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On 'Golden Parachutes' as Manager Discipline Devices in Takeover Contests

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ABSTRACT

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The effect of severance pay on management behavior during a takeover battle is generally ambiguous. Yet, the severance payment completely restraining all influence activities always constitutes a 'golden parachute'. The manager leaving office still benefits from the increase in the merged firm's total value. Moreover, given that managers are compensated according to an identical scheme, the optimal shareholder policy always entails a corner solution. Managers will either receive no severance pay, or the payment will be chosen such that their influence activities equal zero. Relatively strong incentive intensities and low synergy gains then imply that offering no severance pay dominates.

Keywords: mergers, contests, golden parachute

JEL-Classfication: K12, G34, M120

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Vanity invented the accelerator while wisdom devised the brake.

(Belgian proverb)

1 Introduction

With a final bid valued at $ 180.95 billion to be transferred in shares, the hostile takeover of Germany's *Mannesmann* by British-based *Vodafone-Airtouch* in February 2000 not only marks the largest firm acquisition in business history so far. Also, the common distinction between "target" and "aggressor" does not seem to apply. Rather, although *Vodafone*'s bid initiated the takeover battle, the two managements entered the contest on equal terms. Specifically, there exist striking similarities in the respective strategic approaches of the two rivaling firms: prior to the merger, both developed their telecommunications businesses mainly through M&A-activities. During the takeover battle, both parties heavily invested in investor relations activities, alliance building, and strategic restructuring - wasting as much as $ 750 million in shareholder wealth.[1]

The severance payments offered by major shareholders of the two companies totalled € 57 million for selected members of *Mannesmann*'s executive and supervisory boards, including € 30 million for executive chairman *Esser*. Given the numbers above, these payments surely did not match the potential loss which could have been incurred during a prolonged takeover battle and hardly risked the economic survival of the merged firm. Yet, representatives of small shareholders pressed "betrayal of confidence" charges. In 2004 the State Criminal Court in Düsseldorf, where the *Mannesmann* headquarter was located, concluded that offering and accepting these severance payments constituted a significant misconduct. Nevertheless, all charges were dismissed. Given the common use of such payments, it was ruled credible that the defendants were mistakenly assuming their behavior to be legal.

In 2005, this decision was successfully appealed at Germany's Supreme Court of Justice. The verdict points out that the severance payments as such decreased shareholder wealth and were not covered by a contractual agreement. In pursuit of their duties, the accused

[1] Fabel (2004).

should have therefore reflected on the possibility of behaving in "betrayal of confidence". Hence, they cannot claim nescience to their defense. During the retrial in Düsseldorf's State Court in November 2006, the most prominent of the defendants, now-*Deutsche Bank* executive chairman and then-member of *Mannesmann*'s supervisory board *Ackermann*, thus emphasized the merger's benefits for all shareholders. Furthermore, he insisted that merger incidences and profits are impossible to forecast. Hence, contracts could only specify non-contingent severance pay. Unconditional provisions could, however, only induce adverse management behavior.

Shortly after making their statements, the defendants accepted significant fines[2] and prosecution was abandoned. Thus, the case did not establish a precedence. However, *Ackermann* was clearly wrong when claiming that severance pay contracts would be impossible. As a matter of fact, so-called "Change-in-Control" agreements increasingly specify conditions which trigger severance pay claims. Such an agreement determines whether the executive can decide to resign at her will or requires "a good cause" for her resignation, a time window during which the contract has to be terminated, and a severance pay rule. Mirroring severance payments for dismissed workers, this rule typically defines a bonus in terms of multiples of the current base salary in addition to compensating the loss of this salary and other benefits for the remaining contract duration.[3] According to Fabel et al. (1999), such backward-looking severance pay rules nevertheless compensate foregone future earnings.[4]

Assuming enforceable contingent severance pay, we therefore set out to develop an economic analysis of the second legal issue raised above: namely, whether the availability or generosity of such pay and its effect on the managers' behavior during the takeover battle provides evidence in support of "betrayal of confidence" charges. Specifically, we analyze a symmetric contest. Both managements can draw on firm resources to finance defensive or offensive actions at their discretion. Shareholders must only agree to the final offer. We are interested in the relationship between the on-the-job compensation scheme of the managers and their behavior in the takeover contest. The contest winner's scheme

[2] *Ackermann* and *Esser* agreed to pay € 3.2 million and € 1.5 million, respectively.

[3] Carey (2002).

[4] Specifically, the compensation rules reflect that both the firm and the employee have learned about the latter's productivity over time. The respective payments then also ensure second-best sorting. See Fabel (2002).

is transferred to the merged firm. Even with exogenous synergies, the winner's benefit is therefore determined endogenously by both parties' contest behavior.

The manager's lay-off risk constitutes an externality which can be internalized by a credible severance pay offer. Yet, the optimal shareholder policy does not necessarily discourage influence activities completely. On the one hand, higher severance pay offers directly reduce the potential gain for the contest winner. Aggressive behavior is further indirectly discouraged since the payment to the contest loser must be financed by drawing on the merged firm's earnings. On the other hand, a reduction in the aggressiveness of the opponent enhances the marginal impact of a manager's influence activities on the probability to succeed in the contest. Higher severance pay may therefore also encourage such activities.

When compensation schemes differ between the two firms, the shareholders are additionally interested in choosing a contest winner. The respective trade-off is governed by the differences in the fixed salary component of the compensation scheme. Implementing their optimal choice of the contest winner, the shareholders may need to accept some influence activities in equilibrium. In this case, the counteracting effects of severance pay on the induced aggression level of the contest participants render conclusions concerning the disciplinary nature of such payments generally ambiguous.

Only if compensations entail no fixed salary, the incentive-intensity perfectly internalizes the opponent's reaction and severance pay unambiguously decreases a manager's aggressiveness in the contest. Also, shareholders are indifferent with respect to the contest winner if the compensation schemes are identical. In this case, severance pay and the incentive-intensity constitute substitute instruments to decrease the manager's aggressiveness. Hence, managers will either receive no severance pay and compete via influence activities, or the optimal severance pay perfectly crowds out such activities.

Clearly, the scope of our analysis follows the seminal contributions by Milgrom (1988) and Milgrom and Roberts (1988). Using the principal-agent framework, they show that both initiating takeovers and protective measures taken by the management constitute unproductive rent-seeking activities. Severance pay then reduces the incentives to engage in such activities. More recently, Spear and Wang (2005) have extended this basic framework to account for repeated moral hazard in a dynamic setting. They show that severance

pay also provides the necessary separation incentives for successful managers whose future performance pay would be excessively high. Moreover, using a real-options approach, Lambrecht and Myers (2005) demonstrate that such payments limit inefficient disinvestment strategies.

Principal-agent analyses of takeover behavior generally assume the firm's management to be either in a defensive or an offensive position. This feature also applies to Choi (2001) who characterizes efficient management performance pay and turnover decisions that are designed to induce adequate M&A-behavior. Optimal contracts are derived given an exogenous distinction between "friendly" and "hostile" takeovers. Further, the study does not consider the effects of severance pay. To our knowledge, only Milgrom and Roberts (1990) have analyzed manager contests. Yet, they assume an exogenous rent to be distributed in a winner-take-all contest. From above recall, however, that *Vodafone-Airtouch* paid its bid in shares, not in cash.[5] Hence, the "prize" captured by the winner was rather endogenous.

Defensive actions in takeover battles are empirically well documented. In addition to investor relations activities, the target firm's management often attempts to decrease the synergetic value by restructuring the ownership and the asset structure.[6] According to Mikkelson and Partch (1997), a significant portion of the potential synergy gains associated with a merger is actually generated through replacing the management which adds to the disciplinary virtue of the turnover threat.[7] Further, Canoy et al. (2000) analyze a two-stage game between the acquiring firm, the target management, and the target firm's shareholders over the potential merger surplus. Managers can carry out efficiency-enhancing R&D-investments. The distribution of bargaining powers can induce either over- or underinvestment of the target firm's management prior to the takeover. If the bargaining power is concentrated on the target firm's management, it will also demand a severance pay in order to leave the firm.

The "entrenchment" approach to corporate governance then emphasizes severance pay as one of the determinants of management bargaining power.[8] According to Bebchuk et al.

[5] The process resembled a proxy contest in which the management draws entirely on internal resources to finance the takeover. Shareholders then only expect to benefit from the resulting increase in the share price following the successful acquisition. See Sridharan and Reinganum (1995).

