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Why Do Firms Merge and Then Divest: A Theory of Financial Synergy

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Abstract

This paper develops a theory of mergers and divestitures wherein the motivation for mergers stems from the inability to finance marginally profitable, possibly short-horizon projects as stand-alone entities due to agency problems between managers and potential claimholders. A conglomerate merger can be viewed as a technology that allows a marginally profitable project, which could not obtain financing as a stand-alone, to obtain financing and survive a period of distress. If profitability improves, the financing synergy ends and the acquirer divests assets to avoid coordination costs. Since it is the project's ability to survive as a stand-alone that causes the divestiture, divestiture decisions are interpreted as good news by the market in our model. Further, our theory is able to reconcile two important but seemingly contradictory empirical findings: 1) mergers increase the combined value of the acquirer and target (see Jensen and Ruback (1983), Bradley et al. (1988) and Kaplan and Weisbach (1992)); and, 2) diversified firms are less valuable than more focused stand-alone entities (see Berger and Ofek (1995), Lang and Stulz (1994), and Servaes (1996)). Diversification adds value in our model by facilitating the financing of positive net present value projects that cannot be financed as stand-alones. At the same time, because these same projects are only marginally profitable, diversified firms are less valuable than stand-alones.

1 Introduction

Recent empirical work has documented a trend towards corporate focus (Comment and Jarrell (1995)). In particular, this focusing has been performed by firms that had previously diversified. Ravenscraft and Scherer (1987) report that 33% of acquisitions in the 1960s and 1970s were later divested, while Porter (1987) finds that more than 50% of the acquisitions made by 33 firms in unrelated industries were subsequently divested. For a sample of 1158 firms, Mitchell and Lehn (1990) find 401 acquisitions took place over the period 1982-86 and that 20.2% of those were divested by 1988.¹ Finally, Kaplan and Weisbach (1992) who study a sample of large acquisitions completed between 1971 and 1982, find that by the end of 1989, these acquirers have divested almost 44% of the target companies.

The empirical evidence also indicates that firms which merge and then divest often perform well in the interim period. Kaplan and Weisbach [1992] argue that many acquisitions are not failures from an ex-post perspective and suggest that an acquirer may sell a business it has improved or a business that it once had synergies with but no longer does.² Also, recent evidence from the 1960's conglomerate merger wave shows that firms involved in conglomerate mergers over that period were more likely to be financially distressed than firms involved in related mergers (Hubbard and Pahlia [1995]).

Our paper presents an explanation for why a firm diversifies and then busts up that is consistent with value-increasing mergers. It is also consistent with good performance between the time of the merger and the divestiture. The theory does not rely on taxes, or on the acquirer having deep pockets. The motivation for merging stems from the inability

of a marginally profitable project to obtain financing as a stand-alone entity due to agency problems between managers and potential claimholders. Divestiture occurs after good performance that allows the once marginally profitable project to be financed as a stand-alone.

Two important caveats concerning the applicability of our theory are in order. First, one of the merging firms must be experiencing financial distress for our theory to be applicable. So our model is most directly applicable to marginally profitable start-up companies and existing companies that are financially distressed. Second, our theory only applies when severe agency problems exist between the manager and the claimholders of the distressed firm. For this reason, our theory is more applicable to mergers where one of the merging firms is small and cash flow verifiability is a problem.³

While our theory does not apply to all conglomerate mergers (since many do not involve firms currently experiencing financial distress), it can explain those conglomerate mergers that do involve distressed firms. The results in Hubbard and Pahlia indicate that, at least for the 1960s, many of these conglomerate mergers involve financially distressed firms. However, the pattern of a merger followed by a divestiture frequently occurs for reasons other than the one suggested here. In particular, firms also divest divisions to reverse misconceived acquisitions (Mitchell and Lehn (1990)).

