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Bankruptcy law, asset substitution problem, and creditor conflicts

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Abstract

We argue that there may be an additional goal of bankruptcy law to mitigate possible conflicts of interest among senior and junior debt. If a firm is heavily in debt, senior and junior debt can be affected differently by changes in firm's risk. The senior creditor tends to lose by risk-increasing, the junior creditor tends to lose by risk-decreasing. The entrepreneur and one creditor could cooperate and change investment policy jointly to the cost of the remaining creditor (*coalition problem*). This might even work, if asset substitution is not efficient. We ask, whether there are counterbalancing provisions of bankruptcy law which mitigate coalition problems. Deviations from absolute priority in Chapter 11 of the U.S. Bankruptcy Code tend to complicate the forming of coalitions, since the entrepreneur usually receives quite a large return without coalition. With respect to Germany, the Bankruptcy Code provides more outside options to the creditors, thereby defining threat points. This makes it also more difficult to form coalitions.

JEL classification: G33, G31

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1. Introduction

There are two basic goals of bankruptcy law (see Hart, 1995). First, bankruptcy law should sanction a firm's management, representing equity, in order to provide adequate *ex ante*

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incentives. Second, a firm's *ex post* value should be maximized once the bankruptcy proceedings have started. To be more precise, bankruptcy law should provide a framework to induce the efficient liquidation/continuation decision whilst adequately solving distributional conflicts among the creditors. There is a tension between these two goals (see Aghion, 1998). In this paper, we argue that there may be a third objective, namely to mitigate possible conflicts of interest among the creditors *ex ante*.

Conflicts of interest among creditors may arise, when they are affected differently by changing investment policy. This important agency problem of debt financing is known as the asset substitution or risk shifting problem. To keep things simple, let us assume that the *entrepreneur* is the single shareholder and runs the firm.[1] After signing the debt contract, the entrepreneur has an incentive to choose risky, maybe inefficient projects. Because of limited liability and fixed repayment, the entrepreneur has a convex pay-off function. She profits from gains entirely but shares losses with the creditors. Therefore, a riskier project which leads to higher gains but also higher losses may affect the entrepreneur and the creditors in different ways. This is the basis for an important conflict of interest in the case of debt financing where *all* the creditors tend to lose, because claims are of equal ranks.

In this paper, we analyze the risk shifting problem assuming *different* creditor classes, that is, senior and junior debt. There is some option pricing literature evaluating the value of junior and senior debt depending on the firm's risk (see Black & Cox, 1976; Smith, 1979).[2] In principle, senior and junior debt can be affected differently by changes in firm's risk. One creditor may gain while the other creditor may lose. We show that this may induce *coalition problem*s. The entrepreneur and one creditor could cooperate and change investment policy jointly, devaluing the claim of the remaining creditor. This might even be possible if asset substitution is not efficient. Thus, under certain circumstances, secured debt may have undesirable *ex ante* effects on investment policy.

It should be analyzed, whether there are counterbalancing provisions to mitigate coalition problems.[3] We focus on certain provisions of U.S. and German bankruptcy law. The answer is quite ambiguous. On the one hand bankruptcy law provides a priority rule in principle and therefore allows for conflicts of interests among creditors. On the other hand, there are rules which complicate the forming of coalitions, for instance deviations from absolute priority in Chapter 11 of U.S. Bankruptcy Code or sanctions in German penal law, respectively. Furthermore, the German Bankruptcy Code provides outside options to the creditors which makes it more difficult to form coalitions. However, this might also be the case for efficient coalitions.

It is shown that coalition problems arise in firms with high leverage or in cases of excess debt. Often, the entrepreneur has inside information to start bankruptcy proceedings in time. However, she will keep the unpleasant information and start the proceedings, if there is too little incentive. With respect to Chapter 11, the entrepreneur usually does not lose control and may extract some monetary benefits since she has a relatively strong bargaining position. These benefits may induce the entrepreneur to file for bankruptcy in time which tends to avoid the coalition problem. This is not the case in Germany, since the entrepreneur usually loses control, in the case of reorganization at least partially, and receives too little monetary benefit in case of bankruptcy. There are, however, provisions in criminal law

which force the entrepreneur to file for bankruptcy in case of excess debt. The legal definition of *excess debt* is, however, rather vague; moreover, excess debt is measured in balance sheet terms. Thus, there is a lot of discretion in interpreting excess debt which induces the entrepreneur to delay. The coalition problem seems to be rather serious in Germany, since there may be situations with *de facto* excess debt, but not in balance sheet terms. With respect to the discussion on U.S. bankruptcy law (see, for instance, Bebchuk, 1998), this article provides an argument in favor of Chapter 11, since it is not yet clear whether reform proposals, for example, the so-called "options approach" or the "auctions approach" would induce the entrepreneur to start bankruptcy proceedings in time, thereby avoiding coalition problems.

The topic of this paper is related to two strands of literature. One strand deals with the asset substitution problem in general (see Keeton, 1979; Stiglitz & Weiss, 1981; Bester & Hellwig, 1989; Kürsten, 1995). To our knowledge, this literature has not yet considered conflicts of interest among creditors. The second strand is focusing on the *ex ante* efficiency of bankruptcy law, asking how the law can induce the entrepreneur to choose an efficient effort level or investment policy (see Berkovitch, Israel, & Zender, 1998; Povel, 1999; White, 1980). Bulow and Shoven (1978) consider coalition problems explicitly, however they assume equally ranked creditor claims and analyze problems of *ex post* inefficiency with respect to the liquidation/continuation decision.

White (1980, 1989) provides an analysis of coalition problems which may affect investment policy *ex ante*. Her papers are presumably most closely related to this article. She considers a coalition of the bank lender and equity holders devaluing the bondholder's claims. However, there are some important differences to my paper. First, *White* does not consider the case that the coalition's creditor (the bank) has a senior claim with priority for the full amount. Therefore, she does not derive the result, that there may be a coalition's incentive to choose an inefficient and *less* risky project. *White* points out, that the coalition favors *risky* and maybe inefficient projects—as the entrepreneur would favor it even without coalition. Second, we assume a different information structure. In *White*'s model, the bank has inside information, but the bondholders do not. Financing a new project at least partially with new bonds, the coalition may expropriate the bondholders. One could argue, that clever bondholders would check the firm's condition before giving additional money, therefore anticipating the wealth-shifting problem. However, we assume that the entrepreneur has inside information. We do not consider the case of financing *new*, *additional* investments but rather focus on *asset substitution*. Therefore, inside information is not revealed except when the entrepreneur wants to do so, in order to induce the coalition's creditor to give her a side-payment. In the model of *White*, side-payments are not considered explicitly; presumably it should be the *entrepreneur* who pays the bank—this is the third difference. Fourth, we stress the role of excess debt which seems to be an important factor for the existence of coalition problems. Fifth, we examine whether several provisions of current U.S. and German bankruptcy law tend to mitigate or aggravate coalition problems. Sixth, we consider the paper's results with respect to the current discussion on Chapter 11 (see, for instance Bebchuk, 1998; Hart, 1995).

There are a lot of interesting issues in bankruptcy law, which we do not deal with in this paper, for instance the role of corporate bankruptcy as a filtering device (see White,

1994), the valuation problem (see Bebchuk, 1998), inefficiencies due to coordination problems among numerous creditors (see Gertner & Scharfstein, 1991), the justification of mandatory bankruptcy law (see Povel, 1999; Schwartz, 1997) and the design of optimal bankruptcy law (see Aghion, Hart, & Moore, 1992; Bebchuk, 1988; Berkovitch & Israel, 1999).

The paper is organized as follows. In Section 2, we model the conflict of interest between senior and junior debt. First, we set out the assumptions (Section 2.1), then provide the intuition behind the main ideas (Section 2.2). In Sections 2.3 and 2.4, we analyze the positions of the entrepreneur and the creditors formally, interpreting the formal results (Section 2.5) and comparing them to the case of equally ranked claims (Section 2.6). The results of the model are discussed in Section 2.7. In Section 3, we address the role of current U.S. and German bankruptcy law in mitigating coalition problems (Section 3.1). Then, we discuss proportionate and absolute priority rule (APR; Section 3.2). Third, we consider the paper's results with respect to the discussion on Chapter 11 (Section 3.3). Section 4 offers some concluding remarks.