[6] Compare Dann and DeAngelo (1988), Denis (1990), and Denis and Denis (1991), for instance.

[7] See, for example, Martin and McConnell (1991), Denis and Denis (1995), and Denis and Serrano (1996).

[8] However, Falaschetti (2002) finds no evidence for a relationship between shareholder concentration -

(2002) and Bebchuk et al. (2005), the availability of such payments, among other governance rules, fosters the firm management's possibilities to influence its own compensation. Thus, while admitting that the efficiency effects of "golden parachutes" are generally ambiguous, they are taken to restrain shareholder rights in Gompers et al.'s (2003) calculation of a governance index. Lacking any formal theory, conclusions are derived entirely from empirical observations. Hartzel et al. (2004), for instance, conclude that the availability of severance pay rather encourages the waste of resources in takeover battles and, therefore, reduces efficiency.

Given this discussion, the current paper's contribution is threefold: first, our analysis shows that severance pay and investments in influence activities may generally constitute either strategic substitutes or complements. Consequently, efficiency conclusions cannot be derived from empirical findings showing that such activities decrease or increase with the availability of severance pay. Second, we demonstrate that any third-party - e. g. a court's - evaluation of the efficiency enhancing or distorting nature of such payments must appreciate the internalization effects associated with the pre- and post-merger incentive schemes in the firms. Third, we derive our conclusions from a novel model of a symmetric takeover battle where the costs of all influence activities as well as the severance pay itself reduce the contest winner's performance pay.

The paper proceeds as follows. We introduce the model and the game description in Section 2. Section 3 presents the solution of the game. In sections 4 and 5 we discuss the case with identical manager incentive schemes and the general case. The paper concludes with a summarizing discussion.

2 The model

Consider two firms, 1 and 2, each owned by risk-neutral shareholders. Each firm is led by a single person, the risk-neutral manager.[9] The managers are currently paid according

thus, enhanced bargaining power - and the incidence of offering a "golden parachute."

[9] Given the current model's scope, the assumption of risk-neutrality should not be perceived as restrictive. Even with this assumption, our conclusions will be shown to depend on the assumed compensation schemes and contest function. Hence, assuming risk-aversion or heterogeneity concerning the individual abilities to affect contest outcomes would only add more ambiguity. See Cornes and Hartley (2003).

to a compensation scheme which entails a fixed salary part $a_i \geqq 0$, and an incentive intensity, b_i, with $0 < b_i < 1$ for $i = 1, 2$. The incentive intensity ties the management compensation to the present discounted values of future business operations. For symmetry and simplicity, the *pre*-contest present-discounted value (PDV) of each firm's business operations is normalized to equal unity which implies the restriction $a_i + b_i \leq 1$ for the managers' compensation schemes.

Thus, *pre*-merger management incomes are given by $w_i = a_i + b_i[1]$. The particular schemes have been chosen for internal incentive reasons to align management and shareholders' interests in the two *pre*-merger firms. The PDVs of future business operations reflect the total firm values - gross of the manager compensation - prior to a possible takeover battle. Both firm's managers can invest part of the PDVs of their firms to influence the probability of successfully taking over the rival firm. The shareholders of the merged firm have to agree to the proposed merger plan and decide on the chief executive officer (CEO) of a newly created firm.

The defeated manager must leave the new firm. If manager i loses the contest and has to leave office, she may receive a severance pay f_i. In contrast, if she succeeds and remains in office, her original compensation scheme is transferred to the newly created, merged firm. In this case, she earns $w_i^m = a_i + b_i [V - f_j]$, $i, j = \{1, 2\}$ and $i \neq j$, where V is the PDV of the merged firm gross of severance payments. Hence, this pay is covered by drawing on firm resources as well. Each manager therefore participates in the costs of removing her rival from office.[10]

We analyze the problem as a game with three stages:

- At *stage 0* the shareholders of the (separate) firms can credibly commit to a severance payment, f_i, $i = 1, 2$, that is paid to its CEO in case she has to leave office.
- At *stage 1* the managers of the two firms can (simultaneously) invest in influence activities R_1 and R_2. These activities take place simultaneously. For analytic simplicity, we assume that the managers act in the interest of the shareholders in case of indifference.

[10] Then, also note that, given the availability of severance pay, the managers' incentive schemes are not linear. Linearity only applies to their on-the-job compensation.

- At *stage 2* the shareholders decide whether to agree to the proposed merger plan, $s = 1$, or not, $s = 0$. We distinguish two cases: (1) either one of the managers initiates the contest ($R_i > 0$ for at least one $i = 1, 2$). If the shareholders agree, the successful manager becomes CEO of the newly created firm. Else, the merger fails and both managers remain in office. (2) No manager initiates the contest ($R_1 = R_2 = 0$). In this case, both $s = 1$ and $s = 0$ imply that the shareholder's payoff is equal to the payoff they would receive if their firms were not merged.[11]

Let $R_i \geqq 0$, $i = 1, 2$, denote both the costs and the level of the influence activities generated by manager i. Following the literature on rent seeking and conflict, the decision procedure that links $\{R_1, R_2\}$ with the final outcome of the game is not modeled explicitly. Instead we assume that the influence activities affect the probability of success, p_i, $i = 1, 2$, of the managers. Let p_i^i, p_i^j denote the partial derivatives of p_i with respect to R_i and R_j. The function $p_i(R_1, R_2)$ possesses the following general properties:

$$\text{(a)} \qquad p_1(0,0) = p_2(0,0) = 0 \qquad \text{iff} \quad R_1 + R_2 = 0$$

$$\text{(b)} \qquad \begin{aligned} &p_1(R_1, R_2) + p_2(R_1, R_2) = 1, \\ &p_i^i(R_1, R_2) > 0, \quad p_i^j(R_1, R_2) < 0 \quad \text{iff} \quad R_1 + R_2 > 0 \end{aligned}$$

To derive more clear-cut conclusions, we also consider the case when the probability of success p_i follows a Tullock contest-success or conflict-function

$$\begin{aligned} p_1(R_1, R_2) &= \begin{cases} \dfrac{R_1}{R_1 + R_2}, & R_1 \geq 0 \vee R_2 \geq 0 \wedge R_1 + R_2 > 0 \\ 0, & R_1 = R_2 = 0, \end{cases} \\ p_2(R_1, R_2) &= \begin{cases} \dfrac{R_2}{R_1 + R_2}, & R_1 \geq 0 \vee R_2 \geq 0 \wedge R_1 + R_2 > 0 \\ 0, & R_1 = R_2 = 0 \ . \end{cases} \end{aligned} \tag{1}$$

Expression (1) captures the idea that at least one manager has to act in order to induce a merger. An increase in the level of influence activities then *ceteris paribus* increases the

[11] Specifying the shareholder payoffs for every s completes the game in the most convenient way possible.

probability to win the contest.[12] The influence activities, R_i, $i = 1, 2$, reflect the wasteful investments associated with the contest.

The *post*-contest PDV of future business operations for the merged firm is given $V = g(V_1 + V_2)$, where $g \geqq 0$ reflects a synergy parameter net of the administrative costs of merging the firms. Within the current model, synergies are not associated with compensation cost savings. Moreover, g is not affected by the takeover contest itself.[13] However, the influence activities reduce the post-contest values, V_i, of the original firms. Recalling that the *pre*-merger firm PDVs equal 1 for both firms, $V_i = 1 - R_i$, $i = 1, 2$. Obviously, the managers' influence behavior then also adversely affects the total value of the merged firm, V.

Assuming that the shareholders agree to the proposed merger plan, the expected (*stage 1*) income of the two managers can be derived as w_i if $R_i + R_j = 0$ and

$$\begin{aligned} E\left[w_i(R_1, R_2)\right] &= p_i w_i^m + (1 - p_i) f_i \\ &= \frac{R_i}{R_1 + R_2}(a_i + b_i\left[g(2 - R_i - R_j) - f_i\right]) + \frac{R_j}{R_1 + R_2} f_i \end{aligned} \tag{2}$$

if $R_i + R_j > 0$ since $p_i = (1 - p_j)$, $i, j = \{1, 2\}$ and $i \neq j$. If the shareholders do not agree to the proposed merger plan, however, the income is equal to

$$w_i(R_1, R_2) = a_i + b_i(1 - R_i)\ . \tag{3}$$

Thus, given that $R_i + R_j > 0$, the expected *ex-ante* value of the merged firm equals

[12] See Tullock (1980). This function ist extensively used in the literature on rent seeking. Grossman (2001) introduces a variant of this function when modeling appropriation and defense. Its properties have been analyzed by Hirshleifer (1989) and Nitzan (1994).