It is well-known that positive net present value projects may be denied funding when management has the ability to manipulate the cash flows and managerial investment policy is costly to verify (Townsend (1979), Diamond (1984), Gale and Hellwig (1985), Hart and Moore (1989, 1994, 1995), Fluck (1997, 1998)). Our basic model contains both these features

and is an extension of Fluck (1997, 1998). Since the manager's incentive compatibility constraints require that she receive part of a project's cash flows, companies with marginally-profitable projects (start-up or distressed companies) are unable to support outside equity⁴. Furthermore, if the projects can not obtain equity financing then they can not raise debt-financing either (Fluck (1997, 1998)). In this setting, a conglomerate merger can then be viewed as a technology that allows a marginally profitable project, which could not obtain financing as a stand-alone, to obtain financing and survive a period of distress. For this reason, the conglomerate can raise more financing in total than its parts as stand-alone entities.⁵

However, this financing synergy associated with the merger need not persist. The project's profitability may improve sufficiently for it to be able to obtain financing as a stand-alone. If this happens and there are coordination costs associated with being a conglomerate, the conglomerate's management has an incentive to divest the project. Thus our model has the potential to explain both value-increasing conglomerate mergers and subsequent divestitures undertaken by the same firms.

Hubbard and Pahlia (1995) examine the 1960s conglomerate wave and find strong support for the financing synergy hypothesis, in which diversifying acquisitions involve target firms that are financially constrained. The authors find no support for the economic synergy and selling and distribution economies hypotheses and no evidence consistent with the debt and taxes hypothesis. In addition, they report that acquiring firms involved in diversifying acquisitions did not appear to have higher levels of free cash flows, nor were they punished

by the stock market (on acquisition announcement) with negative excess returns.

One recent merger (discussed extensively in Clark and Ofek (1994)) that involved an existing company with marginally profitable projects is American Home Product's acquisition of A.H. Robins Inc. American Home Product's lack of new products made liquidation an attractive option for its investors since its existing products were only marginally profitable. A.H. Robins was a pharmaceutical developer and manufacturer with a respected research and development staff and a strong health care product line including several well-known trademarks. Consistent with our model, their merger allowed AHP to continue financing its existing marginally profitable products.

Our theory is also applicable to mergers involving venture capital targets that are marginally profitable and can not undertake IPOs. As Gompers (1995) describes, merger is a frequently used strategy to provide financing for marginally profitable start-ups: "If venture capitalists receive favorable information about the firm and it has the potential to go public, the venture capitalist continues to fund the project. If the project is viable but has less potential to go public, the venture capitalist quickly searches for a corporate buyer. Firms that have little potential are liquidated." (Gompers (1995), Page 1483)

We have already discussed empirical evidence showing that merger followed by good performance and divestiture is a typical pattern. This pattern is a key prediction of our model. Further, Hubbard and Pahlia's evidence (that financially constrained firms are more often involved in conglomerate than related mergers) supports the hypothesis that our theory is applicable to some fraction of mergers and an even larger fraction of conglomerate mergers.

Interestingly, several other stylized facts about corporate restructuring are consistent with this hypothesis. We discuss each of these in turn.

First, our theory is consistent with empirical evidence⁶ that focus-increasing divestitures will be treated as good news by the market, since in our model it is the project's ability to survive as a stand-alone that causes the divestiture. The announcement of the divestiture conveys favorable news to investors if the manager is better informed about the profitability of the project than claimholders, and is unable to credibly inform claimholders about the improved profitability of the project prior to the divestiture announcement. This explanation for the positive price reaction to the divestiture announcement differs from the usual story which says that the divestiture causes the value increase. Instead, the model implies that mergers and divestitures are endogenous: the documented value increases for busted-up firms might not occur for other conglomerates if they were forced to bust up.

On the other hand, if the project's profitability fails to improve, then in our model the conglomerate's management has an incentive to close it down. The announcement of a plant closing reveals that the acquisition failed to produce value. Thus, the evidence of Blackwell et al. (1990) and Brickley et al. (1990) that the market's reaction to a plant closing is negative is also in line with our theory.

Second, our theory is consistent with empirical evidence that diversification increases the combined shareholder value of the acquirer and the target (Jensen and Ruback (1983), Bradley et al. (1988), Kaplan and Weisbach (1992), and Morck, Shleifer and Vishny (1990)). Mergers increase shareholder value in our model since positive net present value projects

which would otherwise not get financed can be undertaken by the merged firm. Morck, Shleifer and Vishny find that the change in the combined value for the acquirer and target is positive for 75 percent of their sample. Their evidence is consistent with the hypothesis that some fraction of mergers take place to realize financing synergies. This gain is also found for acquisitions that are successful and subsequently divested. In particular, Kaplan and Weisbach find a positive change in value for the combined firm at the time of the acquisition for acquisitions that were subsequently divested and for successful acquisitions that were subsequently divested.⁷

However, it is unclear to what extent these mergers are motivated by agency problems associated with financial distress and verifiability of cash flows. Thus, we must be careful not to overinterpret this evidence in favor of our theory.