2. Senior debt, junior debt, and asset substitution problem

2.1. Assumptions

We consider a firm which was set up in $t = -1$ with junior and senior debt. In $t = 0$ the entrepreneur can choose between a risky and a safe investment policy. Investment policy affects the individual outcomes in $t = 1$ when the firm is liquidated. In particular, we assume for the different points of time:

Assumption 1 ($t = -1$). The entrepreneur E signs the credit contracts with the senior creditor B1 and the junior creditor B2. The face value of the debt is D_1 and D_2, respectively. Repayment takes place in $t = 1$. Entrepreneur E, who is the manager-owner in the limited liability firm, invests the money in a project P. The project's outcome in $t = 0$, $\tilde{M}$, is uncertain and has the following expected value in $t = -1$: $\mu(\tilde{M}) > D_1 + D_2$. The entrepreneur and both of the creditors are wealth-maximizing and risk-neutral.

Assumption 2 ($t = 0$). The outcome of the project, M is realized with $M \geq 0$. Due to the contract, entrepreneur E is supposed to put M in a risk-free investment (project P1). The market rate for risk-less assets is zero. The revenue of P1 in $t = 1$: $R(\text{P1}) = M$. Entrepreneur E has managerial discretion in $t = 0$ and can put M alternatively in a risky investment (project P2). The revenue of P2 in $t = 1$ is $\tilde{R}(\text{P2})$. The creditors cannot observe the project choice. $\tilde{R}(\text{P2})$ is a stochastic variable with two outcomes, 0 and $2M$ with equal probability $p(0) = p(2M) = 0.5$. The expected revenue (in $t = 0$) is $\mu(\tilde{R}(\text{P2})) = M$.

Assumption 3 ($t = 1$). The firm is liquidated. Senior debt is repaid before junior debt.

To sum up, we consider the following time structure:

$t = -1$	$t = 0$	$t = 1$
• B1 gives senior debt (D_1) • B2 gives junior debt (D_2) • Agreement on a two-staged project P: first stage: outcome $\tilde{M}$ in $t = 0$ ($\mu(\tilde{M}) > D_1 + D_2$), second stage: safe investment (P1) of realized M in $t = 1$	• M is realized • Contractual agreement: safe investment of M (project P1), outcome in $t = 1$: M (interest rate is zero) • Alternative: risky investment P2, outcome in $t = 1$: 0 and $2M$ with equal probability 0.5 • Creditors cannot observe project choice	• Liquidation of the firm • Repayment of D_1 and D_2

It might be easier to read the article by providing the following list of symbols:

B1 (B2)	name of the senior creditor/bondholder (junior creditor, respectively)
D_1 (D_2)	face value of senior debt (junior debt, respectively)
E	name of the entrepreneur
{E,B1};{E,B2}	name of the coalition of entrepreneur and senior creditor (entrepreneur and junior creditor, respectively)
M	safe return of project P1
$2M$	maximum return of the risky project P2 (minimum return: 0)
L; $2L$	in Section 2.4: safe return of an inefficient project P1; maximum return of an inefficient risky project P2 (minimum return: 0), assuming: $L < M$
P1 (P2)	name of the safe project (risky project, respectively)
R	total revenues of the firm
R_{B1}, (R_{B2}, R_E)	individual revenues of the senior creditor (junior creditor; entrepreneur, respectively)
μ	expected value
Y_{B1}, (Y_{B2}, Y_E)	individual losses ($Y < 0$) and gains ($Y > 0$) of the senior creditor (junior creditor; entrepreneur, respectively).

The claims of the senior creditor B1 and the junior creditor B2 have a face value of D_1 ($D_1 > 0$) and D_2 ($D_2 > 0$), respectively. The loan from B1 is fully paid back before the loan from B2. The entrepreneur E gets the rest. Different creditor claims can occur, if there is a "me-first-rule" in favor of B1, secondly, if there is secured and unsecured debt,[4] thirdly, if there is unsecured debt and *subordinated* debt, which has even lower priority than unsecured debt.

The point of view for our analysis is $t = 0$. In $t = -1$, the credit contracts were signed; the expected revenue of the investment exceeded the sum of the face values. In $t = 0$, the outcome M is realized. Entrepreneur E is supposed to put M in a safe investment.[5] However, there might be an incentive to put it into a risky investment. Although the creditors might

have taken into account some opportunistic behavior in some general way, they could not anticipate in $t = -1$ the concrete opportunity to choose project P2. One reason for this could be asymmetric information on the action set of E. However, there also might have been symmetric, but incomplete information in $t = -1$.[6]

Note that after the realization of M in $t = 0$, the case $D_1 + D_2 > M$ might occur. In some sense this case faces a situation of *excess debt*, because the sum of the face values of debt exceed the realized project value. However, from the creditor's point of view in $t = -1$, the *expected* value exceeded the sum of the face values, thus signing the credit contract was rational (they are risk-neutral). This assumption is not that restrictive. In reality, even the secured creditors sometimes realize losses, since they have not completely noticed the firm's bad condition. The case of the large German construction company "Philipp Holzmann" in 1999 shows that most creditors did not notice that Holzmann was heavily in debt.

In what follows, we first provide the intuition of the main ideas (Section 2.2). Then, we consider the "pure" asset substitution problem, which indicates that the risky project P2 does not imply a social loss or social gain (Section 2.3). Afterwards we stress the "mixed" asset substitution problem where higher risk is coupled with a social loss (Section 2.4). Coalitions among one creditor and the entrepreneur are explicitly regarded in Section 2.5. Coalitions imply binding agreements on investment policy in $t = 0$ or on side-payments in $t = 1$. It is assumed that creditors cannot pledge side-payments, for example, because they are not verifiable. One can interpret side-payments in different ways. It may be a pure cash-payment or may involve future monetary benefits which are offered by the coalition's creditor, for example, favorable credit contracts with quite low interest rates.

2.2. The intuition

In this section, we show how the expected revenues of the single parties and of certain coalitions depend both on the realized return in $t = 0$ and the investment policy in $t = 0$. The revenues determine the preferences on investment policy. The entrepreneur has two investment opportunities in $t = 0$:

- "Continuation" of the (less risky) project P1 which induces a safe revenue of M in $t = 1$.
- Switching to the risky project P2 with two outcomes, 0 and $2M$, with equal probability $p(0) = p(2M) = 0.5$.

R_{E}, R_{B1} and R_{B2} indicate the *individual* revenues of senior creditor B1, junior creditor B2 and entrepreneur E in $t = 1$. With regard to the safe project P1, individual revenues are:

$$R_{\mathrm{B1}} = \begin{cases} D_1, & \text{if } M \geq D_1 + D_2, \\ D_1, & \text{if } D_1 + D_2 > M \geq D_1, \\ M, & \text{if } D_1 > M > 0. \end{cases} \tag{1.1}$$

$$R_{\mathrm{B2}} = \begin{cases} D_2, & \text{if } M \geq D_1 + D_2, \\ M - D_1, & \text{if } D_1 + D_2 > M \geq D_1, \\ 0, & \text{if } D_1 > M > 0. \end{cases} \tag{1.2}$$

$$R_{\mathrm{E}} = \begin{cases} M - D_1 - D_2, & \text{if } M \geq D_1 + D_2, \\ 0, & \text{if } D_1 + D_2 > M \geq D_1, \\ 0, & \text{if } D_1 > M > 0. \end{cases} \tag{1.3}$$