[13] Examples for such synergy effects have been discussed by Lo and Pushpakumara (1999) who emphasize that the new organizational structure allows to share resources. Moreover, following Fluck and Lynch (1999), conglomerate mergers are able to pursue projects with positive net present value which cannot be financed as stand-alones. Finally, according to Seth et al. (2000), the enhanced possibility to transfer intangible assets within the merged firm induces synergies in horizontal and cross-border mergers.

$$E\left[V^{SH}\right] = p_i\left[V - w_i^m - f_j\right] + p_j\left[V - w_j^m - f_i\right] \qquad (4)$$
$$= V - E\left[w_1\right] - E\left[w_2\right] \ ,$$

whereas the value of the non-merged firms is equal to

$$V_i^{SH} = V_i - w_i \ . \qquad (5)$$

We analyze a situation where shareholders cannot prevent the takeover contest. They are only asked for their *ex-post* agreement to the proposed merger. Taking the *post*-contest perspective of shareholders, the merger option therefore adds value of

$$\triangle V^{SH} = V^{SH} - \sum_{i=1}^{2} V_i^{SH} \ . \qquad (6)$$

Hence, if

$$\triangle v^{SH} = \triangle V^{SH}/2 > 0 \ , \qquad (7)$$

there always exists some distribution of shares of the merged firm over the shareholders of the two original firms such that each shareholder's wealth can increase.

Moreover, (7) implies the possibility of a Pareto-improving cash payment to one of the two shareholder groups in return for taking over their firm. Yet, the current analysis neither addresses the issue of determining the medium nor the terms of exchange applied to shares when merging the firms. For simplicity, it is assumed that the shareholders will agree to the proposed merger if (7) holds.

However, conditional on ownership structures, the shareholders may have conflicting interests in the determination of the severance payments at *stage 0*. To keep the analysis tractable, this possibility is ruled out by assuming that there exist two representative shareholders. Hence, let the "owner" of firm i be defined as a shareholder who owns the

fraction $\alpha_i \in [1/2, 1]$ of the total shares of firm i.[14] The remaining fraction, $(1 - \alpha_i)$, is owned by shareholder j - the "owner" of firm j. The fraction of shares of the non-merged firms then determine the shareholder's claim on the value of the merged firm. Hence, shareholder i's, $i = 1, 2$, expected profit is given by

$$\pi_i = q_i \frac{\alpha_i + (1 - \alpha_j)}{2} E\left[V^{SH}\right] + (1 - q_i)\left(\alpha_i V_i^{SH} + (1 - \alpha_j) V_i^{SH}\right) \tag{8}$$

where $q_i \in [0, 1]$ denotes the *ex-ante* (generally subjective) probability of a successful merger.[15]

3 Shareholder incentives and *ex-post* agreement

We solve the game by backward induction starting at *stage 2*. For each stage, we explicitly distinguish characteristic conditions which are satisfied in the general case, given the Tullock conflict function, and assuming that the two *pre*-merger performance pay plans are identical. However, in this section we are only interested in the consequences of the possible outcomes of the takeover battles for the shareholders' acceptance of the proposed merger plan and the incentives to provide a severance pay for the defeated manager.

[14] The restriction to the interval $[1/2, 1]$ allows to label shareholders as 'shareholder i' and is without relevance for the analysis to follow. In particular, we need not assume that majority shareholders of one firm must constitute minority shareholders in the other firm.

[15] Alternatively, it could be assumed that the distribution of shares of the merged firm does not depend on the initial ownership structure. Instead it may result from a bargaining process where β_i and β_j, with $\beta_i + \beta_j = 1$, denote the bargaining weights of the shareholders. In this case, (8) would generalize to

$$\pi_i = q_i \beta_i E\left[V^{SH}\right] + (1 - q_i)\left(\alpha_i V_i^{SH} + (1 - \alpha_j) V_i^{SH}\right) . \tag{9}$$

We have verified that all results derived in this paper hold for the specific as well as for the general case. Hence, as long as possible conflicts of interest between shareholders are solved via bargaining over outcomes, the above assumption that initial shareholdings determine the claims on *post*-merger firm value does not impose a loss of generality.

Stage 2: The shareholders' final decision

Expression (7) provides the *ex-post* participation constraint of the shareholders. The optimal policy generally defines a function $s(a_1, a_2, b_1, b_2, f_1, f_2, R_1, R_2, g)$ such that

$$s(a_1, a_2, b_1, b_2, f_1, f_2, R_1, R_2, g) = \begin{cases} 1 \Leftrightarrow E\left[\Delta v^{SH}\right] \geq 0 \\ 0 \Leftrightarrow E\left[\Delta v^{SH}\right] < 0 \end{cases}, \tag{10}$$

where we have assumed that the shareholders will accept the plan in case of indifference.

In the case of the Tullock function, (10) implies that the shareholders accept if the induced synergies of the merger satisfy

$$\begin{aligned} g \geq \overline{g} = & \frac{(a_2 + b_1 + b_2 - 2 + (b_1 - 1)f_2)R_1 + (b_1 - 1)R_1^2}{(2 - R_1 - R_2)((b_1 - 1)R_1 + (b_2 - 1)R_2)} \\ & - \frac{(a_1 + b_1 + b_2 - 2 + (b_2 - 1)f_1)R_2 + (b_2 - 1)R_2^2}{(2 - R_1 - R_2)((b_1 - 1)R_1 + (b_2 - 1)R_2)} \\ & + \frac{(b_1 + b_2 - 2)R_1 R_2}{(2 - R_1 - R_2)((b_1 - 1)R_1 + (b_2 - 1)R_2)} . \end{aligned} \tag{11}$$

Given this contest-success function and identical incentive pay, no equilibrium severance pay implies $a_1 = a_2 = a$, $b_1 = b_2 = b$, $f_1 = f_2 = 0$, $R_1 = R_2 = R$. Hence, the above condition further simplifies to

$$g \geq \overline{g} = 1 - \frac{a}{2((1 - b)(1 - R)} . \tag{12}$$

Suppose the managers would receive no fixed salary and abstain from influence activities. Then, $\overline{g} = 1$ and shareholders always accept if there exist positive synergies. Given that the managers receive a positive fixed wage, a, the right-hand side of the expression is positive as long as $R < 1$ and the critical level of synergies is smaller than 1. This rather surprising finding reflects that merging the two firms can reduce their wage bill simply because one of the managers is laid off.

With identical incentive schemes, the *ex-post* participation constraint can alternatively be expressed in terms of equilibrium influence activities $R_1 = R_2 = R$ where

$$R \leq \overline{R} = 1 + \frac{a - (1-b)f}{2(1-b)(g-1)} \ . \tag{13}$$

Hence, the shareholders' agreement to the merger plan depends on the amount of resources wasted in the merger contest. If the amount of resources invested exceeds $\overline{R}$, it is no longer profitable for the shareholders to accept the merger plan.

For the case of general incentive schemes, $E\left[\Delta v^{SH}\right] = 0$ implicitly defines a functional relationship $\overline{R}_2 = R_2(R_1)$ between both influence activities such that

$$R_1 + R_2 \leq \overline{R}_2 + R_1 \tag{14}$$

ensures acceptance.

Stage 1: The managers' choices of influence activities

Anticipating the *ex-post* decision of the shareholders, the managers maximize their expected income by choice of the influence activities. A Nash-equilibrium of the stage-1 subgame constitutes a set $\{R_i^*\}_{i=1,2}$ which satisfies [16]

$$R_1^* \in \arg\max_{R1} \{s(R_1, R_2^*)E\left[w_1(R_1, R_2^*)\right] + (1 - s(R_1, R_2^*))w_1(R_1, R_2^*)\} \ , \tag{15}$$

$$R_2^* \in \arg\max_{R_2} \{s(R_1^*, R_2)E\left[w_2(R_1^*, R_2)\right] + (1 - s(R_1^*, R_2))w_2(R_1^*, R_2)\} \ . \tag{16}$$

To solve the optimization problems, we begin by assuming that R_1^* and R_2^* imply the shareholders' acceptance at stage 2. Only subsequently - i. e. upon having investigated the shareholders' optimal severance pay policy - we can examine whether this conjecture is correct.