Third, our theory is also consistent with evidence that diversified firms are less valuable than focused firms (Berger and Ofek (1995), Lang and Stulz (1994), and Servaes (1996)). Since mergers facilitate the financing of marginally profitable projects that are unable to raise funds as stand-alone entities, diversified firms would be on average less valuable than focused firms, but more valuable than if the diversification never took place. This argument highlights the difficulty in establishing causality. In our model diversification does not destroy value; rather, it is the low value of the assets that causes diversification.⁸ Again, we would like to stress that these studies focus on acquisitions in general, not ones specifically motivated by financial distress and unverifiable cash flows.

This paper focusses on the ability of a conglomerate merger to alleviate the adverse

consequences of financial distress. However, the acquisition of a troubled firm by either a vulture fund or by a firm in the same industry may produce similar gains as an unrelated merger, but with lower coordination costs. Thus, one open question that remains is why conglomeration is used when other low coordination cost alternatives are available.

One possible explanation can be offered for each alternative. First, vulture funds have only recently become important in the United States (perhaps as financial markets and institutions have become larger and more efficient). Thus, conglomerate mergers might be less important now than in the past as a technology for resolving financial distress. At the same time, international evidence indicates that conglomeration still plays an important role in the financing of startups and distressed firms in some economies (Khanna and Palepu (1996)).

Second, firms in the same industry as the target are more likely to be going through distress at the same time as the target firm (Shleifer and Vishny (1990)). Therefore, they would be less likely acquirers than firms in unrelated industries. This reasoning implies that related mergers are more likely to involve firms in booming industries, whereas unrelated mergers are more likely to involve firms in industries that are going through difficult times. Further, a related merger is more likely to be used to resolve financial distress when distress is atypical for the industry.

The paper is organized as follows. The next section briefly reviews other explanations for corporate restructuring. Section 3 describes the basic model while section 4 develops the financing conditions for stand-alone entities. Section 5 analyzes the benefits from conglomeration and from a subsequent divestiture. Section 6 presents the model's empirical

implications and indicates possible extensions. Section 7 concludes.

2 Literature on Mergers and Divestitures

Our story can be distinguished from other explanations that have been proposed for mergers and divestitures. Shleifer and Vishny (1989) argues that diversification and divestiture can be viewed as managerial strategies to achieve entrenchment. Managers choose manager-specific acquisitions so as to make themselves indispensable to their firm at the shareholders' expense. When an asset or subsidiary cease to provide further entrenchment benefits for the manager, divestiture follows. Matsusaka and Nanda (1995) provide an explanation that relies on being able to move resources more easily within a firm than across firms. Merging two divisions into one firm allows resources to be transferred across the divisions as profit opportunities arise. On the other hand, if the firm wants to credibly commit resources to a division to deter entry into that division's industry, it may divest itself of the other division.

Another line of explanation for mergers is that diversified firms have greater debt capacity and so enjoy greater tax shields from interest deductions (Lewellen (1971)). In John's (1993) model of spinoffs, firms determine their optimal capital structures by trading off the agency costs of underinvestment associated with risky debt against the the benefits of debt-related tax shields. Stand-alone projects with negatively correlated cash flows are found to be more valuable combined while the converse is true when the correlation is positive. Majd and Myers (1987) argue that conglomerate firms pay less in taxes than their segments would pay separately due to the tax code's asymmetric treatment of gains and losses. A segment

that experiences losses is more likely to capture the tax benefits of a loss if it is part of a conglomerate than if it operates as an independent entity. In contrast, the advantage of a merger in our model comes from being able to finance positive NPV projects that could not be financed as stand alone entities.

