptcy and agency costs associated with weak creditor rights and finds a positive relationship between local borrowing and the strength of creditor rights in the host country. However, we can show how creditor rights influence the optimal borrowing decision even in the absence of differences between the legal setting of both countries – as it is the case for nationally operating business groups as well as multinationals operating in countries with similar legal environments. Furthermore, we take our analysis one step further, as we do not only focus on the borrowing decision of a single subsidiary but take into account the existence of internal capital markets. As we show in our analysis, a comprehensive view of the multinational with all its subsidiaries is essential to understanding the borrowing decision of and debt allocation within a multinational corporation. The reason lies in the feedback

effects on managerial incentives, which were identified by the literature on internal capital markets.⁷

Starting with Gertner et al. (1994) and Stein (1997) the literature on internal capital markets did pioneering work in corporate finance by identifying incentive problems within large corporations. Rajan et al. (2000) find evidence for inefficient internal cross-subsidization between divisions. Brusco and Panunzi (2005), Gautier and Heider (2002), Inderst and Laux (2005) and Inderst and Müller (2003) all develop models with managerial incentives of empire-building, in which they highlight adverse incentive effects associated with the reallocation of internally generated funds. Even though their focus is typically on the trade-off between efficiency and incentive aspects of “winner-picking”, the underlying incentive mechanisms are the same as for our modeling of the incentive effects associated with coinsuring the other subsidiary. Inderst and Müller (2003) are the only ones who do not only focus on the reallocation of existing internal funds but include the effects on external funding and account for the coinsurance effect of conglomeration.

And finally, a separate but related strand of the corporate finance literature considers the financing of nationally operating business groups. The focus of this literature is mainly on corporate governance issues and the explanation of concentrated, often pyramidal and family controlled ownership structures, while taking into account different legal environments. However, there are a few papers explicitly investigating the debt structure within business groups. Bianco and Nicodano (2006) acknowledge the richer debt structure choice of business groups as compared to stand-alone firms and the relevance of limited liability in determining the optimal debt allocation within business groups. Finally, Gopalan et al. (2007) find evidence for cross-subsidization after weak performance and lower bankruptcy rates for group affiliates as compared to stand-alone firms.

⁷A good survey of the internal capital markets literature is given by Stein (2003).

3 The Model

Consider a multinational corporation (MNC) that consists of a non-operating parent company and two legally independent subsidiaries. All units are run by risk-neutral managers.⁸ While one of the subsidiaries (H) is located in the home country of the parent company, the other subsidiary (F) operates in a foreign country. Each subsidiary manager has the opportunity to invest into a project.⁹

Each investment project yields a return of X in case of success and zero otherwise. Of course, returns in different subsidiaries may be correlated in so far as they arise from selling similar products and using similar technologies. However, as the focus of our analysis is on managerial incentive problems, we disregard that part of the risk that is the same for all subsidiaries and focus on the remaining local part of the risk, which is therefore assumed to be uncorrelated across different subsidiaries. The probability of success for the investment project in the foreign subsidiary F is directly determined by the effort level of the subsidiary manager. In particular, if the manager chooses the effort level q_F , the corresponding probability of success is q_F . As effort is costly, the manager chooses the probability of success $q_F \in [0, 1]$ that maximizes his utility, given the borrowing structure of the multinational corporation. We will discuss the underlying managerial incentives in more detail below. To keep the analysis concise, we focus on the incentives of manager F in the foreign country and therefore fix the probability of success for the investment project in subsidiary H at an exogenously given level of q_H with $q_H \in [0, 1]$.¹⁰ By introducing this asymmetry between the two subsidiaries, we also take into account in a stylized way the empirical finding that monitoring becomes more difficult with distance.¹¹

⁸This assumption is made to keep the analysis tractable. It would be straightforward to extend our analysis to allow for risk averse managers. This would force the principal to weight the cost of providing incentives through exposing the manager to bankruptcy risk against the positive incentive effect. Allowing for risk averse managers would thus affect the quantitative results, but not the qualitative results of our analysis.

⁹In the following analysis, we only consider investment projects with a positive net present value.

¹⁰In doing so we follow Boot and Schmeits (2000) in their main analysis, who in a similar set-up investigate the effects of coinsurance and incentives on the optimality of conglomeration.

¹¹See Doukas and Pantzalis (2003) and Wright et al. (2002). In a similar vein, Burgman (1996) finds that MNCs have higher agency costs as compared to national corporations.

Both projects generate further profits beyond the first period. These additional profits are identical for both subsidiaries and denoted by Z . Z can be interpreted as the sum of discounted future profits of a subsidiary and it is independent of managerial effort and the first period outcome. In Chapter 5 we allow for the future profits in both affiliates to differ, i.e. $Z_F \neq Z_H$, to capture how different growth opportunities in different affiliates affect the optimal borrowing structures.

BORROWING STRUCTURES AND BANKRUPTCY

Financing an investment project requires a certain amount of external debt D . Outside investors provide the necessary funds. The market interest rate is normalized to zero, so the investors' opportunity cost is zero. Investors are risk-neutral and fully competitive. They will therefore realize expected profits of zero. Interest rates for the investment projects are determined endogenously. The manager of the parent company, i.e. the CEO of the multinational firm, decides on the debt allocation within the MNC. The CEO maximizes total expected profits for the multinational firm. For each subsidiary he decides whether the borrowing is undertaken centrally by the parent company or decentrally by the subsidiary. Thus, he can choose among the following four borrowing structures:

1. A fully decentralized debt structure, with decentralized borrowing in both subsidiaries, denoted by dd .
2. A mixed debt structure, with decentralized borrowing in subsidiary F and centralized borrowing for subsidiary H , denoted by dc .
3. A mixed debt structure with centralized borrowing for subsidiary F and decentralized borrowing in subsidiary H , denoted by cd .
4. A fully centralized debt structure, with centralized borrowing for both subsidiaries, denoted by cc . In this case, the CEO borrows the total amount of $2D$ from a single creditor.¹²

¹²Borrowing from a single investor is in the interest of the CEO because it allows him to credibly convey the information to the creditor that the debt structure is completely centralized. It furthermore is a reasonable presumption if we consider transaction cost motives.

		H	
		Central.	Decentral.
F	Central.	cc	cd
	Decentral.	dc	dd

Figure 1: Overview Borrowing Structures

Figure 1 gives an overview of these debt structures.¹³ The first letter always indicates the borrowing in the foreign subsidiary F , whereas the second letter refers to the borrowing for subsidiary H ; c stands for centralized borrowing by the parent company and d for decentralized borrowing by the subsidiary itself.

If debt repayments cannot be met, the borrowing unit is insolvent and a bankruptcy process is initiated.¹⁴ Initiating a bankruptcy process entails costs that reduce the future value of the corresponding subsidiary to αZ , $\alpha \in [0, 1]$. These bankruptcy costs are independent of whether the insolvent borrowing unit is continued or liquidated.¹⁵ Thus, we refrain from considering further value-destroying inefficiencies in case of liquidation of the firm. These further costs would complicate the analysis without changing the qualitative results of our model.

In order to capture the effect of creditor rights on the bankruptcy process, we introduce a parameter $p \in [0, 1]$. The parameter p reflects the probability of liquidation for the

¹³The question might arise, why the CEO could not decide to mix centralized and decentralized borrowing for each subsidiary. In fact, the model does not preclude these kind debt structures but rather focuses in a stylized way on the effects of a sufficiently high level of local borrowing. Thus, one can think about the necessary amount of external debt, D , as the crucial amount of (additional) borrowing, which would induce difficulties in payment in case of failure.