Given the above assumption, the managers' optimization problems can yield both interior and corner solutions with respect to the influence activity levels. Denote by

[16] For simplicity we suppress a_i, b_i and f_i, $i = 1, 2$, whenever possible.

$dw_i =: a_i + b_i(g(2 - R_i - R_j) - f_j) - f_i$ the income differential between staying in office and leaving the firm. The following first-order condition for manager 1 must then be satisfied in an equilibrium with $R_1 > 0$:

$$\frac{\partial E[w_1]}{\partial R_1} = p_1^1 dw_1 - p_1 b_1 g = 0 \ . \tag{17}$$

Intuitively, an increase in influence activities raises the probability of staying in office. This value of staying in office is given by dw_1. Yet, an increase in influence activities also reduces the PDV of the merged firm and, hence, the manager's incentive pay if remaining in office. These two effects balance given an interior solution.

Clearly, for manager 2

$$\frac{\partial E[w_2]}{\partial R_2} = p_2^2 dw_2 - p_2 b_2 g = 0 \ . \tag{18}$$

The slope of the reaction functions then determines whether R_1 and R_2 are strategic substitutes or complements. Differentiating (17) or (18) with respect to the respective rival manager's choice of influence activity implies

$$\frac{dR_i}{dR_j} = -\frac{dw_i p_i^{ij} - b_i g(p_i^i + p_i^j)}{dw_i p_i^{ii} - b_i g p_i^i} \tag{19}$$

where p_i^{ii} and p_i^{ij} denote the direct and cross second partial derivative of p_i. The denominator must be negative if the first-order condition characterizes a maximum. Hence,

$$\frac{dR_i}{dR_j} \gtreqless 0 \Leftrightarrow dw_i p_i^{ij} - b_i g(p_i^i + p_i^j) \gtreqless 0 \ . \tag{20}$$

Generally, the slope of the reaction is not only determined by the properties of the contest function, as would be the case in simpler models.[17] It also reflects the characteristics of the managers' compensation schemes. Using the first-order conditions and $p_j = 1 - p_i \rightarrow p_j^j = -p_i^j$, the above condition can be rearranged to yield

[17] See Körber and Kolmar (1996), for example.

$$\frac{dR_i}{dR_j} \gtrless 0 \Leftrightarrow dw_i p_i^{ij} - b_i g^2 (p_i \frac{b_i}{dw_i} - (1-p_i)\frac{b_j}{dw_j}) \gtrless 0 \ . \tag{21}$$

For the case of identical management-compensation schemes, $b_i = b_j = b$, $dw_i = dw_j = dw$, and we obtain

$$\frac{dR_i}{dR_j} \gtrless 0 \Leftrightarrow dw p_i^{ij} - \frac{b^2 g^2}{dw}(2p_i - 1) \gtrless 0 \ . \tag{22}$$

The above condition is satisfied in as well as off equilibrium. For the case of a symmetric contest-success function, it follows that $p_i = 1/2$ in equilibrium.[18] In this case,[19]

$$\frac{dR_i}{dR_j} \gtrless 0 \Leftrightarrow p_i^{ij} \gtrless 0$$

and the slope of the reaction function is only determined by the cross derivative of the contest function. For non-zero cross-derivatives, the property $p_i^{ij} = p_i^{ji} = -p_j^{ij} = -p_j^{ji}$ implies that R_2 is a strategic substitute to R_1 if R_1 is a strategic complement to R_2, and vice versa.

Given the Tullock function, the simultaneous solution of (17) and (18) yields the unique stage-1 Nash-equilibrium conjecture:[20]

$$R_1^* = \max\left\{0, \frac{b_2(-f_2 + a_2 + b_2(-f_1 + 2g))(-f_1 + a_1 + b_1(-f_2 + 2g))^2}{g(b_1(f_2 - a_2) + b_2((1+b_1)f_1 - a_1 + b_1(f_2 - 4g)))^2}\right\} \ , \tag{23}$$

[18] Specifically, this property is satisfied for the class of generalized Tullock functions $p_i(R_1, R_2) = f_1(R_1)/(f_1(R_1) + f_2(R_2))$ where f_1, and f_2 are increasing convex functions.

[19] A necessary condition for the existence of an interior equilibrium is $dw_i > 0$. Otherwise it would be rational to lose in the merger contest.

[20] The sufficient conditions at this point are

$$\frac{\partial^2 E[w_1]}{\partial R_1^2} = 2b_1 g^2 \left(\frac{b_2}{b_2(2g - f_1) + a_2 - f_2} + \frac{b_1}{b_1(2g - f_2) + a_1 - f_1}\right),$$
$$\frac{\partial^2 E[w_2]}{\partial R_2^2} = 2b_2 g^2 \left(\frac{b_2}{b_2(2g - f_1) + a_2 - f_2} + \frac{b_1}{b_1(2g - f_2) + a_1 - f_1}\right),$$

which are smaller than zero for an interior solution.

$$R_2^* = \max\left\{0, \frac{b_1(-f_2+a_2+b_2(-f_1+2g))^2(-f_1+a_1+b_1(-f_2+2g))}{g(b_1(f_2-a_2)+b_2((1+b_1)f_1-a_1+b_1(f_2-4g)))^2}\right\}. \tag{24}$$

Using (19), the slope of the reaction function equals

$$\frac{dR_i}{dR_j} = \frac{b_j(a_i+(b_i-1)f_i)-b_i(a_j+(b_j-1)f_j)}{2b_i(a_j+b_j(2g-f_i)-f_j)} \tag{25}$$

in equilibrium. Thus, we can distinguish the following cases:

Case 1 *Assume that both managers have an identical incentive scheme, i. e.* $a_1 = a_2$, $b_1 = b_2$, *and* $f_1 = f_2$. *In this case,* $dR_i/dR_j = 0$. *Both influence payments are neither substitutes nor complements in a local environment around the equilibrium.*

Case 2 *Assume that neither manager receives a severance pay,* $f_1 = f_2 = 0$. *In this case*

$$\frac{dR_i}{dR_j} \gtrless 0 \Leftrightarrow \frac{a_i}{b_i} \gtrless \frac{a_j}{b_j}.$$

Consequently, $dR_1/dR_2 \gtrless 0 \Leftrightarrow dR_2/dR_1 \gtrless 0$. If the reaction function of manager 1 is increasing, the reaction function of manager 2 is decreasing, and vice versa. Thus, influence activities are never strategic substitutes or complements to each other at the same time.

Given an interior equilibrium, the comparative-static behavior of the Nash equilibrium with respect to the parameter values a_k, b_k, and f_k, $k = 1, 2$, can be determined by totally differentiating (17) and (18) and applying Cramer's rule. Generally, effects are qualitatively ambiguous. However, assuming identical incentive schemes it follows:

$$\frac{\partial R_i}{\partial f} = \frac{(1+b)(bg((p_i^j)^2 - p_i^j p_i^i) + dw(p_i^{jj}p_i^i - p_i^{ij}p_i^j))}{bg(p_i^j+p_i^i) - dw(p_i^{ij})^2 - (2bgp_i^j - dwp_i^{jj})(2bgp_i^i - dwp_i^{ii})}, \tag{26}$$

$$\frac{\partial R_i}{\partial a} = \frac{-bg((p_i^j)^2 - dwp_i^{jj}p_i^i + p_i^j(bgp_i^i + dwp_i^{ij}))}{bg(p_i^j+p_i^i) - dw(p_i^{ij})^2 - (2bgp_i^j - dwp_i^{jj})(2bgp_i^i - dwp_i^{ii})}, \tag{27}$$

$$\frac{\partial R_i}{\partial b} = \frac{(2bgp_i^i - dwp_i^{jj})((g(2-R_1-R_2)-f)(p_i^i - pg)}{bg(p_i^j + p_i^i) - dw(p_i^{ij})^2 - (2bgp_i^j - dwp_i^{jj})(2bgp_i^i - dwp_i^{ii})}$$
$$- \frac{(bg(p_i^j + p_i^i) - dwp_i^{ij})((g(2-R_1-R_2)-f)p_i^i - (1-p)g)}{bg(p_i^j + p_i^i) - dw(p_i^{ij})^2 - (2bgp_i^j - dwp_i^{jj})(2bgp_i^i - dwp_i^{ii})} \ . \tag{28}$$

Since the product of cross effects should not exceed the product of direct effects on expected wages, the denominator of the above expressions, $\frac{\partial^2 E[w_i]}{\partial R_i^2}\frac{\partial^2 E[w_j]}{\partial R_j^2} - \left(\frac{\partial^2 E[w_i]}{\partial R_i \partial R_j}\right)^2$, can be taken as positive. Hence,

$$\frac{\partial R_i}{\partial f} \gtreqless 0 \Leftrightarrow bg((p_i^j)^2 - p_i^j p_i^i) + dw(p_i^{jj} p_i^i - p_i^{ij} p_i^j) \gtreqless 0$$
$$\Leftrightarrow \left(\frac{bg}{dw}\right)^2 \left(p_i^2 + p_i p_j\right) + (p_i^{jj} p_i + p_i^{ij} p_j) \gtreqless 0, \tag{29}$$

where we have used (17) and (18) again. The first term in (29) is positive whereas the sign of the second term depends on p_i^{ij}. If the cross derivative is zero or positive, $\partial R_i/\partial f < 0$. However, the cross derivative may be negative and exceed the (positive) other terms. In this case an increase in the severance pay *increases* influence activities.