Finally, Gertner, Scharfstein and Stein (1994) highlight another argument why conglomeration may be value-enhancing. In their study of external versus internal capital markets the authors argue that conglomerates have an advantage over banks in the efficient redeployment of the assets that are performing poorly under existing management. Since internal markets provide senior managers the residual right of control of the firm's assets, these control rights provide the firm's senior management with increased monitoring incentives as they get more gains from monitoring. Note that our theory does not rely on manager-specific assets, strategic behavior associated with an oligopolistic product market, taxes, costs associated with redeploying assets, or the acquirer having deep pockets. In our model, conglomerates may have an advantage over external capital markets in their ability to raise financing for positive net present value projects that are unable to obtain financing as stand-alone entities.

Several papers that discuss mergers and divestitures start from the premise that diversification is value-destroying. Managers benefit from value-reducing diversification because of power and prestige associated with managing a larger firm (Jensen (1986), Stulz (1990)), because managerial compensation is related to firm size (Jensen and Murphy (1990)), because diversification reduces the risk of the manager's undiversified personal portfolio (Amihud and Lev (1981)) and because diversification may make the manager indispensable to the firm

(Shleifer and Vishny (1989)). Our paper provides a different perspective to these arguments by presenting a mechanism which allows a conglomerate merger to add value.

With the value-reduction associated with diversification taken as a given, the managerial labor market (Fama (1980)), product market competition (Hart (1983)) and the market for corporate control (Jensen and Ruback (1983)) have all been used to explain why firms refocus. These explanations suggest that value-increasing reductions in the level of diversification are associated with disciplinary events such as block purchases, acquisition attempts, financial distress or managerial changes. In contrast, our model implies that a firm refocusses whenever one of its projects can be financed as a stand-alone entity. Thus, refocussing occurs in our model as a response to shifts in the profitability of the firm, either anticipated or unexpected.

3 The model

3.1 The basic model

Consider two firms. One firm (firm L) has an indefinite sequence of two period projects (project L), each with the same cash flows. The other firm (firm S) is currently distressed. Firm S can experiment with a two period project which starts now (project S1). With probability p project S1 is successful, in which case the distress is over and firm S can continue to invest in an indefinite sequence of more profitable 2 period projects (project S2). With probability $1 - p$ project S1 fails, in which case firm S's investment opportunities are exhausted. Cash flows are constant across the two periods for each project. Project S2 can only be undertaken if project S1 is undertaken.

Let v^j denote the per-period cash flow of the project j where j can be L, S1 or S2. Each project requires an investment outlay, I^L , I^{S1} , or I^{S2} respectively. For simplicity, we set $I^{S1} = I^{S2} = I^S$. Thus, the NPV of a single 2-period project j satisfies:

$$NPV^j = \delta^2 v^j + \delta v^j - I^j \quad (1)$$

for $j = L, S1$ or $S2$. Further, the NPV of an infinite sequence of 2-period projects satisfies:

$$NPV_\infty^j = \frac{\delta v^j}{1 - \delta} - \frac{I^j}{1 - \delta^2} \quad (2)$$

for $j = L, S1$ or $S2$.

Investors and managers use the same positive discount factor, δ to value expected future cash flows. We assume that all projects have positive NPVs, so for $j = L, S1$ or $S2$:

$$NPV^j \geq 0. \quad (3)$$

Each project's equipment has an economic life of two years. Once the investment is sunk, the equipment is assumed to have a zero liquidation value for the remainder of the two years.⁹

The manager may finance the replacement of physical assets using either external sources, or using a portion of each period's cash flow from the current project (depreciation allowance). For a given project $j = S1, S2$ or L , we assume that the depreciation allowance a^j is the same in each period. Since I^S is needed for each project $S2$, including the one starting at time 2, a^{S1} and a^{S2} are the same, and denoted by a^S . Because the depreciation allowance

can be invested at a return of $\delta^{-1} - 1$ per period until needed, a^j solves $I^j = \frac{a^j}{\delta} + a^j$ for $j = S$ and L . Thus,

$$a^j = I^j \frac{\delta}{\delta + 1} \quad (4)$$

for $j = S$ and L .

Managers can divert cash flows as private benefits, but not depreciation allowances set aside in prior periods. Operating cash flows are observable to both management and investors, but are prohibitively costly to verify in a court of law.¹⁰ Similarly, whether or not the manager has set aside the depreciation allowance in the current period is known to both parties but is costly to verify in a court of law. Only receipts of payments, such as dividends, debt payments, and payments associated with asset liquidation are verifiable in this model. All other financial and accounting variables are assumed to be prohibitively costly to verify.