With the risky project P2, there is a high return $2M$ in the good state, but no return at all in the bad state, each with probability 0.5. Thus, the expected individual revenues are:

$$\mu(\tilde{R}_{\mathrm{B1}}) = \begin{cases} \frac{1}{2}D_1, & \text{if } 2M \geq D_1 + D_2, \\ \frac{1}{2}D_1, & \text{if } D_1 + D_2 > 2M \geq D_1, \\ M, & \text{if } D_1 > 2M > 0. \end{cases} \tag{2.1}$$

$$\mu(\tilde{R}_{\mathrm{B2}}) = \begin{cases} \frac{1}{2}D_2, & \text{if } 2M \geq D_1 + D_2, \\ \frac{1}{2}(2M - D_1), & \text{if } D_1 + D_2 > 2M \geq D_1, \\ 0, & \text{if } D_1 > 2M > 0. \end{cases} \tag{2.2}$$

$$\mu(\tilde{R}_{\mathrm{E}}) = \begin{cases} \frac{1}{2}(2M - D_1 - D_2), & \text{if } 2M \geq D_1 + D_2, \\ 0, & \text{if } D_1 + D_2 > 2M \geq D_1, \\ 0, & \text{if } D_1 > 2M > 0. \end{cases} \tag{2.3}$$

For example, let us assume: $D_1 = 8$, $D_2 = 6$. What are the individual revenues in $t = 1$ depending on M and on the project choice? (Tables 1 and 2)

Table 1
Safe project P1: individual revenues of senior creditor B1, junior creditor B2 and entrepreneur E, depending on M (assuming $D_1 = 8$, $D_2 = 6$)

M	0	2	4	6	8	10	12	14	16	18	20
R_{B1}	0	2	4	6	8	8	8	8	8	8	8
R_{B2}	0	0	0	0	0	2	4	6	6	6	6
R_{E}	0	0	0	0	0	0	0	0	2	4	6
$R_{\mathrm{E}} + R_{\mathrm{B1}}$	0	2	4	6	8	8	8	8	10	12	14
$R_{\mathrm{E}} + R_{\mathrm{B2}}$	0	0	0	0	0	2	4	6	8	10	12

Table 2
Risky project P2: expected individual revenues of senior creditor B1, junior creditor B2 and entrepreneur E, depending on M (assuming $D_1 = 8$, $D_2 = 6$)

M	0	2	4	6	8	10	12	14	16	18	20	7
$\mu(\tilde{R}_{\mathrm{B1}})$	0	2	4	4	4	4	4	4	4	4	4	4
$\mu(\tilde{R}_{\mathrm{B2}})$	0	0	0	2	3	3	3	3	3	3	3	3
$\mu(\tilde{R}_{\mathrm{E}})$	0	0	0	0	1	3	5	7	9	11	13	0
$\mu(\tilde{R}_{\mathrm{E}} + \tilde{R}_{\mathrm{B1}})$	0	2	4	4	5	7	9	11	13	15	17	4
$\mu(\tilde{R}_{\mathrm{E}} + \tilde{R}_{\mathrm{B2}})$	0	0	0	2	4	6	8	10	12	14	16	3

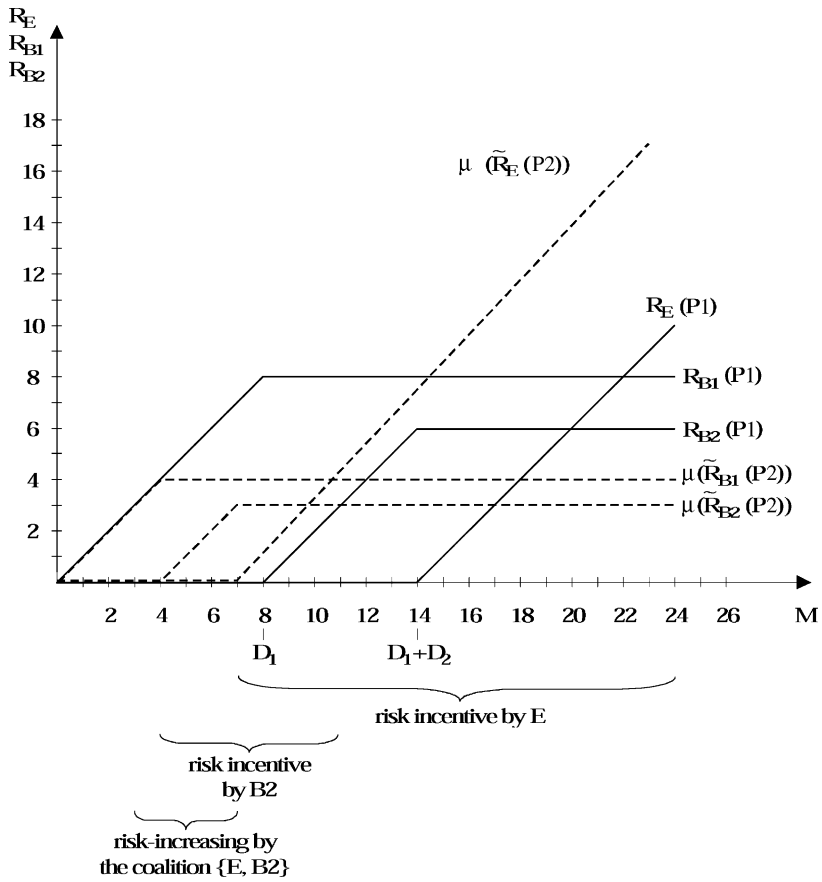

Figure 1. Individual pay-off functions (in $t = 1$) depending on project P1 (safe) or P2 (risky) and on the outcome M in $t = 0$ (assuming $D_1 = 8$, $D_2 = 6$).

Figure 1 shows the individual pay-off functions. The straight lines indicate the functions for the safe project, the dotted lines for the risky project.

Obviously, for $M > 7$, the entrepreneur E is better off, if she switches to the risky project. Surprisingly, also the junior creditor B2 may be better off by risk-increasing, if $4 < M < 11$. When total revenues are low, the position of B2 is comparable to the entrepreneur's position. For M close to D_1, the junior creditor experiences a large loss with respect to P1. B2 may be interested in risk-increasing activities, because she can lose little else. Unlike the junior creditor, the senior creditor is in general better off by choosing the safe project P1.

One can also see the potential for coalitions. For $4 < M < 7$, the entrepreneur has no interest in switching to the risky project, whereas the junior creditor B2 has. If B2 gives a side-payment to E, B2 can induce her to choose the risky project. On the other hand, the senior creditor B1 is interested in less risky projects.

If the *risky project P2 were the starting point*, the senior creditor would be interested in risk-decreasing. Since the entrepreneur is never interested in risk-decreasing, B1 has to give E a sufficiently large side-payment. If P2 was the starting project, the coalition of B1 and

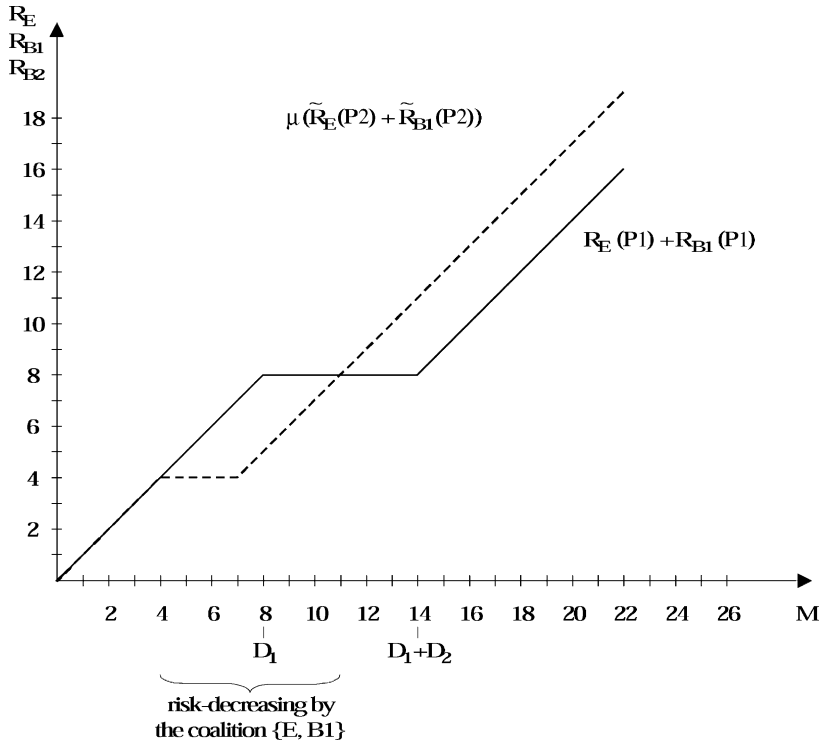

Figure 2. Pay-off function of the coalition comprised of the senior creditor B1 and entrepreneur E depending on project P1 (safe) or P2 (risky).