For the Tullock function we already know that $p_i^{ij} = 0$ in equilibrium. Hence, $\partial R_i/\partial f < 0$. The remaining comparative-static effects - given an interior solution - can thus be obtained as

$$\frac{\partial R_i^*}{\partial a} = \frac{1}{4bg} > 0 \ , \tag{30}$$
$$\frac{\partial R_i^*}{\partial b} = \frac{f-a}{4b^2 g} \lesseqgtr 0 \Leftrightarrow f \lesseqgtr a \ , \tag{31}$$
$$\frac{\partial R_i^*}{\partial g} = \frac{(1+b)f - a}{4bg^2} \lesseqgtr 0 \Leftrightarrow (1+b)f \lesseqgtr a \ . \tag{32}$$

From the point of view of each manager, remaining in office becomes more attractive as the salary part a of his compensation increases. The managers are therefore induced to increase their influence activities. Moreover, with higher incentive intensities b the retained manager benefits more strongly from the possible merger synergies. However, the direction of the

respective impact on the managers' contest behavior depends on the benefit of remaining in office relative to leaving office. Obviously, a similar trade-off applies to variations of the synergy parameter g.

Stage 0: The severance pay commitment

At *stage 0* the shareholders maximize their expected income by choice of a severance pay offer $\{f_1, f_2\}$. They anticipate the behavior of the managers at *stage 1* and their own final decision at *stage 2*. An equilibrium in severance payments is a pair $\{f_1^*, f_2^*\}$ such that

$$f_i^* \in \arg\max_{f_i} \pi_i(a_1, b_1, f_i, a_2, b_2, f_j^*), \qquad i, j = 1, 2 \ . \tag{33}$$

Recall that the probability of a successful merger, denoted by s, is determined at *stage 2*. It only depends on a comparison of the value of the merged firm and the values of the non-merged firms. In particular, s is either 0 or 1 conditional on the synergy parameter g and the details of the compensation schemes.

Thus, we can now address the initial conjecture that shareholders will accept the merger plan given the managers' optimal influence behavior. Three different cases can emerge:

(a) As long as $s = 1$, $\pi_i = \pi_j$ because both shareholders care only about the expected value of the merged firm.

(b) If $s = 0$, each shareholder maximizes the weighted sum of the expected values of the (non-merged) firms. If $s = 0$, however, the managers rationally choose $R_1 = R_2 = 0$ because any increase in the influence activity can only reduce their income. Hence, $\pi_i = \alpha_i(1 - a_i - b_i) + (1 - \alpha_j)(1 - a_j - b_j)$ in this case. Clearly, a change in f_i has no influence on either shareholder group's optimization problem.

(c) If f_1 and f_2 are chosen such that $ds/df_i \neq 0$, an increase in f_i either initiates the merger or prevents an otherwise possible merger. In both situations the shareholders' optimization problems effectively coincide. If the merger becomes profitable, $\partial\pi_1/\partial f_i = \partial\pi_2/\partial f_i = 0$ for all values of f_i smaller than $f_i^*(f_j)$ because f_i is not paid out. At the same time, $\partial\pi_1/\partial f_i = \partial\pi_2/\partial f_i$ for all values of f_i larger than $f_i^*(f_j)$ because both shareholders

locally maximize the same objective function.

The above conclusions are summarized as follows:

Lemma 1 *At* stage 0*, there are no conflicting interests among the shareholders of the two firms with regard to the severance pay offers.*

The lemma simplifies the remaining analysis considerably since we can apply a cooperative solution to determine the optimal values of f_1 and f_2.

4 Identical management compensation schemes

In this section, we analyze the case with identical manager compensation schemes $a_i = a$, $b_i = b$, for $i = 1, 2$. Given the equilibrium conjecture, the (*stage 1*) influence activity levels can then be derived as

$$R_i^* = \max\left\{0, \frac{(b(f_j - 2g) - a + f_i)^2(a - bf_i - f_j + 2bg)}{bg(2a - (1+b)(f_i + f_j) + 4bg)^2}\right\} . \tag{34}$$

It immediately follows:

Proposition 1 *If $g \geq 1$, $s = 1$ in equilibrium.*

Proof. Consider the following two preliminary observations. (1) Without loss of generality assume that $R_2 = 0$. If $R_1 = 0$, no merger is initiated and manager 1 receives $a + b$. If $R_1 = \varepsilon$, $\varepsilon > 0$, $\varepsilon \to 0$, manager 1 receives $a + b(2g - f)$. The latter expression exceeds the former if and only if $2g \geq 1 + f$. If this inequality is not satisfied, the managers will not invest in the conflict. In this case, $s = 1$ is optimal for the shareholders. Moreover, if the inequality is satisfied it is never rational for both managers not to invest in the contest as long as $s = 1$. (2) Further, suppose that the shareholders want to minimize influence activities at minimum costs. Then, $f_i = (a + 2bg - f_j)/b \wedge f_i \geq f_j$ guarantees that $R_i^* = 0$ and $R_j^* = \varepsilon$.

Hence, total severance payments are minimized if $f_i = f_j = f$. Due to *Lemma 1*, this strategy is a solution to the shareholder problem at *stage 0*. Then, given (34), (7) implies

$$E\left[\Delta v^{SH}\right] \geq 0 \Leftrightarrow a + (b-1)\left(f - \frac{(g-1)(-a+f+bf+2bg)}{2bg}\right) \geq 0\ . \tag{35}$$

For $s = 1$ it therefore follows that

$$\begin{aligned}\frac{\partial E\left[\Delta v^{SH}\right]}{\partial f} &= \frac{(b-1)(1+b+(b-1)g)}{2bg} \geq 0 \\ &\Leftrightarrow (1+b)+(b-1)g \leq 0 \\ &\Leftrightarrow b \geq \widetilde{b} = \frac{g-1}{g+1},\end{aligned} \tag{36}$$

from the point of view of the shareholders. Inequality (36) implies that,for all incentive intensities $b \geq \widetilde{b}$, the shareholders would like to reduce the severance payment to zero. In contrast, they would like to pay a positive severance payment for $b < \widetilde{b}$. It immediately follows that shareholders never pay more than the amount necessary to ensure that influence activity levels are either equal zero or are equal to $\varepsilon > 0$, $\varepsilon \to 0$.

The respective severance pay is given by

$$\widetilde{\Phi} = \frac{2bg+a}{1+b}. \tag{37}$$

Hence, for every incentive scheme $\{a, b\}$, optimal severance payments equal $\frac{2bg+a}{1+b} \Leftrightarrow b < \widetilde{b}$ or $0 \Leftrightarrow b \geq \widetilde{b}$. Then, let $b < \widetilde{b}$. In this case, (35) simplifies to

$$E\left[\Delta v^{SH}\right] \mid_{f=\Phi} \geq 0 \Leftrightarrow \frac{2}{1+b}((1-b)(g-1)+b(1+b))\ , \tag{38}$$

which is greater than zero for $g \geq 1$. Now, suppose $b \geq \widetilde{b}$. In this case, (35) yields

$$E\left[\Delta v^{SH}\right] \mid_{f=0} \geq 0 \Leftrightarrow \frac{2(-1+b(a+b-g)+g)}{1+b} \geq 0. \tag{39}$$

To show that (39) is greater or equal to zero for all $g \geq \widetilde{g}$ we proceed in three steps. First, we demonstrate that (39) is satisfied for $b = \widetilde{b}$. Second, we show that (39) is satisfied

for $b = 1$ and that $\partial E\left[\Delta v^{SH}\right]/\partial b < 0$ at $b = 1$. This information and the continuity of (39) in b implies that there must be at least two values for $b \geq \widetilde{b}$ such that $\partial E\left[\Delta v^{SH}\right]/\partial b = 0$, which is necessary for $E\left[\Delta v^{SH}\right] b < 0$.