¹⁴In the following we use the expressions insolvency and bankruptcy synonymously in referring to the situation that a debtor is not able to meet its debt repayments. Hence, 'bankruptcy process' is meant in a comprehensive way including also possible out of court settlements.

¹⁵These might include direct bankruptcy costs, like filing and administrative costs but especially consist of indirect bankruptcy costs like the loss of future business and profits due to high insecurity and bad reputation associated with the rumors about the corporation's insolvency independent of whether it is actually declared bankrupt. Due to the relevance of missed profits, we prefer to consider proportional bankruptcy costs $(1 - \alpha)Z$ in our model. However, our results also hold in a setting with additive bankruptcy costs in the form of $-C$. For empirical research on the costs of bankruptcy see also Altman (1984). As also Djankov et al. (2008) find in a case study, bankruptcy costs are ceteris paribus higher, thus α lower, the less developed the country is.

borrowing unit in case of insolvency. If liquidated, the assets of the subsidiary, i.e. the future value αZ , are transferred to the creditor. With the probability of $(1-p)$, liquidation does not take place. In this case creditors obtain nothing and αZ remains within the corresponding subsidiary. Creditor rights affect the probability of liquidation p insofar as a stronger creditor-orientation typically leads to a relatively high probability of liquidation p . Conversely, in countries with weak creditor rights and/or a more debtor-oriented legal environment the liquidation of an insolvent firm is less probable, resulting in a lower value for p .¹⁶

We start by analyzing a set-up that does not allow for differences in the legal setting, in particular for the parameters α and p , between the two countries. This setting applies to purely nationally operating business groups as well as multinationals operating in countries with similar legal environments like Germany and Italy. However, differences in the legal environment introduce further effects on the optimality of the debt structure. These effects, which are especially present in multinational corporations operating in very different countries like Germany and India, will be investigated in section 5.

THE COINSURANCE EFFECT

To capture the effect of coinsurance in our model, we make the following assumption:¹⁷

Assumption 1 *The return X , which a single investment project generates if successful, is high enough to cover the debt repayments of both investment projects whenever needed.*

Assumption 1 ensures that debt repayments are feasible. Furthermore, it ensures that in case of (partially) centralized borrowing the parent company is able to meet both debt repayments and thus avoid a costly bankruptcy process as long as at least one of the

¹⁶In a simplified way we could think about the difference between a creditor-oriented legal environment like in Germany and a typically more debtor-oriented legal system like the US system. For empirical evidence on this relationship see for example Claessens and Klapper (2005). Even though they only investigate the relationship between filing for bankruptcy and creditor rights, their finding of a positive relationship gives suggestive support for our modeling. See also Acharya et al. (2010) for the positive relationship between creditor orientation and liquidation.

¹⁷For keeping the exposition of our model as simple as possible, the formal delineation of this assumption is only introduced when needed in the further analysis.

subsidiaries is successful.¹⁸ This introduces the possibility of coinsurance: Centralizing the borrowing structure reduces the occurrence of costly bankruptcy. To see this we consider the different borrowing structures in more detail.

1. Fully decentralized debt structure (*dd*)

In this case, each subsidiary manager borrows on his own. For each subsidiary the project can either be successful and debt can be repaid, or it can be unsuccessful and the insolvency of the subsidiary has to be declared. Note that this can only be an equilibrium outcome if the parent company does not have any incentives to bailout the subsidiary concerned. It is the case if the following condition holds: $Z - DR_k^{ij} \leq (1 - p)\alpha Z$, with $i, j \in \{c; d\}$, $k \in \{F, H\}$, and R_k^{ij} as the equilibrium interest rate. This condition can be rearranged to $DR_k^{ij} \geq Z[1 - (1 - p)\alpha]$.¹⁹ Throughout the paper we only consider cases for which this condition holds.

2./3. Mixed debt structures (*dc*, *cd*)

Consider *dc* first. Under *dc* subsidiary *F* (in the foreign country) borrows locally whereas the parent company borrows on behalf of subsidiary *H* (in the parental country). A bankruptcy process will be initiated for subsidiary *F* if *F*'s project fails. However, subsidiary *H* benefits from the coinsurance by subsidiary *F*: Even if *H*'s project fails, the parent company is able to repay the debt, as long as subsidiary *F* is successful.²⁰ Only if *F*'s project fails as well, the parent company has to declare bankruptcy. The reasoning for *cd* follows the same lines.

4. Fully centralized debt structure (*cc*)

If the borrowing is completely centralized, both subsidiaries coinsure each other and

¹⁸This is in line with empirical evidence on inefficient cross-subsidization in business groups (Gopalan et al. (2007)).

¹⁹The condition states that the necessary debt repayments have to be larger than the increase in the expected future value for the MNC if the local debt is repayed. In case of debt repayment, the future value within the MNC would be Z with certainty. In case of insolvency, there is a chance that the subsidiary will not be liquidated resulting in the expected future value of $(1 - p)\alpha Z$ at the end of $t = 1$. The cost of debt repayment is DR_k^{ij} .

²⁰We implicitly assume that the funds can be frictionless passed on to the parent company if needed.

the parent company has to declare bankruptcy only if both fail simultaneously. In this case, the whole MNC is liquidated with the probability p .

Thus, for given effort levels, centralizing the borrowing structure reduces the occurrence of bankruptcy.

MANAGERIAL INCENTIVES

We now turn to managerial incentives. The manager of subsidiary F derives private benefits of control. These “classical” managerial benefits of control are denoted by $M \geq 0$ and reflect the psychic benefits of running the subsidiary, having a prestigious job, etc. (Aghion and Bolton (1992)). The manager can enjoy M as long as he is the manager of the subsidiary. This is definitely the case if his investment project is successful. However, even if his project fails, he may be able to enjoy these benefits: Either because he is helped-out by subsidiary H or because weak creditor rights prevent the liquidation of subsidiary F .

Furthermore, the manager’s private benefits increase with the resources under his control, i.e. the manager enjoys empire-building.²¹ To capture this effect, we introduce the benefit variable, $E \geq 0$. The manager enjoys E , whenever he is successful and does not have to bailout subsidiary H . If the borrowing for subsidiary H is undertaken centrally and subsidiary H fails, the profits generated by the investment project in subsidiary F (in case of success) are used by the parent company to meet the debt repayments of subsidiary H . In this case, the manager of subsidiary F is not able to enjoy E , even though he is successful.²²

²¹Note that in the following we use the term “empire-building” slightly different from other authors. While with “empire-building” some previous papers referred to the resulting problem of inefficient overinvestment, we focus on the underlying managerial incentives. Throughout our paper “empire-building” refers to the interest of the manager in having more assets under management. Even though we exclude overinvestment in our model, we show that these managerial preferences induce additional inefficiencies in a conglomerate setting.