E would work for $4 < M < 11$, since the coalition's pay-off is then higher by switching to the safe project P1 as Figure 2 shows. For example, if $M = 10$, the senior creditor receives $\mu(R_{B1}) = 4$ by choosing the risky project and $R_{B1} = 8$ by choosing the safe project; the entrepreneur receives $\mu(R_E) = 3$ and $R_E = 0$, respectively. A side-payment in $t = 1$, which is lower than four, but which exceeds three, makes both parties better off (Figure 2).

In what follows, we will go back to our basic model, where the safe project is the starting point. Hitherto, we have regarded individual losses and gains from asset substitution for a fixed level of debt. It may, however, be interesting to analyze wealth-shifting effects depending on the debt level. We shall, therefore, now address individual losses and gains by varying the level of senior debt.

2.3. Switching from the safe project P1 to the risky project P2: individual losses and gains depending on the level of senior debt

In this section, we calculate the loss and gain of each party when the entrepreneur increases risk in $t = 0$. Losses and gains depend on the debt level. To calculate losses and gains, one has to subtract individual revenues facing the risky project P2 (relation (2.1)–(2.3)) from individual revenues facing the safe project P1 (relation (1.1)–(1.3)). Y_E, Y_{B1} and Y_{B2} indicate

the individual losses and gains.

$$Y_{\mathrm{E}} = \mu(\tilde{R}_{\mathrm{E}}(\mathrm{P2})) - R_{\mathrm{E}}(\mathrm{P1}), \quad Y_{\mathrm{B1}} = \mu(\tilde{R}_{\mathrm{B1}}(\mathrm{P2})) - R_{\mathrm{B1}}(\mathrm{P1}),$$
$$Y_{\mathrm{B2}} = \mu(\tilde{R}_{\mathrm{B2}}(\mathrm{P2})) - R_{\mathrm{B2}}(P1). \tag{3}$$

To simplify, let us focus on a situation where $D_1 \leq M$ and $D_1 + D_2 \leq 2M$ holds and which leads us to the basic results. That means, only the first and second rows in (1.1)–(1.3) do now matter and only the first row in (2.1)–(2.3). Therefore, we can focus on the following two cases:

$$D_1 + D_2 \leq M \text{ (normal case, case a)} \quad \text{or} \quad D_1 + D_2 > M \text{ (case of excess debt, case b)}$$

In the normal case a, both the claim of B_1 and the claim of B_2, are riskless. In case b, the junior creditor B_2 faces a default risk of $D_1 + D_2 - M$ for sure. Considering case a, the losses and gains then amount to:

$$Y_{\mathrm{B1}} = -\tfrac{1}{2}D_1 < 0. \tag{4.1}$$

$$Y_{\mathrm{B2}} = -\tfrac{1}{2}D_2 < 0. \tag{4.2}$$

$$Y_{\mathrm{E}} = \tfrac{1}{2}(D_1 + D_2) > 0. \tag{4.3}$$

Considering case b, the losses and gains amount to:

$$Y_{\mathrm{B1}} = -\tfrac{1}{2}D_1 < 0. \tag{5.1}$$

$$Y_{\mathrm{B2}} = \tfrac{1}{2}D_2 + D_1 - M \left\{ \begin{matrix} \leqq \\ \equiv \\ \geqq \end{matrix} \right\} 0. \tag{5.2}$$

$$Y_{\mathrm{E}} = \tfrac{1}{2}(2M - D_1 - D_2) > 0. \tag{5.3}$$

In which way do losses and gains depend on the face value of senior debt (D_1)?[7] Considering (4.1)–(5.3), obviously, the function $Y_{\mathrm{B1}}(D_1)$ is monotonically decreasing with D_1. $Y_{\mathrm{B2}}(D_1)$ is constant with respect to case a and monotonically increasing with D_1 with respect to case b. Finally, $Y_{\mathrm{E}}(D_1)$, with increasing in D_1 with respect to case a and decreasing to case b. Figure 3 shows the functions $Y_{\mathrm{E}}(D_1)$, $Y_{\mathrm{B1}}(D_1)$ and $Y_{\mathrm{B2}}(D_1)$.

Obviously, the creditors B1 and B2 are affected in a different way, by substituting the safe project P1 with the risky project P2. If the claim of the senior creditor B1 is sufficiently large, not only the entrepreneur E, but *also* the junior creditor B2 will gain, whereas B1 will lose. This result matches the intuitive analysis of the individual pay-off functions in Section 2.2.

2.4. Inefficient risk-increasing: individual gains and losses

In what follows, it is shown that B2 can even gain if the risky project P2 would lead to a social loss, that means even if the project P2 is not efficient. To represent the case of inefficient risk-increasing, we modify the model and assume, that the project P2 is *inefficient* and has two possible outcomes, 0 and $2L$ ($0 < L < M$ and $2L \geq D_1 + D_2$), both with probability 0.5. Then, individual expected revenues are:

$$\mu(\tilde{R}_{\mathrm{B1}}) = \tfrac{1}{2}D_1, \quad \mu(\tilde{R}_{\mathrm{B2}}) = \tfrac{1}{2}D_2, \quad \mu(\tilde{R}_{\mathrm{E}}) = \tfrac{1}{2}(2L - D_1 - D_2). \tag{6}$$

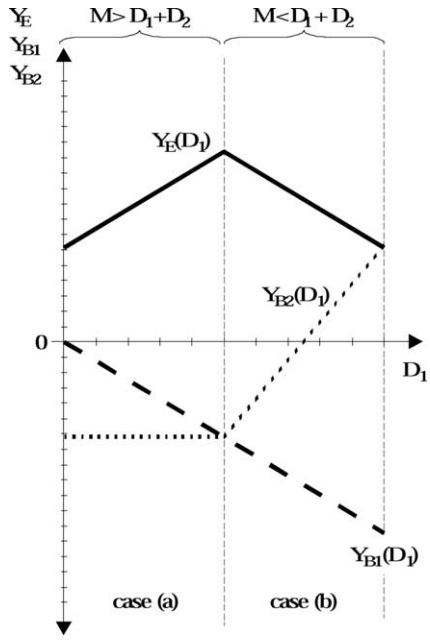

Figure 3. Switching from the safe to the risky project: individual gains and losses dependent on the senior claim D_1.

Regarding case a ($D_1 + D_2 \leq M$) individual losses and gains amount to (see (4.1)–(4.3)):

$$Y_{\mathrm{B1}} = -\tfrac{1}{2}D_1 < 0. \tag{7.1}$$

$$Y_{\mathrm{B2}} = -\tfrac{1}{2}D_2 < 0. \tag{7.2}$$

$$Y_{\mathrm{E}} = \tfrac{1}{2}(D_1 + D_2) - (M - L) \left\{ \begin{matrix} \leqq \\ > \end{matrix} \right\} 0. \tag{7.3}$$

In case a, the entrepreneur E will gain with respect to (7.3), if the senior claim of B1 is sufficiently large:

$$D_1 > 2(M - L) - D_2. \tag{8}$$

Correspondingly, E will only gain, if the social loss due to project P2 is not too large, that is, if the following condition holds:

$$M - \tfrac{1}{2}(D_1 + D_2) < L < M. \tag{9}$$

In case b ($D_1 + D_2 > M$) the gains and losses are:

$$Y_{\mathrm{B1}} = -\tfrac{1}{2}D_1 < 0. \tag{10.1}$$

$$Y_{\mathrm{B2}} = \tfrac{1}{2}D_2 + D_1 - M \left\{ \begin{matrix} \leqq \\ > \end{matrix} \right\} 0. \tag{10.2}$$

$$Y_{\mathrm{E}} = \tfrac{1}{2}(2L - D_1 - D_2) \geq 0. \tag{10.3}$$

In case a, both of the creditors lose. In case b, the junior creditor B2 may gain with respect to (10.2), if the following condition holds:

$$D_1 > M - \tfrac{1}{2}D_2. \tag{11}$$

Since the entrepreneur E does not receive any return in case b choosing the safe project P1, E will already gain, if there is any positive revenue implementing the risky project P2, that means that if the following condition holds:

$$2L > D_1 + D_2 \quad \text{or} \quad D_1 < 2L - D_2. \tag{12}$$

To sum up (11) and (12), both the junior creditor B2 and the entrepreneur E will individually gain from switching to the *inefficient* project P2, if the following condition holds:

$$M - \tfrac{1}{2}D_2 < D_1 < 2L - D_2. \tag{13}$$

A numerical example serves for clarification: assume that the starting project P1 has a safe outcome of $M = 10$ and the risky project P2 has the outcomes 0 and 18 with equal probability of 0.5 ($L = 9$), then the junior creditor B2 (with $D_2 = 6$) gains with respect to (11), if the senior claim exceeds $D_1 > 7$. The entrepreneur will also gain with respect to (12), if $D_1 < 18 - 6 = 12$ is satisfied. Thus, both entrepreneur and junior creditor gain if $7 < D_1 < 12$.