Hence, we finally prove that there cannot exist two values of b which satisfy this condition.

1. If $b = \widetilde{b}$ (39) simplifies to

$$E\left[\Delta v^{SH}\right] \mid_{f=0} \geq 0 \Leftrightarrow 2 + a - \frac{a}{g} - \frac{4}{1+g} \geq 0 \ . \tag{40}$$

This condition is equal to zero if $a \leq -2g/(g+1) < 0$. In addition,

$$\frac{\partial E\left[\Delta v^{SH}\right] \mid_{f=0}}{\partial a} = 1 - \frac{1}{g} \geq 0 \Leftrightarrow g \geq 1 \ . \tag{41}$$

Both findings imply that $E\left[\Delta v^{SH}\right] \mid_{f=0} > 0$.

2. If $b = 1$, the budget constraint implies that $a = 0$. Hence, (39) simplifies to

$$E\left[\Delta v^{SH}\right] \mid_{f=0} = 0 \ . \tag{42}$$

In addition,

$$\frac{\partial E\left[\Delta v^{SH}\right] \mid_{f=0}}{\partial b} = (1-g) \leq 0 \Leftrightarrow g \geq 1 \tag{43}$$

at $b = 1$.

3. From the continuity of $E\left[\Delta v^{SH}\right] \mid_{f=0}$ in b, the shareholder surplus can become negative for $b \geq \widetilde{b}$ only if there exist at least two values for b such that $\partial E\left[\Delta v^{SH}\right] \mid_{f=0} /\partial b = 0$. Hence,

$$\frac{\partial E\left[\Delta v^{SH}\right] \mid_{f=0}}{\partial b} = 0 \Leftrightarrow b \in \left\{ -\frac{\sqrt{a}}{\sqrt{2}\sqrt{g}}, \frac{\sqrt{a}}{\sqrt{2}\sqrt{g}} \right\} \ . \tag{44}$$

The first element of the above set is always smaller than or equal to zero which implies that it can never be in $b \geq \widetilde{b}$. Thus, the conjecture has been proved. ■

Proposition 1 has several interesting implications. It shows that positive synergies ($g \geq 1$) constitute a sufficient condition for the *ex-post* acceptance of the merger plan.

However, as can be seen from the proof of *Proposition 1*, positive synergies are not necessary for acceptance. Specifically, (38) reveals the following:

Corollary 1 *For 'low' values of b ($b < \widetilde{b}$) the shareholders are willing to accept a merger plan even with negative synergies, $g < 1$.*

Proof. It follows from (38) that the shareholders accept the merger if

$$(g-1) \geq -\frac{b(1+b)}{(1-b)} \ . \tag{45}$$

The right-hand side of this condition is smaller than or equal to zero which proves the claim. ■

Simply laying off one of the two managers potentially reduces the total wage bill of both firms. In this case, the shareholders accept the proposal even with negative technological synergies.

Another implication of *Proposition 1* is summarized as:

Corollary 2 *There exists a critical value for the incentive intensity,*

$$\widetilde{b}(g) = \frac{g-1}{g+1} \ , \tag{46}$$

with the following property: for all incentive intensities $b < \widetilde{b}(g)$, the optimal shareholder policy implies rewarding the minimum severance payment, $f^* = \frac{2bg+a}{1+b}$, which just induces the managers to avoid all influence activities. Given incentive intensities $b > \widetilde{b}(g)$, the optimal severance payment equals zero, $f^* = 0$.

Insert figure 1 about here!

Corollary 2 follows directly from the proof of *Proposition 1*. Figure 1 illustrates the function $\widetilde{b}(g)$. The corollary implies that the direct incentive part b and the severance

payment f are (imperfect) substitutes from the point of view of the shareholders. The variable compensation component always induces the manager to internalize at least part of the impact of her influence activities on the post-merger firm value. Clearly, the degree of internalization increases with b. For sufficiently high-powered management-compensation schemes severance pay becomes obsolete. The effect of the severance payment in inducing less aggressive contest behavior ceases to compensate for the cost of this payment itself.

The same basic argument can be made for increases in the synergy gains. Given the incentive intensity b, an increase in g implies more gains from the merger which are internalized via the manager's compensation scheme upon retention as the contest winner. Thus, "golden parachutes" only improve the expected surplus of the shareholders if the management compensation scheme does not induce an appropriate sensitivity with respect to the effect of influence activities on the future firm value.

Next we compare the income levels of the successful and the defeated manager. The severance payment necessary to induce $R_i^* = 0$, $R_j^* = \varepsilon$ yields the compensation $a + b(2g - f) = (2bg+a)/(1+b)$ for the contest winner. This income is equal to the severance payment of the defeated manager.

Corollary 3 *For 'low' incentive intensities ($b < \widetilde{b}(g)$) the severance payment f^* is a "golden parachute": each manager would be equally well off if remaining in office or laid off. For 'high' incentive intensities ($b \geq \widetilde{b}(g)$) the severance payment f^* is equal to zero. The successful manager is better off ex post than the defeated manager.*

In the case of symmetric incentive schemes the existence of a "golden parachute" not only implies that each manager is indifferent between being laid off and being in office. Also both the successful and the defeated manager are equally well off.

We can now also evaluate the comparative-static effects, (31) and (32). Using the optimal severance payment, f^*, we obtain

$$\frac{\partial R_i^*}{\partial b} = \begin{cases} \frac{-a}{(4b^2 g)} < 0, & b \geq \widetilde{b} \\ \frac{4g+a}{4gb(1+b)} > 0, & b < \widetilde{b} \end{cases} \tag{47}$$

$$\frac{\partial R_i^*}{\partial g} = \begin{cases} \frac{-a}{4bg^2} < 0, & b \geq \widetilde{b} \\ \frac{1}{g} > 0, & b < \widetilde{b} \end{cases} \tag{48}$$

Strong incentive intensities b sufficiently internalize the adverse effects of their contest behavior. By the same argument, an increase in synergies increases the potential loss of influence activities. From the point of view of a manager whose incentive intensity is sufficiently high, strong synergies are therefore undesirable. At the same time, starting from weak incentive intensities, increasing these intensities and stronger synergies will increase influence activities even with optimal severance payments.

Given the managers' compensation schemes, the optimal shareholder policy defined in *Corollary 2* requires a severance payment

$$f^* = \begin{cases} \widetilde{\Phi} & \text{if} \quad g \geqq \frac{1+b}{1-b} \\ 0 & \text{if} \quad g < \frac{1+b}{1-b} \end{cases} . \tag{49}$$

Severance pay in terms of shares may therefore appear more effective because its value would reflect the PDV of the merged firm which in turn depends on the level of influence activities. To investigate the effects of such "powered severance pay" we only consider the case where the fixed payments are zero, $a = 0$, $i = 1, 2$. Then, let

$$f^d = \frac{b}{d} V \tag{50}$$

denote the severance payment as a fraction of the variable income the manager would have earned if he had been successful. The parameter $d \in [0, \infty)$ can be chosen by the shareholders at stage 0. This modification does not affect the stage-2 decision problem.

Maximizing the managers' expected income at stage 1 yields

$$R_1^* = R_2^* = \frac{g}{2} \left(1 + \frac{1}{b - d} \right) \tag{51}$$

given an interior equilibrium. Hence, the influence activities R_i^* are increasing in d and decreasing in b. A reduction in the "poweredness" of the severance payment induces more aggressive behavior since winning the contest becomes more attractive. At the same time, an increase in b enhances the internalization of the adverse effects of the influence activities. Thus, it also induces more aggressive behavior. The following can then be shown:

Proposition 2 *The severance pay value that induces the manager to withhold her influence activities is independent of the "poweredness" of the severance pay.*

Proof. Setting (51) equal to zero in order to investigate the corner solution $R^* = 0$ yields $\widetilde{d} = 1 + b$. Recalling that $a = 0$,

$$f^d_{d=\widetilde{d}} = \frac{b}{1+b}V = \frac{2bg}{1+b} = \widetilde{\Phi} \ . \tag{52}$$

Thus, the value of the "powered parachute" is exactly the same as under the fixed severance pay solution discussed before. ■

Consequently, as long as fixed payments equal zero, the medium of exchange - lump sum cash payment or contingent on the PDV - is not decisive for the managers' behavior.[21] Rather, this behavior is governed by the absolute value of this payment. The shareholders cannot economize on payments by promising shares of the merged firm as a compensation for the defeated manager.