²²Note that our assumption about a successful manager being obliged to bail out an unsuccessful manager in case of centralized borrowing reduces the managers’ incentives to work hard. In a longer horizon version of the model, this effect could be mitigated by allowing for periodical performance reviews of the different subsidiaries. Then, less successful subsidiaries may be forced to shift resources to more promising subsidiaries. Thus, in an enhanced version of the model one could distinguish short-run and long-run effects. In the short run, successful subsidiaries might be forced to help out unsuccessful ones,

Finally, we assume that effort is costly for the manager. Effort costs are captured by the following quadratic cost function $\frac{1}{2}q_F^2$.²³

The manager's expected utility for the different borrowing structures are given by the following functions:

$$EU(dd) = q_F(M + E) + (1 - q_F)(1 - p)M - \frac{1}{2}(q_F)^2, \quad (1)$$

$$EU(dc) = q_F q_H(M + E) + [q_F(1 - q_H) + (1 - q_F)(1 - p)]M - \frac{1}{2}(q_F)^2, \quad (2)$$

$$EU(cd) = q_F(M + E) + \{(1 - q_F)[q_H + (1 - q_H)(1 - p)]\}M - \frac{1}{2}(q_F)^2, \quad (3)$$

$$EU(cc) = q_F q_H(M + E) + \{q_F(1 - q_H) + (1 - q_F)[q_H + (1 - q_H)(1 - p)]\}M - \frac{1}{2}(q_F)^2. \quad (4)$$

The first two terms capture the expected managerial benefits and the last term the monitoring costs. Note that the manager's wage is normalized to his outside option of zero. This is a reference case reflecting the problem that managers can not be given perfect incentives by wage contracts alone in the presence of incomplete contracts.²⁴ We expect cultural and geographical distance between the parent company and a foreign subsidiary

while in the long run, more successful subsidiaries may grow at the expense of less successful ones. The latter factor is called the internal cost of capital allocation mechanism (Boot and Schmeits, 2000).

²³This simple functional form for the effort costs allow us to keep the analysis explicit. However, we could generalize the cost function without loss of generality as long as it is increasing and convex in q_F .

²⁴See for example Dewatripont and Tirole (1994).

An important question is, of course, whether our results are robust to allowing monetary incentives that depend on some signal, as raised in Aghion and Bolton (1992). This issue has been discussed in a number of articles that consider contractible signals (e.g. Brusco and Panunzi (2005), Berkovitch and Israel (1996), Dewatripont and Tirole (1994)). Brusco and Panunzi (2005) specifically consider wages in providing managerial incentives. Although they find that wages do increase managerial incentives in case of centralized capital allocation, they do not override the coinsurance effects. Berkovitch and Israel (1996) explain why control allocation and capital structure are instrumental in providing managerial incentives even when the manager can be motivated by a direct compensation contract as they allow additional flexibility to the design problem. A similar argument can be made in the context of our model. Even if monetary incentives are given, they can be supplemented by exploiting the manager's preferences for private benefits of control and empire building. Providing monetary incentives is costly for the investor because he has to share profits with the manager. Providing incentives by decentralizing debt is costly for the investor because he foregoes the coinsurance possibility. How strong the incentive effects of these different schemes are depends on how much the manager values monetary compensation as compared to the benefits of control and empire building. Thus, depending on the relative size of the parameters, the parent company may go for decentralization, in particular if the coinsurance benefits are relatively low and the manager has a high preference for non-pecuniary as opposed to pecuniary benefits.

to aggravate the problem of contractual incompleteness, making it particularly relevant in the present context of a multinational corporation. Furthermore, given that external contracts are enforceable, the CEO is not able to influence the continuation decision for an insolvent subsidiary with decentralized borrowing.²⁵ Therefore, the use of external debt is also a credible commitment device even with an entrenched subsidiary manager.

EXPECTED PROFITS

We now derive expected profits for the MNC under the different borrowing structures. As shown in the Appendix, these are given by

$$E\pi(dd) = (q_F^{dd} + q_H)X - 2D + [2 - (2 - q_F^{dd} - q_H)(1 - \alpha)] Z, \quad (5)$$

$$E\pi(dc) = (q_F^{dc} + q_H)X - 2D + [2 - (2 - q_H)(1 - q_F^{dc})(1 - \alpha)] Z, \quad (6)$$

$$E\pi(cd) = (q_F^{cd} + q_H)X - 2D + [2 - (1 - q_H)(2 - q_F^{cd})(1 - \alpha)] Z, \quad (7)$$

$$E\pi(cc) = (q_F^{cc} + q_H)X - 2D + [2 - 2(1 - q_F^{cc})(1 - q_H)(1 - \alpha)] Z. \quad (8)$$

All four expected profit functions have the same structure:

The first term reflects first period expected returns from the investment. They depend on the probabilities of success, and are higher with higher managerial effort levels and thus probabilities of success for subsidiary F . q_F^{dd} , q_F^{dc} , q_F^{cd} and q_F^{cc} denote the optimal effort levels under the different borrowing structures and will be derived in section 4.1.

The second term is the total amount of investment needed, reflecting the real economic costs of the investment projects, which is D for each subsidiary and independent of managerial effort.

The last term reflects the expected second period profits of the investment projects. Recall that $2Z$ is the value of second period profits in the absence of bankruptcy costs. As bankruptcy reduces the second period profits of a subsidiary to αZ , the resulting economic

²⁵Even if the CEO could avoid insolvency for a decentrally borrowing subsidiary as long as the other subsidiary is successful, this is now costly. As discussed above, we only consider cases in which these costs are prohibitively high and the CEO has no incentive to bailout the subsidiary.

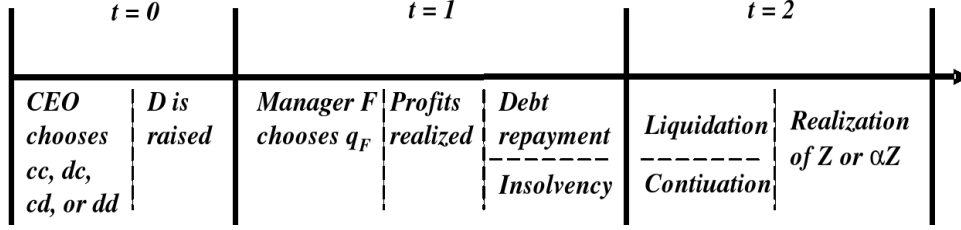


Figure 2: Time Structure

loss in case of bankruptcy is $(1 - \alpha)Z$ per subsidiary. For each borrowing structure this economic loss is multiplied with the corresponding probability of bankruptcy. For example, under a fully decentralized borrowing structure each subsidiary will declare bankruptcy with the probability $(1 - q_i)$ with $i = F, H$, resulting in the overall expected bankruptcy loss of $(2 - q_F^{dd} - q_H)(1 - \alpha)Z$. Similarly expected bankruptcy costs can be derived for all four settings.

The differences between the four borrowing structures are driven by the coinsurance effect and managerial incentives. Apart from these two effects the choice of the borrowing structure does not influence expected profits. In particular, as investors make zero expected profits, interest rates are irrelevant for ex-ante expected profits.

THE TIME STRUCTURE

In period $t = 0$, the CEO of the multinational corporation decides on the debt structure of the MNC and borrowing is undertaken. In the beginning of period $t = 1$, the manager of subsidiary F in the foreign country decides on his effort level. At the end of this period, project returns are realized and debt is repaid if possible. If a borrowing unit is insolvent at this stage, the corresponding subsidiary will be liquidated at the beginning of $t = 2$ with the probability of p . At the end of period $t = 2$, future firm values are realized and the game ends. The time structure of the model is summarized in figure 2.

4 Equilibrium Outcome of the Model

4.1 Optimal Managerial Effort Level

To solve the model, we first derive the optimal managerial effort level under the different borrowing structures. The optimization problem of the manager of the foreign subsidiary F is:

$$\underset{q_F}{Max} EU^{ij}(q_F) \quad (9)$$

$$s.t. \ 0 \leq q_F \leq 1,$$

with $i, j \in \{c; d\}$. Again, i refers to subsidiary F while j relates to subsidiary H . Solving this optimization problem for all four debt structures yields the optimal managerial effort levels and hence probabilities of success for subsidiary F .²⁶ The internal solutions for the different borrowing structures are given by

$$q_F^{dd} = pM + E, \quad (10)$$

$$q_F^{dc} = pM + q_H E, \quad (11)$$

$$q_F^{cd} = (1 - q_H)pM + E, \quad (12)$$

$$q_F^{cc} = (1 - q_H)pM + q_H E. \quad (13)$$

By comparing these probabilities of success, we derive Proposition 1.