2.5. Economic results

2.5.1. Economic results disregarding coalitions

The formal analysis and Figure 3 support the intuitive results given in Section 2.2. For now, we leave coalitions out of consideration.

- First, if the claim of the senior creditor B1 (D_1) is sufficiently small, both senior and junior creditor will lose if risk increases.
- The second result might be a little bit surprising:[8] B1 will lose, but B2 can *gain*, if the claim of B1 is sufficiently large. Thus, the creditors can be affected differently from asset substitution. The junior creditor B2 gains, since her default risk facing the safe project P1 is higher than her default risk the risky project P2. If the project P1 were implemented, B2 would lose for sure, since the safe claim of B1 is quite large.[9] Increasing the risk, B2 may participate in high revenues in good states of nature. In this case, the junior creditor and the entrepreneur are both interested in risk-increasing. However, they will gain to the detriment of B1, the senior creditor.
- This form of wealth-shifting can even occur, if the risky project is inefficient. This proposition will hold if the individual loss of senior creditor B1 exceeds the sum of the individual gains of entrepreneur E and junior creditor B2.

2.5.2. Economic results regarding coalitions

Allowing for coalitions among one creditor and the entrepreneur, additional problems may occur, if asset substitution is not wealth-enhancing.[10]

2.5.2.1. Risk-increasing coalitions.

- Since B2 would tend to support the choice of the risky project P2, she may have an interest in "protecting" entrepreneurial discretion and correspondingly in "controlling" the information exchange with the senior creditor B1. There may well be an incentive to give either no or inaccurate information, to facilitate the choice of P2.
- Both the junior creditor *and* the entrepreneur may be better off even if the risky project is inefficient. In this case, the loss of the senior creditor B1 is larger than the sum of the individual gains of B2 and E. Only if E profits from the project change, she will choose P2. If E does not receive anything from the risky project ($2L \leq D_1 + D_2$), she will not switch.

In this case, the *coalition* {E, B2} may choose the inefficient project P2, if there is a coalition's gain.[11] To make both better off, the junior creditor B2, who would profit from the risky project P2, offers a side-payment to E. Since the entrepreneur is aware of this, she will have an incentive to inform the junior creditor B2 on the opportunity of choosing project P2 (*risk-increasing coalition problem*, see Bigus, 1999, pp. 182–190). The condition for the existence of a risk-increasing coalition is:

$$Y_{\mathrm{E}} \leq 0 \quad \text{and} \quad Y_{\mathrm{E}} + Y_{\mathrm{B2}} > 0. \tag{14}$$

Given that the project P2 implies a total social loss ($L < M$), then the second term of (14) is satisfied, if the loss of the senior creditor B1 exceeds social loss:

$$\tfrac{1}{2} D_1 > M - L. \tag{15}$$

Obviously, condition (15) holds, when the senior claim D_1 is sufficiently large. B2 induces E to choose P2 by paying any positive side-payment.

2.5.2.2. Risk-decreasing coalitions. In principle, a coalition among E and the senior creditor B1 is also possible, let us call it {E, B1}. To see this one has to consider *the risky project as the starting point* remembering the numerical example in Section 2.2. Entrepreneur E has the opportunity to switch to the safe project. E on her own would not choose the safe project, since she does not gain from risk-decreasing. But the senior creditor B1 may prefer to switch to the safe project, when his claim is risky.

If E informs B1 on her project set, B1 may have an incentive to induce E to switch to the safe project paying a sufficiently large side-payment. The coalition {E, B1} would gain, whereas the junior creditor B2 would lose. There may even be a gain for the coalition if the safe project is inefficient (*risk-decreasing coalition problem*). Especially in Germany, this kind of coalition problem seems to be plausible, since the banks are often senior creditors and regularly have close ties to the entrepreneur.

The conditions for this kind of coalition problem are similar to (14):

$$Y_{\mathrm{E}} \leq 0 \quad \text{and} \quad Y_{\mathrm{E}} + Y_{\mathrm{B1}} > 0. \tag{16}$$

To make the risk-decreasing coalition problem clear, I assume the risky project P3 as the starting point. P3 has an outcome of 0 and $2M$, each with probability $p = 0.5$. Entrepreneur E could switch to the safe, but inefficient project P4 with outcome $R(\mathrm{P4}) = L$ ($L < M$). For

sake of simplicity, let us assume $D_1 + D_2 > L$ and $D_1 < L$. In (17.1)–(17.3), the left term shows the individual revenues for the safe project P4, the right term – each indicated by $\frac{1}{2}$ – shows them for P3. The individual losses and gains amount to:

$$Y_{\mathrm{B1}} = D_1 - \tfrac{1}{2}D_1 = \tfrac{1}{2}D_1 > 0. \tag{17.1}$$

$$Y_{\mathrm{B2}} = L - D_1 - \tfrac{1}{2}D_2 \left\{\begin{matrix}\leqq\\ \geqq\end{matrix}\right\} 0. \tag{17.2}$$

$$Y_{\mathrm{E}} = 0 - \tfrac{1}{2}(2M - D_1 - D_2) < 0. \tag{17.3}$$

The coalition {E, B1} receives the expected revenue:

$$Y_{\mathrm{E,B1}} = Y_{\mathrm{E}} + Y_{\mathrm{B1}} = D_1 + \tfrac{1}{2}D_2 - M. \tag{18}$$

With respect to (18), the coalition {E, B1} will only gain, if the following condition holds:

$$Y_{\mathrm{E,B1}} > 0, \quad \text{if} \quad D_1 > M - \tfrac{1}{2}D_2. \tag{19}$$

For instance, if $M = 10$, $L = 9$ and $D_2 = 6$, the coalition {E, B1} will gain, if $D_1 > 7$. Assuming $D_1 = 8$, the individual losses and gains from risk-decreasing amount to $Y_{\mathrm{B1}} = +4$, $Y_{\mathrm{B2}} = -2$ and $Y_{\mathrm{E}} = -3$. Entrepreneur E would not switch to the safe and inefficient project P4 on her own. However, if B1 pays more than 3 (and less than 4) in $t = 1$, both B1 and E are better off choosing the safe project P4.

2.6. Comparison of equally and unequally ranked creditor claims

One might wonder, whether the existence of different creditor claims would make problems of wealth-shifting worse than in a situation with equally ranked creditor claims. For sake of simplicity, we assume $D_1 = D_2$ in Section 2.6, that means the face values of the claims are equal. Furthermore, consider the "pure" asset substitution problem, that is, there is no social loss. Figure 4 shows individual losses and gains from risk-increasing dependent on D1 for both scenarios.

In both scenarios, the entrepreneur benefits from risk-increasing in the same way. The *creditors* however, might, be affected very differently. Considering equally ranked claims, *both* of the creditors lose. Assuming $D_1 = D_2$, they even lose the same amount. Let us now switch to the scenario of different claims (right part of Figure 4). Regarding case b, the junior creditor may gain from risk-increasing, but the senior creditor loses more than in the scenario of equally ranked claims.