Following Zwiebel (1995) who assumes that investors and management share the control benefits of projects, we assume that the NPV of a positive NPV project is divided between investors and managers. In our model the manager's share of the NPV is θ and the investors' share is $(1 - \theta)$. When $\theta = 1$ the manager captures all the rents, while $\theta = 0$ indicates that investors capture all the rents. When ownership is concentrated, investors are likely to receive a substantial fraction of the rents, so θ would be relatively low. On the other hand, when ownership is diffuse then the manager is likely to capture *most* of the rents, so θ would be close to 1. Note that the two extreme cases of $\theta = 0$ and $\theta = 1$ are unreasonably restrictive. When $\theta = 0$, no financial contract is sustainable. When $\theta = 1$, then equity value

is completely insensitive to news about the profitability of future projects available to the firm.

Section 3.1.1. The model of outside equity

Consider a firm j with a cash flow of $v^j(t)$ each period $t=1,2,\dots$ and an outlay of $I^j(t)$ each even-numbered period $t=0,2,4,\dots$. This firm has a sequence of two-period projects, with the project starting at t having a net present value, $NPV^j(t) = \delta v^j(t+1) + \delta^2 v^j(t+2) - I^j(t)$.¹² Outside equityholders have a claim to the cash flows of the company at each time t , $v^j(t)$, and a right to dismiss and replace management or to liquidate the company independently of the realization of cash flows. Since management can divert cash flows as private benefits, outside equityholders' claim translates into an effective claim to the cash flows net of depreciation and private benefits of control. Equity is issued with unlimited life (Fluck (1998)).¹³

The timing of the model of outside equity is as follows. At time t_0 outside equityholders invest $I^j(t_0)$ in projects. Each period t , equityholders decide whether to keep or to replace the entrepreneur-manager or to liquidate the firm. Each period, the entrepreneur-manager may choose to set aside depreciation allowance, $a^j(t)$ and reports the earnings of the project. The reported earnings are paid out as dividends, $d^j(t)$.

The dividends can be decomposed into two components: the normal-return component and the rent-sharing component. The normal-return component, $d_\star^j(t)$, provides the equity with normal return on the capital invested (including repayment of the capital itself). For t even, the sum of the depreciation allowances set aside at $t+1$ and $t+2$ are worth $I^j(t+2)$ at time $t+2$. This $I^j(t+2)$ is available to the equityholder at time $t+2$ by liquidating the

firm. Thus, for any even t ,

$$\delta d_*^j(t+1) + \delta^2 d_*^j(t+2) = I^j(t) - \delta^2 I^j(t+2). \quad (5)$$

This condition implies that the present value of all future d_*^j 's equals the current outlay $I^j(t)$

for any even t :

$$I^j(t) = \sum_{\tau=1}^{\infty} \delta^\tau E[d_*^j(t+\tau)]. \quad (6)$$

The rent-sharing component, $d_{**}^j(t)$, provides the equityholders with their share of the firm's NPV. Since equity receives fraction $(1 - \theta)$ of the firm's NPV, the d_{**}^j 's satisfy the following expression for any even t :

$$\delta d_{**}^j(t+1) + \delta^2 d_{**}^j(t+2) = (1 - \theta)NPV^j(t). \quad (7)$$

This decomposition is useful since it highlights the dual role played by dividends.

From now on, we assume for simplicity that d_*^j and d_{**}^j are time-invariant for firm $j=S2$ or L (an infinite sequence of $S2$ or L projects). Then the normal return component for firm $j=S2$ or L becomes

$$[\delta + \delta^2]d_*^j = I^j[1 - \delta^2], \quad (8)$$

which implies

$$\frac{\delta d_*^j}{1 - \delta} = I^j. \quad (9)$$

Turning to the rent-division component,

$$[\delta + \delta^2]d_{**}^j = (1 - \theta)NPV^j \quad (10)$$

which, using (1) and (2), implies

$$\frac{\delta a_{**}^j}{1 - \delta} = (1 - \theta)NPV_{\infty}^j. \quad (11)$$

When no challenge is initiated, outside equityholders receive the dividends the manager has announced, and the manager receives his share of the NPV. In the event of a liquidation the manager receives no payoff and equityholders receive the liquidation value of the physical assets, here zero, plus any balance from the depreciation account. In the event of a dismissal, the manager receives no payoff, and outside equityholders bear a cost associated with replacing the manager. Immediately following a dismissal new management with identical qualities – identical cash flows – succeeds old management in control.