Proposition 1 *The more centralized the debt structure is, the lower the probability of success for subsidiary F is. In particular:*

$$1) \ q_F^{dd} \geq q_F^{dc} \geq q_F^{cd} \geq q_F^{cc} \quad \text{if } \frac{pM}{E} \geq \frac{(1-q_H)}{q_H},$$

$$2) \ q_F^{dd} \geq q_F^{cd} \geq q_F^{dc} \geq q_F^{cc} \quad \text{if } \frac{pM}{E} < \frac{(1-q_H)}{q_H}.$$

Proof: Straightforward by comparing the optimal effort levels q_F^{ij} with $i, j \in \{c; d\}$.

²⁶Differentiating with respect to q_F and with $\frac{\partial^2 EU^{ij}}{\partial q_F^2} < 0 \ \forall i, j = c, d$ yields these internal solutions for the optimal effort level. Potential corner solutions are analyzed further down in Corollary 1.

The underlying intuition is the following: Managerial incentives and thus effort levels are driven by benefits of control (given by the first term of the optimal effort levels) and benefits of empire-building (given by the second term of the optimal effort levels). Being coinsured by subsidiary H reduces manager F 's optimal effort level, as manager F anticipates a potential bailout by H . This effect relates to the disciplining effect of debt (Grossman and Hart (1982), Hart and Moore (1995)), which is stronger with local borrowing. Similarly, coinsuring subsidiary H reduces F 's effort: F anticipates that even if he is successful, he may not be able to keep the additionally generated funds in his subsidiary but have to bailout subsidiary H . This effect is in the vein of the negative incentive effects associated with the reallocation of funds in internal capital markets. If we now compare the different borrowing structures, the results of Proposition 1 become clear:

Under a fully decentralized structure dd neither subsidiary F nor subsidiary H are coinsured, so none of the adverse incentive effects is present. The manager chooses the highest effort level q_F^{dd} . Under a fully centralized structure cc both of the subsidiaries are coinsured and both adverse incentive effects are present. Thus, the manager chooses the lowest effort level q_F^{cc} . Under the mixed borrowing structures dc and cd only one of the two adverse incentive effects of coinsuring or of being coinsured is present. The ordering between the two mixed structures is not conclusive. Whether the borrowing structure dc or cd is associated with a higher effort level depends on the relative strength of the two incentive effects. The stronger the effective disciplining effect of bankruptcy pM as compared to the managerial empire-building tendencies E , and the lower the probability of success for subsidiary H , i.e. q_H , the stronger are the incentives under dc as compared to cd : With higher values for pM , the incentives from decentralizing the borrowing for subsidiary F are very valuable, while with lower values for E , the loss in incentives by decentralizing H are less severe. Similarly, a high value of q_H reduces the disadvantage of centralizing the borrowing for subsidiary H while it reinforces the disadvantage of

centralizing the debt for subsidiary F .²⁷

Finally, note that the optimal effort levels depend on the prevailing creditor rights p . As p reflects the threat of liquidation in case of bankruptcy, stronger creditor rights, i.e. higher values of p , induce higher effort levels. With strong creditor rights, the manager of subsidiary F knows that whenever a bankruptcy process is initiated the probability of remaining the manager of subsidiary F is small. This gives him a strong incentive to exert high effort and avoid bankruptcy. This effect is strongest for borrowing structures with decentralized debt in subsidiary F .

4.2 Optimal Borrowing Structure and Creditor Rights

As we have seen in section 3, centralizing the borrowing structure allows the CEO of the multinational corporation to reallocate internal funds in order to reduce the occurrence of bankruptcy and hence expected bankruptcy costs. However, coinsuring the subsidiaries entails adverse incentive effects. These incentive effects reduce the probability of success in case of debt centralization and thus ceteris paribus lower expected returns and increase expected bankruptcy costs. Based on this trade-off, we now derive the optimal borrowing structure for the multinational corporation. The focus of our analysis is on creditor rights. For the following analysis, we only allow for parameter ranges resulting in positive net interest rates, thus $R_F^{ij} \geq 1$ and $R_H^{ij} \geq 1$ with $i, j = c, d$.²⁸

CASE 1: EQUILIBRIUM WITHOUT EMPIRE-BUILDING TENDENCIES

First, we consider the situation without empire-building tendencies, i.e. $E = 0$. In this case the following Proposition holds:

Proposition 2 *Without empire-building tendencies, i.e. $E = 0$, the borrowing structures dd and cd are never optimal. The CEO of the multinational prefers a fully centralized*

²⁷The low probability of failure for subsidiary H ($1 - q_H$) makes it less probable that subsidiary F will have to bailout subsidiary H in case of coinsurance of H . However, the manager of subsidiary F can comfortably rely on being bailed out by subsidiary H , in case of coinsurance of subsidiary F .

²⁸This assumption excludes implausible situations in which investors are willing to pay the MNC for lending money. Investors would only want to pay for lending in the unrealistic situation that their expected pay-offs in case of bankruptcy were higher than debt repayments.

borrowing structure when creditor rights are weak and the mixed borrowing structure dc when creditor rights are strong. The optimal borrowing structure is

1) cc for $p < p_1$,

2) dc for $p \geq p_1$,

$$\text{with } p_1 = \frac{(1-\alpha)Z}{[X+(3-2q_H)(1-\alpha)Z]M}.$$

Proof: See Appendix.²⁹

The intuition of the result is as follows: First of all, note that without empire-building tendencies, i.e. $E = 0$, coinsuring subsidiary H entails no adverse incentive effects on the foreign subsidiary manager F . Thus, centralizing the borrowing for subsidiary H reduces expected bankruptcy costs and is the dominant borrowing strategy for subsidiary H . The fully decentralized borrowing structure dd is always dominated by the mixed borrowing structure dc with local borrowing in the foreign subsidiary F and centralized borrowing in the subsidiary H . Similarly, the mixed borrowing structure cd is always dominated by the fully centralized borrowing structure cc .

Consider the extreme case in which creditor rights are practically inexistent, i.e. $p = 0$. In this situation, local borrowing entails no disciplining effect as even in case of insolvency the subsidiary will not be liquidated. Thus, decentralizing the borrowing of subsidiary F would not enhance managerial effort but induce additional expected bankruptcy costs. So for $p = 0$, decentralizing the debt of subsidiary F cannot be optimal. Similarly, for very low levels of creditor rights, the increase in managerial incentives by decentralizing the borrowing for subsidiary F is negligible as opposed to the reduction in expected bankruptcy costs which, due to the coinsurance effect, can be achieved by centralizing the borrowing for subsidiary F . Increasing creditor rights enhance the disciplining effect of local borrowing and thus the incentives of subsidiary F manager. Thus, the opportunity cost of centralizing the borrowing for subsidiary F increases with creditor rights and at

²⁹The proof of this and other propositions can be found in the Mathematical Appendix posted on our website: http://www.en.compecon.vwl.uni-muenchen.de/download/discussionpaper/MNC_appendix.pdf

p_1 dominates the coinsurance advantage of centralizing the borrowing for subsidiary F .