Problems of wealth-shifting may be aggravated in the scenario of different creditor claims since creditors may be affected differently by changes in investment policy. Information and monitoring costs may also increase when there are different creditor claims. The coalition's creditor tends to keep the other (losing) creditor in the dark concerning the project choice. The affected creditor may anticipate this and search for information on his own—causing monitoring costs. When there are equally ranked creditors there is no incentive to do this. In principle, one creditor can monitor the entrepreneur on behalf of the others. The others trust her because they are all affected in the same way.[12]

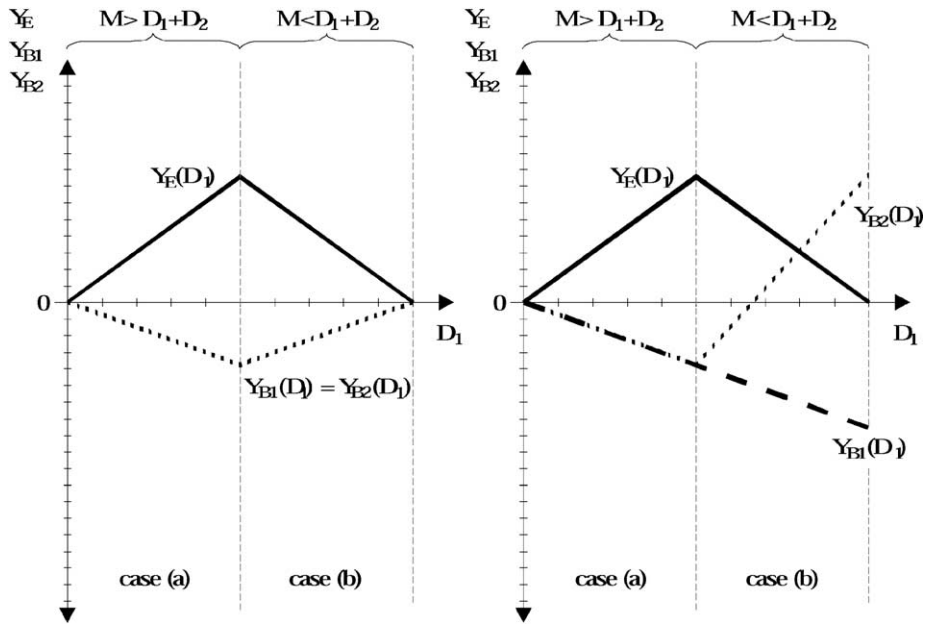

Figure 4. Risk-increasing: individual gains and losses of entrepreneur E and creditors B1 and B2 dependent on the claim of B1 (D_1). Left side: equally ranked claims; Right side: B1 has a senior, B2 has a junior claim.

2.7. Discussion

How relevant are the aforementioned problems? The answer depends on the specific "type" of creditor claims, on the existence of entrepreneurial private benefits, and on the institutional setting. First, when we have secured and unsecured debt, seizing firm's assets gives in general some control rights to the secured creditor and limits therefore entrepreneurial discretion. For instance, in Germany, an entrepreneur cannot sell seized real estate (and reinvest the returns in risky projects) without consent of the secured creditor. However, if control rights are not very strong or security agreements are not sufficiently disclosed entrepreneurial discretion will hardly be limited (see Drukarczyk, 1991). This occurs regularly in Germany, for example, in cases where account receivables are put into pledge. To sum up, on the one hand the seizing of assets may induce coalition problems by creating different creditor claims. On the other hand, they may mitigate incentive problems by limiting the entrepreneur's action set. Note that there is no coalition problem when collateral is valuable and the claim of the senior creditor is not risky at all. The senior creditor is indifferent to investment policy then, the junior creditor is not interested in a risk-increasing coalition since she cannot expropriate the senior creditor.

Coalition problems may be especially relevant in two cases, first with regard to a me-first-rule, where the senior creditor has a prior claim on the firm's total assets without specifying property rights on certain assets, second with respect to unsecured debt and subordinated debt with even lower priority. Unsecured debt is then senior, subordinated debt is junior, respectively. Since there is no seizing of firm's assets in this case, the action set is not limited. Especially German commercial banks issue unsecured and subordinated debt. It has been suggested, that

subordinated creditors should monitor the banks on behalf of all bank creditors.[13] Considering the potential risk incentive to the subordinated creditors this suggestion should be discussed in more detail.[14]

Coalition problems will differ, when we assume entrepreneurial benefits which are non-monetary, private and not transferable. This assumption may be plausible, since entrepreneurs often receive some "psychic" return from running a firm, for instance from realizing own ideas or social reputation. Within our setting, the risk-increasing coalition problem may be more serious then, since risk-increasing makes both monetary outcomes and nonmonetary private benefits more likely. On the other hand, the risk-decreasing coalition problem may be less serious, since the entrepreneur demands a larger side-payment to get compensated for the loss of entrepreneurial control.

The type of coalition problem also depends on institutional details. In Germany, especially risk-decreasing coalitions seem to be plausible, since the banks are often senior creditors and have close ties to the entrepreneur. In the U.S., bondholders frequently have a senior claim whereas banks have a junior claim. Since negotiation with numerous bondholders is very costly, the entrepreneur tends to form a coalition with the bank which is interested in risk-increasing when the bank has a junior claim. Please keep in mind that a coalition problem may only occur if there is a default risk at least of two different creditor groups. Note that a coalition problem may also occur when there is priority due to the maturity rather than to the rank of debt.

3. The role of bankruptcy law in mitigating the asset substitution problem

3.1. Special provisions of U.S. and German bankruptcy law with respect to coalition problems

3.1.1. Starting bankruptcy proceedings in order to avoid the forming of coalitions

We should stress, that creditor conflicts especially arise when a firm is heavily in debt or faces excess debt, that is, when the sum of the creditor claims exceeds the (expected) firm's value.[15] Coalition problems will not occur, if the forming of coalitions is not possible. Usually, forming is much more difficult, once bankruptcy proceedings have started, since the entrepreneur then loses control—as it is the rule in Germany (see Drukarczyk & Schmidt, 1998)[16]—or since the court supervises opportunistic behavior. As the entrepreneur often has inside information, she is generally supposed to start the bankruptcy proceedings. However, she may well have an incentive to delay filing for bankruptcy. The law provides some incentives to start the proceedings, they are different in Germany and in the U.S. though.

In Germany, bankruptcy formally has to be filed, when excess debt occurs. This provision only holds for corporations (see § 19 I, InsO; InsO = *Insolvenzordnung*, the German Bankruptcy Code). The entrepreneur usually loses control in the case of bankruptcy. If she delays filing, she may be accused of it under the criminal code. Nevertheless, there is some discretion which is due to the vague definition of excess debt. With regard to § 19 II 1 InsO, a corporation faces excess debt, if the total liabilities exceed the total assets. There is an evaluation problem since the law does not provide a clear-cut rule in order to measure excess debt

(see Drukarczyk, 1993, pp. 366–370). There is a lot of discretion, especially with respect to the evaluation of company's assets. Continuation values can be chosen, when continuation is "more probable" (see § 19 II 2, InsO). Of course, the entrepreneur tends to use continuation values which usually exceed liquidation values. But there is also some discretion using liquidation values. The evaluation depends, *inter alia*, on the "intensity" of liquidation. This ranges from selling the firm entirely to selling each single asset. Additionally, the liquidation value depends also on the available time for selling the assets. If there is some time pressure, liquidation values tend to be lower.

To sum up, the entrepreneur not only has an incentive to delay the bankruptcy proceedings but the law also provides some discretion to do so. This means, there may be situations, in which excess debt in the "economic" sense has already occurred, but not in the legal sense. In these situations the aforementioned problems tend to be very severe, since the incentives to choose inefficient projects are very strong and the entrepreneur's discretion to do so, is hardly limited by the law.