Section 3.1.2: Incentive Compatibility Conditions for Equity

When unlimited life equity is issued, the manager of firm j prefers to pay a dividend of $d^j(t)$ and set aside depreciation allowance of $a^j(t)$ in each period t . Equityholders retain the manager so long as investments are made and equilibrium dividends are paid, but fire the manager if either the dividends or the depreciation allowances drop below the equilibrium values. Since the penalty the manager faces for deviating is to be fired, he consumes all the cash flow in the period he deviates. Consequently, for the manager to comply with the contract at time t , the present value of his expected future payoffs under the contract must exceed $v^j(t)$:

$$\sum_{\tau=t}^{\infty} \delta^{\tau-t} E[v^j(\tau) - d^j(\tau) - a^j(\tau)] \geq v^j(t). \quad (12)$$

In the cases of projects S2 and L, this condition can be written much more simply:

$$\frac{\theta(v^j - d_*^j - a^j)}{1 - \delta} = \frac{\theta}{\delta} NPV_\infty^j \geq v^j, \quad (13)$$

where $j = S2, L$, and NPV_∞^j is defined as in (2).

Equityholders are willing not to liquidate the project at time t , only if the present value of all future dividends is greater than the outlay at t :

$$\sum_{\tau=t}^{\infty} \delta^{\tau-t} E[d^j(\tau)] \geq I^j(t). \quad (14)$$

In the cases of projects S2 and L, this condition simplifies to:

$$d_{**}^j \geq 0 \quad (15)$$

where $j = S2, L$. Condition (15) is satisfied if and only if $NPV^j \geq 0$.

Conditions (12) and (14) have to be satisfied for any firm to sustain outside equity. Thus, firms S2 and L can only raise equity if conditions (13) and (15) are satisfied.

Section 3.1.3: The Model of Debt

The manager may also issue debt with various maturities. For financing a two-period project j , the debt contract specifies investors transferring funds I^j to the manager upfront in exchange for payments by the manager over the life of the debt. Debtholders are also given the right to liquidate and/or the right to dismiss management and take over the firm as a going concern conditional on payments not being met (Fluck (1997)). In the event of a default, the control rights are transferred to debtholders. The debt contract expires at maturity if payments are met.

Section 3.1.4: Incentive Compatibility Conditions for Debt

Recall that debt, like equity, receives fraction $(1 - \theta)$ of a firm's NPV. It then follows from Fluck (1998) that a two-period project j can raise one-period debt only if

$$\delta^2 v^j \geq I^j + (1 - \theta)NPV^j. \quad (16)$$

The maximum debtholders can extract from the manager is $\delta^2 v$, since, by liquidating the project at date 1, they can deprive the manager of rents with present value δv ; the present value of *this* at date 0 is δ^2 .

Further, a firm with indefinite growth prospects may also issue longer-term debt by granting investors the contingent right to dismiss management and seize the firm as a going concern in the event of a default (Fluck (1997)). For a given θ , a firm that can raise long-term debt, can also raise outside equity. Conversely, a project that is unable to obtain equity finance will be unable to obtain debt finance.¹¹

4 Financing of Stand-Alone Entities

The following assumptions about project cash flows ensure that firm S2 and firm L can obtain financing but that firm S can not.