CASE 2: EQUILIBRIUM WITH WEAK EMPIRE-BUILDING TENDENCIES

For small tendencies of empire-building the following Proposition holds:

Proposition 3 *When empire-building tendencies are weak, i.e. $0 < E < \bar{E}$, the optimal borrowing structure is*

1) cd for $p < p_2$,

2) cc for $p_2 \leq p \leq p_3$,

3) dc for $p > p_3$,

$$\text{with } \bar{E} = \frac{(1-q_H)(1-\alpha)^2 Z^2}{X^2 + 4(1-q_H)(1-\alpha)ZX + (3+3q_H^2 - 7q_H)(1-\alpha)^2 Z^2}; p_2 = \frac{[X+(1-2q_H)(1-\alpha)Z]E}{(1-q_H)(1-\alpha)ZM} \text{ and}$$

$$p_3 = \frac{(1-\alpha)Z(1-Eq_H)}{[X+(3-2q_H)(1-\alpha)Z]M}.$$

Proof: See Appendix.

The intuition for the result is as follows: Again, when creditor rights are very weak, decentralizing the borrowing for subsidiary F entails negligible incentive effects. Therefore, the borrowing for subsidiary F should be undertaken centrally in order to exploit the coinsurance effect without any significant loss in incentives. However, decentralizing the borrowing for subsidiary H entails some incentive effects for the manager of subsidiary F . Furthermore, with weak empire-building tendencies and weak creditor rights, the coinsurance of subsidiary H by subsidiary F is not very valuable. Hence, it is optimal to decentralize the borrowing for subsidiary H in order to at least exploit the associated incentive effects, as these are relatively valuable with a low overall incentive level. With intermediate levels of creditor rights, however, the disciplining effect of bankruptcy is stronger; enhancing the incentives and probabilities of success associated both with local and centralized borrowing for subsidiary F . As now the part of incentives associated with empire-building becomes negligible but the coinsurance of subsidiary H becomes more attractive, it is optimal to centralize H as well and fully exploit the coinsurance effect. With very strong creditor rights, incentives due to the disciplining effect of debt are very

strong, and hence the probability of success for subsidiary F is relatively large. This renders the coinsurance of subsidiary F unnecessary but the coinsurance of subsidiary H even more valuable, resulting in the optimal borrowing structure dc .

CASE 3: EQUILIBRIUM WITH STRONG EMPIRE-BUILDING TENDENCIES

If empire-building tendencies are very strong, the following Proposition holds:³⁰

Proposition 4 *Consider the case when empire-building tendencies are strong, i.e. $E > \bar{\bar{E}}$. Then the optimal borrowing structures with very low and very strong creditor rights are mixed structures, cd and dc respectively. For intermediate levels of creditor rights a fully decentralized borrowing structure is optimal. Thus,*

- 1) cd for $p < p_4$,
- 2) dd for $p_4 \leq p \leq p_5$,
- 3) dc for $p > p_5$,

$$\text{with } \bar{\bar{E}} = \frac{(1-\alpha)^2 Z^2}{X^2 + (3-2q_H)(1-\alpha)ZX + (3-3q_H + q_H^2)(1-\alpha)^2 Z^2}; p_4 = \frac{(1-\alpha)Z(1-E)}{[X + (2-q_H)(1-\alpha)Z]M} \text{ and}$$

$$p_5 = \frac{[X + (1-q_H)(1-\alpha)Z]E}{(1-\alpha)ZM}.$$

Proof: See Appendix.

For weak creditor rights the intuition is similar to the case with small empire-building tendencies: The CEO wants to exploit the incentive effects associated with decentralizing the borrowing for subsidiary H . These are now even more valuable, as empire-building tendencies are strong. As for weak creditor rights (decentralized) debt entails no major direct incentive effects, it is again optimal to exploit the coinsurance effect for subsidiary F and hence choose the borrowing structure cd . For very strong creditor rights the intuition is also identical to the case with weak empire-building tendencies: As the incentives

³⁰With intermediate levels of empire-building tendencies $\bar{E} < E \leq \bar{\bar{E}}$, the optimal borrowing structure will always be a mixed structure. For very low creditor rights the optimal structure is cd , with very high creditor rights, the optimal structure is dc . Note further that the comprehensive set of optimal borrowing structures $cd \rightarrow dd \rightarrow dc$ only exists if the benefits of empire building are not indefinitely high. In particular, for having a full set, the benefits of empire-building are limited above by $E \leq E^* = \frac{(1-\alpha)ZM}{X + (1-q_H)(1-\alpha)Z}$ in order to ensure $p_5 \leq 1$.

associated with the disciplining effect of debt are very high, exploiting this incentive effect by decentralizing the borrowing for subsidiary F is optimal. As with the decentralization of the borrowing for subsidiary F , the probability of success for subsidiary F increases, the coinsurance of subsidiary H becomes very valuable as well and is exploited by decentralizing the borrowing for subsidiary H .

But what changes for the intermediate level of creditor rights now? Again, stronger creditor rights increase the attractiveness of the coinsurance effect for subsidiary H as well as the incentive effect of local borrowing for subsidiary F . With strong empire-building tendencies, however, local borrowing for subsidiary H is very valuable as it allows fully exploiting the corresponding incentive effects for subsidiary F . This effect dominates the attractiveness of coinsuring subsidiary H for a larger range of creditor rights. Thus, with strong empire-building tendencies, it is optimal to decentralize the borrowing for subsidiary F for lower values of creditor rights before decentralizing the borrowing for subsidiary H becomes attractive. Overall, a fully decentralized borrowing structure is optimal for intermediate levels of creditor rights.³¹

Finally, an interesting implication for the optimal borrowing structure results from a closer look at the corner solutions of the managerial optimization problem (see Appendix). We summarize the findings in the following Corollary:

Corollary 1 *Irrespective of creditor rights, a fully centralized borrowing structure is optimal both in the absence of and with very strong private benefits for the manager of subsidiary F .*

The complete absence of private benefits, i.e. $M = E = 0$, means that the manager does not derive any private benefits - neither from being the manager of the subsidiary nor from having additional funds under control. Thus, neither decentralizing the borrowing

³¹The implicit assumption here is that creditors cannot enhance their creditor rights on a short term basis, as they might wish to do if both subsidiaries are financed locally. We think of creditor rights as rights that are determined by legal procedures and institutional settings. As such, they are not easy to influence by creditors on a short term basis. If in fact decentralization were to lead to endogenously higher creditor rights, the parent company might even take advantage of this possibility to commit to giving the managers even higher incentives by forcing to borrow locally.

for subsidiary F nor decentralizing the borrowing for subsidiary H entails any incentive effects. The project in subsidiary F fails for sure in $t = 1$.³² Hence, the CEO of the multinational corporation centralizes the borrowing structure in order to optimally exploit the coinsurance effect.³³ Similarly, in case of very strong private benefits of control, the manager of subsidiary F always exerts maximum efforts resulting in a probability of success of one under all borrowing structures. In this case, the manager's incentives are already strong enough with a fully centralized borrowing structure. Thus the CEO can perfectly well centralize the borrowing structure in order to optimally exploit the coinsurance effect without renouncing to managerial incentives. Surprisingly, even though we consider two completely different incentive situations, the optimal borrowing structure is the same and in both cases independent of the prevailing creditor rights.

CREDITOR RIGHTS AND INTEREST RATES

One interesting aspect we have not explicitly considered yet is the effect of creditor rights on equilibrium interest rates. Doing so allows us to derive empirically testable predictions, which can be used to verify the compliance of our model with real world data.

Proposition 5 *Foreign affiliates face lower interest rates for local borrowing, the stronger are the creditor rights. That is $\frac{\partial R_F^{dc}}{\partial p} \leq 0$, and $\frac{\partial R_F^{dd}}{\partial p} \leq 0$.*

Proof: See Appendix.