Chapter 11 of the U.S. Bankruptcy Code does not provide an insolvency trigger. The entrepreneur has a lot of discretion on filing, also to delay filing for bankruptcy in order to form coalitions. But there is a countervailing incentive. Entrepreneurs generally have an incentive to start the proceedings voluntarily, since Chapter 11 gives them relatively strong bargaining power (see White, 1998). Usually, the entrepreneur do not even lose control as is common in Germany. Moreover, they have an incentive to start proceedings rather quickly, since bargaining power, *inter alia*, depends on the degree of solvency (see Betker, 1995).

3.1.2. Mitigating coalition problems by "shrinking the size of the cake"

German bankruptcy law tends to mitigate coalition problems. When the entrepreneur informs the junior creditor B2 on the purpose of *risk-increasing*, B2 could react in different ways. If B2 does not trust the entrepreneur's information and recognizes the situation of excess debt, B2 might start bankruptcy proceedings.[17]

If B2 trust this information, she will think about a coalition. Since German penal law does not allow for speculative business when there is the threat of bankruptcy, B2 has to take possible consequences of criminal law into account.[18] In a dynamic setting, both the senior creditor B2 and the entrepreneur E have to consider reputational losses on the credit market, too. To sum up, there are some costs which tend to reduce the coalition's gain. Thus, coalition problems may be mitigated.

Considering the *risk-decreasing* coalition problem, there is no provision in the German criminal code which applies directly. However, the existence of bankruptcy law gives an outside option to the senior creditor, which makes the forming of coalitions much more difficult. The senior creditor B1 will not agree to cooperate if the starting of the bankruptcy proceedings will likely lead to a firm's liquidation as it often did in Germany in the recent years. Since the liquidation of the firm in $t = 0$ induces a safe revenue and B1 has a senior claim, B1 rather refuses to cooperate and starts the bankruptcy proceedings. The outside option changes the participation constraint of the creditor. Compared to the risk-decreasing coalition, B1 saves the side-payment.

Since creditors have less opportunities to start proceedings under U.S. bankruptcy law, senior creditors may not have this outside option. There may also be cases in which the

outside option makes it more difficult to form coalitions which are efficient. The following numerical example makes this argument clearer.

Consider a new example where the risky project, identified as P3, is taken as the starting point and the revenue of P3 is 0 or 20, each with probability 0.5. Obviously, the expected revenue of project P3 is 10. If the senior creditor B1 has a claim of eight and the junior creditor B2 a claim of six, they will receive an individual expected revenue of four and three, respectively. The entrepreneur E will receive the remainder, that is, three. Let us assume that the creditors do not know about the bad condition of the firm. Entrepreneur E now has the opportunity to choose the safe project P4, which leads to a safe revenue of 12. A project choice would be efficient.

E on her own does not have an incentive to switch to project P4, since she would not get anything (the sum of the claims exceeds the safe revenue). However, the senior creditor B1 would profit: she receives eight instead of four. A coalition among E and B1 would lead to a cooperative gain ($8 + 0 > 4 + 3$), moreover, creditor B2 would also gain. The entrepreneur would have an incentive to inform B1 on the project set and to bargain on the side-payment. But this will not work, if there is a bankruptcy law, which probably leads to liquidation as is still often the case in Germany. Since B1 gets informed on the firm's condition and has the outside option to start the bankruptcy proceedings, the new reference level is the safe individual revenue in the case of liquidation. For example, if the liquidation value of P3 is 9, B1 would get 8; 8 is her reference level *then* to evaluate the offer to cooperate. But then the coalition's gain is negative ($8+0 < 8+3$) then, and the coalition will not work. The existence of bankruptcy law provides an outside option and may define a new participation constraint. Anticipating this effect, entrepreneur E would not make an offer to B1.

With respect to U.S. bankruptcy law, the *risk-increasing* coalition is mitigated, since the entrepreneur generally retains strong benefits in bankruptcy—differing to Germany. Chapter 11 gives some bargaining power to the entrepreneur, which is derived from a number of procedural rules on the formation and acceptance of a reorganization plan (see Gertner & Scharfstein, 1991). The entrepreneur has the exclusive right to propose a plan for the first 120 days after filing the bankruptcy petition. There is some discretion to delay the plan. Since the firm's value and the value of secured assets may decline dramatically over time, the entrepreneur's threat to delay is credible. Therefore, the entrepreneur may bargain and retain some equity in the reorganized firm. There is some empirical evidence for such so-called "deviations of APR" (see Betker, 1995). Moreover, the entrepreneur usually does not lose control.

Some scholars did criticize Chapter 11, because it is soft on incumbent management (see Bradley & Rosenzweig, 1992; Jensen, 1991). However, it turns out that deviations from absolute priority may be advantageous in mitigating the "normal" risk incentive problem or the effort problem in a failing firm (see Berkovitch et al., 1998; Frierman & Viswanath, 1994). The *risk-increasing coalition problem* shall also be mitigated. Choosing the safe project, the entrepreneur can maintain control and receive some revenue even in the case of bankruptcy. With respect to the *risk-decreasing* coalition problem the possible consequences are not clear-cut. The coalition problem may become more serious. Since the entrepreneur may retain control and may receive revenues when she chooses the safe project initiating bankruptcy, she will accept a lower side-payment comparing to Germany where the entrepreneur loses control in general. This makes coalition forming easier.

3.2. Asset substitution problem: proportionate priority rule (PPR) or APR?

Both in Germany and in the U.S. the dominant rule of bankruptcy law is APR. Alternatively, one could establish the PPR. It calls for paying all creditors the same proportion of the face value of claims. There are some advantages and also some shortcomings of PPR. For example, it might be an advantage that this rule, in the pure sense, avoids different creditor classes and thus mitigates conflicts of interest among creditors. The parties tend to vote rather unanimously on the liquidation/continuation decision. In the case of different creditor claims, the senior creditors prefer liquidation, whereas the junior creditors may prefer continuation. This conflict of interest may lead to inefficient decisions; moreover, the decision process itself is very costly.

On the other hand, the PPR may not solve information and agency problems and problems of risk allocation. In principle, ranking creditor claims equally limits the efficient risk allocation (see Bebchuk & Fried, 1996; Schmidt, 1980). Moreover, creditors will be unwilling to lend in the first place since their claims may be devalued should the entrepreneur finance bad projects with additional money from new creditors. The fundamental problem is, that the "new" creditors can transfer a part of their default risk to the "old" creditors (see Schäfer & Ott, 1995, p. 555).

Considering information and agency problems, there are advantages to the APR and to secured debt. Secured debt mitigates problems of both overinvestment and underinvestment and (see Hart & Moore, 1995; Stulz & Johnson, 1985, respectively). Monitoring and bonding costs tend to be lower (see Drukarczyk, 1991). However, there remains a puzzle: if secured debt provides many potential benefits, why it is not ubiquitous (see Adler, 1993, 1998)? This article also stresses this so-called ubiquity puzzle, since if there is unsecured and secured debt, coalition problems may arise. The PPR tends to mitigate coalition problems. However, the "usual" agency problems of debt financing still remain, especially since entrepreneurial discretion is hardly limited. If there were secured debt only, both the "usual" agency problems and probably the coalition problems could be mitigated.

3.3. Coalition problems and the discussion of Chapter 11

There has been much criticism of Chapter 11 (see Jensen, 1991). First, it is supposed to be too soft on incumbent management and therefore unable to provide strong *ex ante* incentives. Second, the selfinterested creditors may end up in a great, inefficient deal of haggling, especially since there is no objective value to the liquidation and continuation alternatives (see Aghion, 1998). Some scholars proposed alternatives to the existing rules in order to avoid these problems. The most prominent proposals are called the "auctions" approach (see Baird, 1986; Jensen, 1991) and "options" approach, respectively (see Bebchuk, 1988; Aghion et al., 1992). Differing to existing U.S. bankruptcy law, both approaches provide only one rule for both purposes, liquidation and restructuring. Under the auctions approach the assets of the insolvent company should be auctioned off with the objective to receive the highest value. Under the original version of the options approach, roughly speaking, all debt is converted into equity and all creditors receive somehow an equity stake.[19] At the starting point, the senior creditor owns all equity of the firm. The creditor with second priority owns a call option to buy the senior creditor's equity. The strike price equals the face value of senior debt. The creditor

with third priority owns a call option with a strike price which equals the sum of the face values of first and second priority debt . . . and so on.