5 The general case

In this section we turn to the case of general compensation schemes $\{a_1, a_2, b_1, b_2, f_1, f_2\}$. However, a complete characterization of the equilibrium is impossible. The problem structure does not allow to determine a closed-form solution. Yet, differences in the compensation structures can be shown to induce different contest behaviors. Specifically, assuming that the managers wish to induce the shareholders' acceptance of their merger plan yields some general patterns of influence activities. Thus, the severance payment that ensures no influence activities always constitutes a "golden parachute."

Proposition 3 *The minimum severance payment inducing each manager to completely withdraw from influence activities ensures that the manager incurs no income loss if leaving office. Stronger merger synergies therefore yield a higher benefit for the manager leaving office.*

[21] Obviously, qualitatively identical results can be obtained for sufficiently low salaries.

Proof. Conditions (23) and (24) determine minimum severance payments for manager i conditional on the respective severance pay offer for manager j such that the respective influence activities become zero. These payments are given by

$$F_i(f_j) = a_i + b_i \left[2g - f_j\right], \quad i, j = \{1, 2\} \text{ and } i \neq j. \tag{53}$$

It follows immediately that such severance pay is equal to the income of the respective manager if she would remain in office. For positive b_i this severance pay is increasing in g. ■

Obviously, the severance payments $F_i(f_j)$, $i, j = \{1, 2\}$ and $i \neq j$, do not compensate for past income claims. To preclude the waste of firm resources in the takeover contest, a "golden parachute" must internalize the potential income gain associated with heading the merged firm. However, contrary to the case with identical performance pay, the successful and the defeated manager are not necessarily equally well off. It is even possible that the severance payment to the dismissed manager exceeds the income of his retained rival.

Next we will analyze the relationship between f_i and f_j on the one hand and the lay-off decision by the shareholders on the other hand. Hence, assume that the shareholders wish to minimize the influence activities of their managers. They can agree to retain manager j by offering a severance pay $F_i(f_j) = a_i + b_i \left[2g - f_j\right]$ to manager i. It follows from (53) that $\partial F_i(f_j)/\partial f_j = -b_i < 0$. Clearly, f_j only constitutes a "virtual" severance pay offer since manager i has already been selected to be dismissed. Nevertheless, this offer is sufficient to completely crowd out manager i's influence activities.

Proposition 4 *Assume that the shareholders wish to minimize the influence activities of their managers. The shareholders minimize the total management compensation costs by maximizing the "virtual" severance payment to the retained manager.*

Proof. Denote the "virtual" severance offers to managers i and j in case that the shareholders agree to retain this manager by f_i^v and f_j^v. The total wage bill paid by the shareholders if manager j (manager i) is laid off is equal to $WB(j) = w_i + f_j(WB(i)) = w_j + f_i$. By insertion it follows

$$WB(j) = a_i + (1 - b_i)a_j + (b_i + b_j - b_i b_j)2g - (1 - b_i)b_j f_i^v \ , \tag{54}$$

$$WB(i) = a_j + (1 - b_j)a_i + (b_i + b_j - b_i b_j)2g - (1 - b_j)b_i f_j^v \ . \tag{55}$$

The wage bills are decreasing in the "virtual" severance payments. Shareholders are thus interested in maximizing the "virtual" severance pay. ■

It appears intuitive that, if the shareholders coordinate on a lay-off and severance-pay decision, they should agree to retain the "cheaper" manager. However, the proposition proves that this conjecture is misleading. Hence, recall that the severance pay must at least compensate for the loss of the job. Hence, cost minimization plausibly implies that the "virtual" does not exceed the actual severance payment.

We will add this condition as an additional constraint in the following. Imposing the restrictions $f_i^v \leq f_j$ and $f_j^v \leq f_i$ yields severance payments

$$f_j = f_i^v = \frac{a_j + b_j 2g}{1 + b_j}, \qquad f_i = f_j^v = \frac{a_i + b_i 2g}{1 + b_i}. \tag{56}$$

The difference in wage bills then equals

$$\begin{aligned} \Delta WB_{i,j} &:= WB(i) - WB(j) \\ &= \frac{b_i + b_j}{(1 + b_i)(1 + b_j)}((1 + b_i)a_j - (1 + b_j)a_i + 2g(b_j - b_i)). \end{aligned} \tag{57}$$

Given *Proposition 4*, the following can then be established.

Proposition 5 *Suppose that the "virtual" severance pay offered to the manager who will be retained does not exceed the actual dismissal costs. Further assume that the shareholders wish to minimize the influence activities to their managers.*

1. *If $g \geq 1/2$ and $a_i = a_j$, it is better to retain manager i if and only if $b_i < b_j$.*

2. *If $b_i = b_j$, it is better to retain manager i if and only if $a_i < a_j$.*

3. *It is possible that manager i should be laid off although $a_i + b_i < a_j + b_j$.*

Proof. 1. If $a_i = a_j = a$, (57) simplifies to $\Delta WB_{i,j} > 0 \Leftrightarrow (b_i - b_j)(a - 2g) > 0$. The second term of the product is negative irrespective of a if $g \geq 1/2$. Hence, $\Delta WB_{i,j} > 0 \Leftrightarrow$

$b_i < b_j$.

2. If $b_i = b_j = b$, (57) simplifies to $\Delta WB_{i,j} > 0 \Leftrightarrow (a_j - a_i)(1 + b) > 0$. The second term is positive, hence, $\Delta WB_{i,j} > 0 \Leftrightarrow a_i < a_j$.

3. We show the third part of the proposition by means of an example. Assume that $g = 2$, $a_i = 0.1$, $b_i = 0.1$, and $a_j = 0.2$. Consequently, $\Delta WB_{i,j} = -0.28 + 3.9b_j$. Thus, for $b_j < 0.0717949$, the wage bill if manager i is dismissed is smaller than the wage bill if manager j is laid off - despite the fact that the incentive scheme of manager j is more costly. ■

Parts 1 and 2 of the proposition capture the intuitive part: as long as the fixed (variable) parameter of the salary scheme is the same for both managers, the shareholders should always retain the manager with the smaller variable (fixed) parameter. Yet, this conclusion is not true in general. The retention decision is actually determined by the interplay between actual and virtual severance pay and the incentive schemes.

Propositions 3 - 5 focus exclusively on potential contest equilibria such that the managers' influence activity levels are essentially equal to zero. For interior solutions, the impact of the severance payment on the influence behavior of the managers can further be characterized as follows:

Proposition 6 *Consider a takeover battle in which both managers invest in influence activities. The following relationships hold:*

1. If $a_1 = a_2 = 0$ and $f_1 = f_2 = 0$, it follows that $R_1 = R_2$ irrespective of b_1 and b_2.

2. If $b_1 = b_2$ and $f_1 = f_2$, it follows that $R_1 < R_2 \Leftrightarrow a_1 > a_2$.

3. If $a_1 = a_2$ and $f_1 = f_2 = 0$, it follows that $R_1 < R_2 \Leftrightarrow b_1 > b_2$.

4. The effect of severance pay on the equilibrium influence activities is generally ambiguous.

Proof. Using (23) and (24), it follows that

$$\frac{R_1^*}{R_2^*} = \frac{b_2}{b_1}\frac{f_1 - (a_1 + b_1(2g - f_2))}{f_2 - (a_2 + b_2(2g - f_1))}. \tag{58}$$