The intuition for this Proposition is as follows: Stronger creditor rights reduce the agency problem between the CEO and the manager of subsidiary F . This implies a higher effort level for the manager of subsidiary F and hence higher probabilities of success for the

³²Remember that the future profit Z is generated irrespectively of the probability of success in $t=1$. Therefore, the NPV of the investment project can still be positive.

³³Note that more precisely the CEO of the multinational corporation is indifferent between the borrowing structures cc and cd . This is due to the fact that in our basic model set-up the probability of success for subsidiary F is equal to zero if the manager exerts no effort. In a richer model set-up allowing for a base-line probability of success, which can be realized independent of managerial effort, choosing the borrowing structure cc would be unambiguously optimal.

investment project, which are reflected in the reduced interest rates. Desai et al. (2004) and Aggarwal and Kyaw (2008) find empirical evidence confirming this relationship.

5 Comparative Statics

In this section we investigate how firm and country characteristics influence the optimal borrowing structure. We consider the impact of profitability, of private benefits and of differences in the legal environment between the two countries in turn.

SHORT-TERM VS. LONG-TERM PROFITABILITY

How does the pay-off structure of the investment projects affect the degree of centralization of the borrowing structure? Do multinational corporations in industries with relatively high immediate pay-offs to investment, i.e. high values of X , e.g. in the music industry, prefer a more decentralized borrowing structure? Or should we rather expect multinationals with investment opportunities exhibiting very long pay-off periods, like infrastructure projects, which have a high continuation value Z , to prefer a more centralized borrowing structure? We provide the answer in the following two Propositions:

Proposition 6 *A higher first period profit in case of success X increases the parameter range for which a more decentralized borrowing structure is preferred. In particular, $\frac{\partial p_1}{\partial X} \leq 0$, $\frac{\partial}{\partial X}(p_3 - p_2) \leq 0 \wedge \frac{\partial}{\partial X}(p_5 - p_4) \geq 0$ and $\frac{\partial \bar{E}}{\partial X} \leq 0$, $\frac{\partial \bar{E}}{\partial X} \leq 0$.*

Proof: See Appendix.

Proposition 7 *A higher future value of the firm Z increases the parameter range for which a more centralized borrowing structure is preferred. In particular, $\frac{\partial p_1}{\partial Z} \geq 0$, $\frac{\partial}{\partial Z}(p_3 - p_2) \geq 0 \wedge \frac{\partial}{\partial Z}(p_5 - p_4) \leq 0$ and $\frac{\partial \bar{E}}{\partial Z} \geq 0$, $\frac{\partial \bar{E}}{\partial Z} \geq 0$.*

Proof: See Appendix.

Consider Proposition 6 first: A higher first period profit X makes the success of a subsidiary more valuable. Thus, it is more attractive to provide the manager of subsidiary

F with stronger incentives by decentralizing the borrowing structure. This is reflected both in the reduced optimality range for cc in the cases 1 and 2 (without and with weak empire-building tendencies), and in the increased optimality range for dd in case 3 (with strong empire-building tendencies). Additionally, as compared to case 2, case 3 becomes relatively more likely.

In contrast, consider Proposition 7: An increase in the future value of the investment project Z increases the attractiveness of realizing the coinsurance effect as there is more at stake if a borrowing unit goes bankrupt. Centralizing the borrowing structure has a negative impact on the probability of success for subsidiary F . However, we can show that this adverse effect is outweighed by the positive effect of coinsurance by centralizing the borrowing structure. Hence, in cases 1 and 2 the optimality range for cc increases, in case 3 the optimality range for dd decreases. Furthermore, as compared to case 3, case 2 becomes relatively more likely.

To summarize, we can say that while first period profits increase the relevance of the incentive effect, future profits – or rather the threat of losing them – increase the relevance of the coinsurance effect.

THE PRIVATE BENEFITS OF CONTROL

Intuitively we would expect that the private benefits of control – E and M – have very clear cut and similar effects on the borrowing structure. Both types of private benefits should increase the attractiveness of a decentralized borrowing structure as incentives become more important: An increase in M implies stronger direct private benefits of being the manager. Therefore, we would expect an increase in the attractiveness of decentralized borrowing for subsidiary F in order to exploit these incentives. An increase in E implies stronger indirect benefits of empire-building. Thus, we would expect an increase in the attractiveness of decentralized borrowing for subsidiary H in order to exploit these incentives. Furthermore, we would not expect that an increase in M influences the borrowing structure for subsidiary H . Similarly, we would not expect that an increase in E influences the borrowing structure for subsidiary F . But this is not what we find.

Proposition 8 *Stronger empire-building tendencies E increase (decrease) the parameter range for which a decentralized (centralized) borrowing structure is optimal. However, higher benefits of control M increase the parameter range for which the mixed debt structure dc is preferred as compared to all other borrowing structures. That is for E : $\frac{\partial p_2}{\partial E} \geq 0$, $\frac{\partial p_3}{\partial E} \leq 0$ and $\frac{\partial p_4}{\partial E} \leq 0$ $\frac{\partial p_5}{\partial E} \geq 0$ and for M : $\frac{\partial p_3}{\partial M} < \frac{\partial p_2}{\partial M} \leq 0$ and $\frac{\partial p_5}{\partial M} < \frac{\partial p_4}{\partial M} \leq 0$.*

Proof: See Appendix.

The direct incentive effects are as expected. If the benefits of being a manager M increase, decentralizing subsidiary F becomes more attractive as an increase in M implies a higher incentive effect associated with the decentralization of the foreign managers own subsidiary F . A similar rationale holds with respect to the private benefits associated with empire-building E . In this case, decentralizing subsidiary H becomes more attractive when the associated benefits E are high. Coinsuring subsidiary H would weaken the incentives of the subsidiary manager F too much. However, there is a further indirect effect associated with an increase in the private benefits: Higher private benefits, i.e. higher values of E and M , both increase the probability of success q_F for subsidiary F . This in turn influences the attractiveness of the coinsurance effect. As q_F increases, coinsuring subsidiary H in the parental country becomes more attractive whereas the coinsurance of subsidiary F becomes less attractive. This indirect effect leads to the asymmetric results laid down in Proposition 8.

NATIONAL DIFFERENCES IN THE LEGAL ENVIRONMENT

So far, we focused on multinational corporations and/or business groups operating in countries with similar legal environments. Naturally, many multinationals have subsidiaries in countries with very different legal environments. In this final part of the section, we therefore introduce differences in the legal environment and investigate how these affect the optimal borrowing structure of multinational corporations. In our model, the legal environment is reflected by two parameters: First of all, creditor rights, captured by the parameter p , are core to the legal environment of a country (see introduction).

Secondly, the legal environment comprehends also the design and the efficiency of the bankruptcy process. Thus, the associated dissipative costs $(1 - \alpha)$ will be shaped by the prevailing legal environment.

In the following, we discuss the impact of both aspects on the optimal borrowing structure of a multinational corporation.