There are some shortcomings with both approaches. Cash auctions may lead to prices which are too low when it is difficult for bidders to raise sufficient cash to maintain a company as going concern—maybe due to asymmetric information. The result is a lack of competition in the auction (see Hart, 1995). Often, an industry- or an economy-wide recession is the reason for bankruptcy. Competitive firms, which are potential bidders, may also suffer from recession. This may be a reason for low auction prices, too (see Shleifer & Vishny, 1992). The auction price depends also on the auction method. Different claimants may be interested in different methods (see Bhattacharyya & Singh, 1999). With respect to the options approach (see Hart, 1995), some argue that junior creditors may be unable to exercise their options due to cash-constraints or credit-constraints. Second, the junior creditors may have problems in getting relevant information on the firm. Thus, they tend not to exercise their option although it would be efficient to do so in the absence of asymmetric information. Third, creditors might be unwilling to become shareholders.

With respect to coalition problems both approaches seem to be unfavorable, since the entrepreneur hardly receives a monetary or nonmonetary return once she has commenced the bankruptcy proceedings—there is no incentive for filing for bankruptcy. Furthermore, no civil or criminal penalties are suggested when the entrepreneur delays filing. Thus, the incentive for wealth-shifting may be stronger under these approaches and less serious under existing Chapter 11. Coalition problems, as well as the "usual" agency problems of debt financing, tend to be more serious.

4. Conclusion

We analyzed the asset substitution problem of debt financing assuming different creditor claims. It turns out that not only the entrepreneur may have an incentive to choose a more risky investment policy even if it is not efficient to do so, but also the junior creditor. Therefore, secured debt and seizing firm's assets may *aggravate* the asset substitution problem. Thus far, the literature has focused on the incentive compatibility effect of collateral. Conflicts of interest among different creditors may also arise in the case of unsecured and subordinated debt with even lower priority, as it is the case for commercial banks in Germany.

When the entrepreneur has no incentive to change the project but one creditor has, the entrepreneur and the creditor may form a coalition which may lead to *coalition problems* if the coalition can expropriate the remaining creditor. The gaining creditor pays a side-payment to the entrepreneur and thus induces her to choose a different, maybe, inefficient project at the cost of the remaining creditor. There are two kinds of coalition problems. First, there are risk-increasing coalition problems, which imply a coalition of the entrepreneur and the junior creditor. Second, there are risk-decreasing coalitions, involving the senior creditor. One would expect risk-decreasing coalitions in Germany, since the banks are often senior creditors and frequently have close ties to the entrepreneur. In the U.S., banks may join a risk-increasing coalition, when bondholders have senior claims. Note however, that coalition problems may also occur when there is priority due to the *maturity* rather than to the rank of debt.

We also investigated the role of the German and the U.S. Bankruptcy Code in mitigating coalition problems. Particularly, conflicts of interest arise in the case of excess debt, where the value of total debts exceeds the value of total firm's assets. The forming of inefficient coalitions is much more difficult when bankruptcy proceedings start (and the entrepreneur loses control) or when the coalition's gain is shrinking. In Germany, the corporation has to start proceedings in the case of excess debt. The law, however, fails to provide a clear-cut rule in order to measure excess debt. Therefore, an entrepreneur, who expects to lose control, not only has an incentive to delay filing bankruptcy but has also lots of discretion to do so. Thus, in critical situations, in which "real" excess debt has already occurred, although bankruptcy proceedings have not been started, coalition problems might be very serious. In the U.S., there is no such formal obligation in the case of excess debt. Thus, in principle, coalition problems seem to be plausible. On the other hand, the entrepreneur has an incentive to file for bankruptcy rather early, since Chapter 11 gives her much bargaining power, which depends *inter alia* on the degree of solvency.

Second, bankruptcy law may mitigate coalition problems in "shrinking the size of the cake". For instance, the coalition parties have to take consequences of civil and penal law into account. Additionally, in Germany, bankruptcy law provides an outside option to the creditors—the creditors can also file for bankruptcy. This changes the participation constraint of the senior creditor, if liquidation is likely in bankruptcy proceedings. In the U.S., creditors hardly can file for bankruptcy. Under Chapter 11, however, the entrepreneur receives benefits which tend to weaken the incentive to form risk-increasing coalitions. Finally, we discussed new proposals made in bankruptcy law, such as the auctions approach and the options approach. As long as such proposals do not provide incentives to start bankruptcy proceedings early, coalition problems and other agency problems of debt-financing shall tend to be rather serious.

Notes

1. Thus, we don't consider agency problems in the management–shareholder relationship.
2. Black and Scholes (1973) and Merton (1973) have already pointed out that one could apply their models to analyze the asset substitution problem. For criticism see Long (1974) and Jensen and Meckling (1976), p. 336.
3. For contractual provisions mitigating coalition problems, e.g., collateral, see Bigus (2000b).
4. For simplicity, let us i assume, that B1 has seized the firm's assets entirely. If she seizes only a few assets and the claim of B1 exceeds liquidation revenues in $t = 1$, the claim of B1 will be partly unsecured and equally ranked to the claim of B2. The qualitative results of the model would remain, but the analysis would be much more complicated. Furthermore, we assume, that total revenues of the firm are not affected by pledging activities. Taking possession of collateral and liquidating it might involve transaction costs. Moreover, there might arise opportunity costs, if collateral limits taking wealth-enhancing business opportunities.
5. The basic results would not change assuming E puts M in a risky investment which is less risky than P2.

6. Thus, we assume, that credit contracts are not fully specified and in some way incomplete. Hart (1995) provides an introduction to the theory of incomplete contracts.
7. The sum of the creditor claims amounts to $D_1 + D_2$. I do not provide a formal analysis with D_2 as dependent variable, since a variation of D_2 does not affect the individual wealth of the senior creditor B_1, but only the individual wealth of E and B_2.
8. See also Smith (1979), pp. 96–98, Cox and Rubinstein (1985), pp. 358ff, Jurgeit (1989), p. 230.
9. The junior creditor B2 suffers a default risk for sure, which amounts to $D_1 + D_2 - M$.
10. If asset substitution is wealth-increasing, all parties may gain in principle.
11. In principle, entrepreneur E and the junior creditor B2 have to consider additional costs, which may arise with the coalition forming, depending on the institutional background. For instance, they have to take civil or criminal penalties into account (see Section 3.1.2). In a dynamic context, reputational losses in the credit market may occur. Considering, however, nonmonetary consequences may lead to problems calculating the coalition's gain.
12. However, if both creditors finance a new, *additional* project and one creditor has inside information, the coalition of the "inside" creditor and entrepreneur may have an incentive for wealth-shifting. See White (1980), p. 562.
13. See Handelsblatt, June 22, 1999, p. 27, European Shadow Financial Regulatory Committee (2000), S. 79, Euromoney (2000), S. 145.
14. The question is, whether the risk of a commercial bank's asset portfolio can be changed substantially. In Germany, where there is no separation of investment and commercial banks, there may be opportunities to do so, for instance, when a bank does business in highly speculative derivatives or when a bank sells a large part of its assets (e.g., *via* asset backed securities-transactions) and reinvest in rather risky projects. See for an economic analysis of asset backed securities-transactions Bigus (2000a).
15. The existence of coalition problems depends also on assumptions with respect to pay-off-distributions, see Bigus (1999), pp. 205–210. Therefore, in principle, they can also arise in "normal" cases with no excess debt.
16. See Drukarczyk and Schmidt (1998). In Germany, after starting bankruptcy proceedings, the firm is usually controlled by an administrator, who is appointed by court.
17. According to U.S. bankruptcy law, creditors hardly file for bankruptcy since they typically must coordinate with other creditors to file. A collective action problem may arise, as the filing creditor bears some risks from filing. See Picker (1998), p. 516.
18. See § 283 (1) Satz 2 ("*speculative business under the threat of bankruptcy*") *and* § 27 ("*supporting criminal acts*") of German criminal code (Strafgesetzbuch).
19. There are several versions of the options approach, see Bebchuk (1988) and Hart (1995).

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