Parts 1 - 3 of *Proposition 6* follow directly. Without loss of generality it can be shown that, for manager 1,[22]

$$\begin{aligned}\frac{\partial R_1^*}{\partial f_1} = &\frac{-b_2\left[-f_1 + F_1(f_2)\right]\left[b_2\left[F_1(f_2) - f_1\right] + 2\left[F_2(f_1) - f_2\right]\right]}{g\left[b_1\left[-f_2 + F_2(f_1)\right] + b_2\left[-f_1 + F_1(f_2)\right]\right]^2} \\ &+ \frac{2b_2(1 + b_1)b_2\left[-f_2 + F_2(f_1)\right]\left[-f_1 + F_1\left(f_2\right)\right]^2}{g\left[b_1\left[-f_2 + F_2(f_1)\right] + b_2\left[-f_1 + F_1(f_2)\right]\right]^3}\end{aligned} \tag{59}$$

$$\begin{aligned}\frac{\partial R_1^*}{\partial f_2} = &\frac{-b_2\left[-f_1 + F_1(f_2)\right]\left[\left[F_1(f_2) - f_1\right] + 2b_1\left[F_2(f_1) - f_2\right]\right]}{g\left[b_1\left[-f_2 + F_2(f_1)\right] + b_2\left[-f_1 + F_1(f_2)\right]\right]^2} \\ &\frac{2b_1(1 + b_2)b_2\left[-f_2 + F_2(f_1)\right]\left[-f_1 + F_1\left(f_2\right)\right]^2}{g\left[b_1\left[-f_2 + F_2(f_1)\right] + b_2\left[-f_1 + F_1(f_2)\right]\right]^3}\end{aligned} \tag{60}$$

where $F_i(f_j)$ have been defined in (53) above. Note that the first terms in the two expressions are positive while the second terms are negative. Hence, the signs are generally ambiguous. ■

Part 1 and 3 jointly confirm that differences in the contest behavior of the managers are driven by the fixed salary part. Without severance payment and fixed salaries both managers will always invest the same amount of resources in the contest irrespective of the contract-specific incentive intensities, b_i. However, if fixed salaries exist (and still in the absence of severance payments), a stronger incentive intensity induces less aggressive behavior of the manager. By the same argument, a higher fixed salary payment induces less aggressive behavior given that both the performance and the severance pay are identical for the two managers.

However, only the first terms in expression (59) and (60) reflect a direct disciplinary effect of severance pay on influence activities: first, increasing the severance payment for manager 1, reduces her gain when succeeding in the contest. Second, increasing manager 2's severance pay offer also decreases manager 1's winning prize. Yet, the contest model

[22] The respective calculations are delegated to the Appendix.

is inherently symmetric. Hence, responding to the increase in the marginal impact of her influence activity level on the probability to win the contest, manager 2 may reduce her influence activity level as well. This behavior of manager 2 increases the marginal value of influence activities for manager 1 again. Thus, it counteracts the direct disciplinary effect of severance pay on the latter.

6 Summary and conclusions

Previous studies have analyzed the effects of severance pay within the principal-agent framework and exogenously defined "target" or "aggressor" roles. In contrast, we study a symmetric contest structure between two top managements. The managers' influence activities as well as the severance pay for the contest looser reduce the potential value of the merged firm. Thus, the contest "prize" is endogenous. Shareholders can only decide whether to commit to offering severance pay and to accept or reject the merger plan proposed by the succeeding manager. The contest winner's incentive scheme is then transferred to the new firm while the contest loser must leave the firm.

Our analysis shows that previous analyses of the disciplinary virtue of severance pay may be misleading in three respects: first, the equilibrium contest behavior is generally determined by the managers' fixed salaries rather than their performance pay. Second, even given a symmetric contest structure in a still highly stylized environment with identical compensation schemes, the optimal severance pay is either equal to zero or reaches the minimum level which completely crowds out all influence activities. Hence, there exists no "smooth" trade-off between such payments and the waste of resources in takeover battles. Third, if the management compensation schemes differ, such a trade-off may exist. Yet, due to counteracting direct and indirect effects, severance pay may increase or decrease the influence activity levels. Moreover, completely crowding out all incentives to initiate a takeover contest always requires that the manager leaving office must benefit from the possible merger synergies.

In fact, the only robust conclusion is that managers can only be effectively disciplined by offering such a "golden parachute." The host of other results of our analysis then emphasizes that empirical evidence on the impact of severance pay on influence activities cannot

indicate management "entrenchment." Only a thorough investigation of the interplay between *pre*- and *post*-merger compensation packages and "virtual" severance payments allows to evaluate, or even judge on the efficiency effects and shareholder benefits associated with takeover battles. Rational shareholders should know that setting incentives for an acquisition strategy must be augmented by a policy to abandon this strategy if a profitable opportunity comes with an equally strong contestant in the market for firms. Clearly, they cannot claim nescience to their defense either.

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Appendix: The reaction of the influence activity level to changes in the severance payments

Focussing on (23), it can be obtained that

$$\begin{aligned}
&\frac{\partial}{\partial f_1}\left(b_2\left(-f_2+a_2+b_2\left(-f_1+2g\right)\right)\left(-f_1+a_1+b_1\left(-f_2+2g\right)\right)^2\right)\\
&\quad=-b_2(-f_1+a_1-b_1f_2+2b_1g)\times\\
&\quad\times\left(b_2a_1-3b_2f_1-b_2b_1f_2+2a_2+4b_2g+2b_2b_1g-2f_2\right)\\
&\quad=-b_2\left[-f_1+F_1\left(f_2\right)\right]\left[b_2\left[F_1(f_2)-f_1\right]+2\left[F_2(f_1)-f_2\right]\right] \qquad (61)
\end{aligned}$$

with $F_i(f_j)=a_i+b_i\left[2g-f_j\right]$.

Also,

$$\begin{aligned}
&\frac{\partial}{\partial f_2}\left(b_2\left(-f_2+a_2+b_2\left(-f_1+2g\right)\right)\left(-f_1+a_1+b_1\left(-f_2+2g\right)\right)^2\right)\\
&\quad=-b_2(-f_1+a_1-b_1f_2+2b_1g)\times\\
&\quad\times\left(a_1-4b_2b_1g-f_1-3b_1f_2-2b_2f_1b_1+2b_1a_2+2b_1g\right)\\
&\quad=-b_2\left[-f_1+F1\left(f_2\right)\right]\left[\left[F_1(f_2)-f_1\right]+2b_1\left[F_2(f_1)-f_2\right]\right] \qquad (62)
\end{aligned}$$

Moreover,

$$\begin{aligned}
&\frac{\partial}{\partial f_1}\left(\frac{1}{g\left(\left(-b_1f_2+b_1a_2-b_2f_1-b_2f_1b_1+b_2a_1-b_2b_1f_2+4b_2b_1g\right)^2\right)}\right)\\
&\quad=2b_2\frac{1+b_1}{g\left(-b_1f_2+b_1a_2-b_2f_1-b_2f_1b_1+b_2a_1-b_2b_1f_2+4b_2b_1g\right)^3}\\
&\quad=\frac{2b_2\left(1+b_1\right)}{g\left[b_1\left[-f_2+F_2(f_1)\right]+b_2\left[-f_1+F_1(f_2)\right]\right]^3} \qquad (63)
\end{aligned}$$

and

$$\begin{aligned}
&\frac{\partial}{\partial f_2}\left(\frac{1}{g\left(\left(-b_1f_2+b_1a_2-b_2f_1-b_2f_1b_1+b_2a_1-b_2b_1f_2+4b_2b_1g\right)^2\right)}\right)\\
&\quad=2b_1\frac{1+b_2}{g\left(-b_1f_2+b_1a_2-b_2f_1-b_2f_1b_1+b_2a_1-b_2b_1f_2+4b_2b_1g\right)^3}\\
&\quad=\frac{2b_1\left(1+b_2\right)}{g\left[b_1\left[-f_2+F_2(f_1)\right]+b_2\left[-f_1+F_1(f_2)\right]\right]^3} \qquad (64)
\end{aligned}$$

Collecting terms yields (59) and (60) in the text.

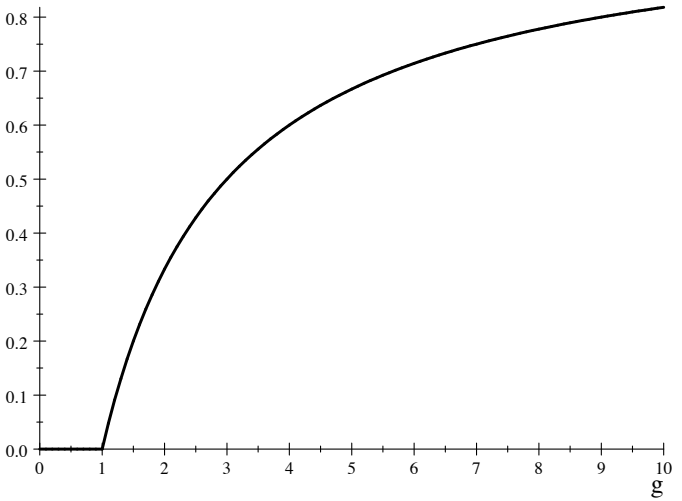

Figure 1: The critical incentive intensity $\tilde{b}(g)$

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