Consider the bankruptcy process first. Without differences in the bankruptcy process, i.e. identical values of α for the two countries, bankruptcy costs reflected by $(1 - \alpha)$, influence the optimal borrowing structure in exactly the same way as future profits Z . Both higher values for Z or lower values of α increase expected losses from bankruptcy and therefore increase the attractiveness of avoiding bankruptcy and hence of a more centralized borrowing structure. The more interesting question however is, how differences in the efficiency of the bankruptcy process between the parental and the foreign country affect the optimal borrowing structure. To answer this question we introduce country specific parameters α_H and α_F for the (in-)efficiencies of the bankruptcy process in the home country of the parental company and the foreign country and investigate the effects on expected profits. Our results are summarized in the following Proposition:

Proposition 9 *With $\frac{\partial E\pi(cc)}{\partial \alpha_F} |_{\alpha_F=\alpha_H=\alpha} = \frac{\partial E\pi(cd)}{\partial \alpha_F} |_{\alpha_F=\alpha_H=\alpha} = 0$
 $\leq \frac{\partial E\pi(dd)}{\partial \alpha_F} |_{\alpha_F=\alpha_H=\alpha} \leq \frac{\partial E\pi(dc)}{\partial \alpha_F} |_{\alpha_F=\alpha_H=\alpha}$, a decrease in the bankruptcy costs $(1 - \alpha_F)$ increases the attractiveness of decentralizing the borrowing for subsidiary F in the foreign country. This increase is especially pronounced for the mixed borrowing structure dc .*

Proof: See Appendix.

The intuition is straightforward: A lower bankruptcy inefficiency in the foreign country F , i.e. a higher value for α_F , is associated with a lower downside risk of decentralized borrowing in F . The loss in the future firm value in case of bankruptcy is lower, and so the CEO prefers to decentralize the borrowing for subsidiary F in order to better exploit the incentive effect. Since under dc subsidiary H is coinsured by subsidiary F , there are positive spillover effects of the better legal environment in country F . The intuition

therefore is as follows: As coinsuring subsidiary H entails adverse incentive effects for the subsidiary F manager and hence lower probability of success for subsidiary F , the gains of a reduced cost of bankruptcy are larger. Note however, that the results are only driven by the reduced attractiveness of the coinsurance effect of centralized borrowing for subsidiary F . The (in-)efficiency of the bankruptcy system does not affect managerial incentives but only the loss in future value in case of bankruptcy.

Differences in bankruptcy efficiency are also reflected in the local interest rates. A more efficient bankruptcy procedure means lower efficiency losses in case debt repayment obligations cannot be met. This allows lower interest rates for the bank to break even, as the following proposition confirms.

Proposition 10 *Foreign affiliates face lower interest rates for local borrowing, the higher the bankruptcy efficiency is. That is $\frac{\partial R_F^{dc}}{\partial \alpha} \leq 0$ and $\frac{\partial R_F^{dd}}{\partial \alpha} \leq 0$.*

Proof: See Appendix.

Let us now turn to creditor rights. A priori, we would expect creditor rights to have a strong direct effect on expected profits. Surprisingly, though, this is not the case.

Proposition 11 *Differences in the creditor rights do not directly affect expected profits under any borrowing structure. However, due to the incentive effect, the attractiveness of borrowing structures with decentralized borrowing for subsidiary F increases with higher creditor rights in country F as compared to the parental company's home country, i.e.*

$$\frac{\partial E\pi(cd)}{\partial p_F} \Big|_{p_F=p_H=p} = \frac{\partial E\pi(cc)}{\partial p_F} \Big|_{p_F=p_H=p} = 0 \leq \frac{\partial E\pi(dd)}{\partial p_F} \Big|_{p_F=p_H=p} \leq \frac{\partial E\pi(dc)}{\partial p_F} \Big|_{p_F=p_H=p} .$$

Proof: See Appendix.

The intuition is as follows: Differences in the borrowing structure directly influence expected bankruptcy costs of the multinational corporation. However, they also affect the interest rates external investors require. From an ex-ante perspective, as investors are fully competitive, these two effects exactly cancel each other out. The only remaining impact of creditor rights is on the incentives of the subsidiary manager F . These of course

only depend on the creditor rights prevailing in the country of origin of the debt. The overall effect under dc is stronger than under dd . This is due to the fact that the same increase in incentives has a stronger effect on expected bankruptcy costs if subsidiary H is coinsured.

NATIONAL DIFFERENCES IN GROWTH OPPORTUNITIES

Finally, we allow for growth opportunities to differ in different countries. We capture this by distinguishing Z_F and Z_H and allowing for $Z_F \neq Z_H$. Suppose for example that $Z_F > Z_H$, i.e. the growth opportunities of the foreign subsidiary are higher than the ones of the domestic subsidiary. On the one hand this makes it more attractive to coinsure the foreign subsidiary so as not to lose the future growth potential in case of an unfavorable outcome of returns in period 1. This would call for a more centralized borrowing structure for the foreign subsidiary. On the other hand, a higher growth potential makes it even more important to give the manager strong incentives to spend effort in order to guarantee that the subsidiary will indeed have favorable returns and thus survive the short run. This effect would call for a more decentralized borrowing structure for the foreign subsidiary. A priori, it is not clear which of the two effects dominates. The following Proposition summarizes how these different effects influence the optimal borrowing structure.

Proposition 12 *Consider a situation where $Z_F = Z_H$. Then, an increase in Z_F increases the likelihood of centralized borrowing for the foreign subsidiary and decreases the likelihood of centralized borrowing for the home subsidiary, i.e. $\frac{dp_i}{dZ_F} > 0 \quad \forall i = 1 - 5$, where the p_i are defined in Propositions 2-4.*

Proof: See Appendix.

The proposition shows that the coinsurance effect dominates the incentive effect if Z_F increases, i.e. the future growth potential of the foreign subsidiary becomes more important. Interestingly, the incentive effect is taken care of in a different way. As Z_F increases, it becomes less likely that the domestic subsidiary is centrally financed. This allows to mitigate the negative incentive the foreign manager suffers when he is forced to

coinsure the domestic subsidiary. Of course, this effect is relevant only if $E > 0$, i.e. if the empire building effect makes the manager suffer from having to bail out other subsidiaries. By choosing decentralized financing for the domestic subsidiary, this negative incentive effect for the foreign manager can be avoided.

Differences in growth opportunities are also reflected in the local interest rates, as the following proposition confirms.

Proposition 13 *Foreign affiliates face lower interest rates for local borrowing, the larger their growth potential is. That is $\frac{\partial R_F^{dc}}{\partial Z_F} \leq 0$ and $\frac{\partial R_F^{dd}}{\partial Z_F} \leq 0$.*

Proof: See Appendix.

Another interesting extension would be to allow for differences in country risk other than creditor rights. To the extent that higher country risk implies lower growth potential, like in case of political risk, the effects would be similar to the ones discussed here. If higher country risk implies a higher volatility of returns and hence a higher likelihood of bankruptcy this would call for more coinsurance and hence less local financing.³⁴ An extensive analysis of such a scenario must be left for future research.

6 Empirical Hypotheses

In this final section, we highlight the main empirical implications of our model.

As we have shown in our analysis, creditor rights are key in determining the optimal borrowing structure of a MNC.³⁵ The first hypothesis we derive relates the borrowing structure of the MNC's foreign affiliates to the strength of creditor rights:

Hypothesis 1 *Subsidiaries of MNCs in countries with weaker creditor rights will rely more on centralized borrowing by the parental company, thus borrow less decentrally.*

³⁴Kwok and Reeb (2000) find for example that multinational companies employ less debt if they invest in a riskier environment than they envisage at home.

³⁵Note, however, that with creditor rights we refer to effective creditor rights. As also Safavian and Sharma (2007) verify empirically, it is not only the creditor-friendliness of the laws that determines the effective strength of creditor rights in a country but also the enforcement of the laws. This is part of our model, as only an effective creditor-orientation constitutes a credible threat of liquidation.

This hypothesis reflects the findings of Desai et al. (2004). The authors find evidence that foreign affiliates' borrowing costs for external finance are higher in countries with weak creditor rights. They furthermore show that foreign affiliates in countries with weak creditor rights use internal capital markets in order to substitute for external debt. As the authors reckon, weak creditor rights might give rise to an agency problem as they reduce the creditor's incentive to avoid bankruptcy. Internal capital markets can thus be used "to fund subsidiaries in jurisdictions providing weak creditor rights, drawing on capital from operations located in countries offering strong creditor rights" (Desai et al. (2004), p. 2456). These are exactly the forces at work in our model. Furthermore, taking into account that financial institutions are better developed with better legal protection (Levine (1999)), the hypothesis is also in line with the findings of Kang et al. (2004) of a positive relationship between the extent of foreign affiliates' local borrowing and financial market development.

Consider the dissipative costs associated with the bankruptcy system next. In our model, bankruptcy costs are captured by the parameter $(1 - \alpha)$. As higher bankruptcy costs increase expected losses from bankruptcy, we derive the following empirical hypothesis:

Hypothesis 2 *High bankruptcy costs lead to a more centralized borrowing structure.*

Even though in our analysis bankruptcy costs are modeled in a rather stylized way – as they simply consist of the costs associated with financial distress, and not of actual liquidation – the above relationship should even be reinforced if we included actual costs of liquidation.

With respect to industry-specific characteristics we can derive the following hypothesis:

Hypothesis 3 *MNCs operating in industries with longterm pay-off periods prefer a centralized borrowing structure, whereas MNCs in industries with shortterm pay-off periods prefer a decentralized borrowing structure.*

From Propositions 6 and 7 we know that immediate profits and future profits have completely opposing effects. For MNCs with higher immediate profits (shortterm pay-off periods) the incentive effect is the driving force for their borrowing structure. In contrast, for firms with higher future profits (longterm pay-off periods) the coinsurance effect is very valuable. These effects are reflected in the above hypothesis.

A more indirect relationship that can be established between the legal environment and the borrowing structure is related to the private benefits of control. As for example Dyck and Zingales (2004) empirically verify: strong “legal institutions are strongly associated with lower levels of private benefits” (Dyck and Zingales (2004), p. 582).³⁶ This holds in particular for regulations regarding the transparency of firms. Thus, we expect the general level of private benefits of control to be relatively lower in countries with a more effective and transparent legal environment. Combining this relationship with our insights with respect to managerial private benefits, M and E , we can derive the following final hypothesis:

Hypothesis 4 *MNCs with foreign affiliates in countries with relatively low transparency requirements and hence higher private benefits of control decentralize their affiliates’ borrowing.*

Finally, using Proposition 5, 10 and 13 we can derive the following hypothesis, relating the interest rates to creditor rights, bankruptcy procedures and growth potentials.

Hypothesis 5 *Lending rates for the foreign subsidiary are lower the stronger the creditor rights, the more efficient the bankruptcy procedure and the larger the growth potential.*

The following table provides evidence from country level data that is consistent with the last hypothesis. Descriptive statistics for the variables used are reported in the Appendix. Table 1 regresses a number of different variables on country specific interest rate

³⁶Even though the focus of their analysis is on private benefits controlling shareholders enjoy, the general findings should at least be partially applicable to the private benefits a non-owner subsidiary manager enjoys.

spreads which are calculated from lending rates and deposit rates. Using the spreads rather than the lending rates allows us to control for country heterogeneity other than the variables under consideration. As a measure for the creditor rights, we use the Getting credit index from the Doing Business Report (World Bank). It consists of information on the strength of legal rights and the depth of credit information. Both are supposed to make it easier for creditors to enforce their claims and hence in turn make it easier for firms to have access to credits. Table 1 confirms the negative relationship between this index and interest rate spreads that is suggested by our hypothesis. To capture the growth potential of foreign subsidiaries, we use GDP growth rates. The coefficients are always negative, as expected. As a measure for the efficiency of the bankruptcy procedures, we use a variable called Recovery rate. This index is taken again from the Doing Business Report. It measures the percentage share that is recouped by creditors through the bankruptcy, insolvency or debt enforcement proceedings. The coefficient has the expected negative sign. Finally, we also include a political risk index, to capture in a different way the growth potential of the foreign subsidiary, assuming that the higher the risk the lower the growth potential. We find the expected positive coefficient. All the variables are highly significant, mostly at the 1 percent level.

7 Conclusion

In this paper we developed a framework for understanding the debt allocation process within multinational corporations. In our analysis we showed that the debt structure within multinationals matters beyond tax issues – a fact that had almost been completely neglected in the literature so far. In particular, we highlighted that the legal environment is key in determining the degree of debt centralization within a MNC. However, as our analysis suggests, different aspects of the legal environment have differing effects on the borrowing structure.

Although very stylized, our model and results do reflect the existing empirical findings

Table 1: Dependent variable: Interest rate spread

	(1)	(2)	(3)	(4)	(5)	(6)
Getting credit index	-0.659** (0.313)	-0.900*** (0.335)				
GDP growth		-0.682*** (0.222)		-0.828*** (0.196)		-0.393*** (0.115)
Recovery rate			-0.178*** (0.0365)	-0.222*** (0.0387)		
Political risk					31.08*** (3.880)	31.57*** (3.944)
Constant	14.69*** (2.861)	19.83*** (3.379)	15.06*** (1.491)	20.36*** (1.941)	-0.260 (1.356)	1.200 (1.444)
R-Squared	0.00826	0.0265	0.0354	0.0623	0.0927	0.109
N	534	519	646	627	630	618
Years	2005-2009	2005-2009	2004-2009	2004-2009	1999-2005	1999-2005

Pooled OLS regression
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Data sources: Interest Rate Spread is taken from the IFS. GDP growth is taken from the IMF. Recovery rate and Getting credit index are taken from the Doing Business 2010 report (World Bank). Political risk data is taken from the International Country Risk Guide (ICRG).

related to multinational finance and creditor rights. While we provide a rationale for mixed borrowing structures, we demonstrate how the trade-off between incentive problems in internal capital markets and coinsurance determines the optimal borrowing structure. Our analysis highlights the relevance of creditor rights for a multi-entity firm's capital structure in general and for multinational corporations in particular. Differences in the legal environment induce a bias of the debt allocation towards the country with a better legal environment, i.e. stronger creditor rights and lower bankruptcy costs. A major contribution of our paper is to highlight the importance of a comprehensive view on multinationals' borrowing decision due to feedback effects on internal capital markets – an aspect that current research on MNC finance did not focus on yet.

A more comprehensive model would endogenize the incentive problems of the home subsidiary as well. The basic trade-off of our model would not be affected but there may be room for reinforcing incentive effects between the subsidiaries. This must be left to future research. Further questions to be addressed in future research relate to the effect of creditor rights on several aspects of multinational finance. An extension of our work could incorporate the choice between equity and debt into a model of multinational finance. A particularly interesting question is how the legal environment affects the multinational's choice between internal debt, i.e. parental borrowing for the subsidiaries, and internal equity. Another interesting aspect which needs further empirical investigation is a differentiated analysis of the effect of creditor rights on the different aspects of the insolvency regime, for example also the actual liquidation of insolvent firms.

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9 Appendix

Table 2: Descriptive Statistics

	Definition	Mean	Std. deviation
Dependent variable			
Interest Rate Spread	Lending rate minus deposit rate	9.240	16.250
Independent variables (country-level)			
Getting credit index	Consisting of Strength of legal rights index (0-10) and Depth of credit information index (0-6)	7.878	3.606
GDP growth		3.497	6.057
Recovery rate	Share [%] recouped by creditors through the bankruptcy, insolvency or debt enforcement proceedings	30.358	25.102
Political risk	Index between zero and one with a higher index reflecting higher political risk	0.371	0.160