Assumptions (17) and (18) make projects S2 and L sufficiently profitable to raise outside equity financing. These assumptions are obtained by combining incentive compatibility conditions (13) and (15) for firms S2 and L (See the Appendix for details):

$$v^{S2} \geq \frac{I^S}{\delta(1 - (1 - \delta)/\theta)(1 + \delta)} \quad (17)$$

$$v^L \geq \frac{I^L}{\delta(1 - (1 - \delta)/\theta)(1 + \delta)}. \quad (18)$$

Forcing claimholders to take less than $(1 - \theta)$ would allow a less profitable firm to obtain financing. Thus, we assume that firm S is sufficiently unprofitable that it could not obtain financing even if the claimholders agreed to take none of project S1's NPV. Condition (19) states that even though S1 is a positive net present value project, that is, $NPV^{S1} > 0$, project S1 can not raise debt-financing as a stand-alone, even if the debtholders are willing to forego their share of the rents. Condition (19) is obtained by adding $\delta v^j - I^j$ to both sides of condition (16) with j set to S1 and θ set to 1.

$$\frac{1}{\delta} NPV^{S1} < v^{S1} \quad (19)$$

As shown in the Appendix, the following restriction (20) rules out equity financing for firm S (even though condition (17) means that firm S2, the potential successor of firm S, would be able to issue outside equity once the uncertainty is resolved):

$$p\theta\delta NPV_{\infty}^{S2} + \frac{1}{\delta} NPV^{S1} - v^{S1} < 0 \quad (20)$$

The incentive compatibility condition for a firm with equity requires that the present value of the current and future cash flows to the manager exceed the total current cash flow. For firm S, the time-1 cash flow is v^{S1} while the remaining terms on the left hand side of condition

(20) are the time-0 value of the managerial cash flows from time 1 onward. Thus, firm S is unable to obtain equity finance when (20) holds. Since equity finance is ruled out by (20), this condition also rules out long-term debt finance.

Given that S2 is a positive NPV project, condition (20) implies condition (19). So the fact that firm S can not sustain long-term debt or outside equity financing but firm S2 is a sequence of positive NPV projects, implies that project S1 can not obtain short-term debt financing. Since project S2 will not become available unless project S1 is undertaken, firm S cannot sustain financing for its projects as a stand-alone entity despite the fact that both projects have positive NPVs.

Conditions (17), (19) and (20), together with the requirement that project S1 have a positive NPV, place restrictions on p , θ , v^{S1} , and v^{S2} . However, a wide range of values exist for which these conditions are simultaneously satisfied. In particular, condition (19) says that $\frac{1}{\delta}NPV^{S1} - v^{S1}$ is less than 0, while (17) implies that $\theta\delta NPV_{\infty}^{S2} > \delta v^{S2}$. So for θ , v^{S1} , and v^{S2} given, condition (20) can always be satisfied if p is sufficiently small.

Without loss of generality, we have assumed that neither firm has any internal cash reserves at time 0. This assumption is not crucial since any internal cash reserves could be obtained by the equityholders via liquidation. For this reason, our model can also be applied to going-concerns that have just entered a period of financial distress. In particular, the condition which ensures that existing equityholders prefer not to liquidate the reserves is exactly the condition which ensures that new equityholders would be willing to provide financing. Notice that this condition holds for firm S2 (from time 2 and onward) and firm

L, but it does not hold for firm S1. So if firm L had I^L in cash reserves available to invest in project L at time 0, 2, 4..., its equityholders could liquidate the reserves and receive I^L , but they would rather invest it in the firm.¹⁴ On the other hand, if firm S had I^S in cash reserves available to invest in project S1 and it remained a stand-alone, then its equityholders would prefer to liquidate the company (see Fluck (1998)).¹⁵

5 Financial Synergy

In this section we establish that managers and equityholders of firms L and S can be made strictly better off by merging the two firms. The gain stems from the merged firm being able to finance positive net present value projects that firm S can not finance as a stand-alone. We show that the two firms merge knowing that if project S1 is successfully completed so that project S2 becomes available, then firm S2 will be divested at time 2 to avoid coordination costs.

Throughout the rest of this section, it is assumed that there is a per-period coordination cost of c associated with running two projects in one business entity. This coordination cost arises from a lack of focus (See, for example, Berger and Ofek (1995) and John and Ofek (1995) for a discussion of these costs.). This cost is paid at the end of the period thereby reducing the projects' cash flows. So in the absence of financial or economic synergies, there is no advantage from a merger. The rationale for divesting firm S2 at time 2 is to eliminate this cost.

Let C denote the merged firm if it does not divest firm S2, let CD denote the merged

firm if firm S2 is divested and let S2 denote the divested firm. Define $E^j(t)$ to be the time- t value of the equity of firm j , that is equal to the present value of all equilibrium dividends, and $M^j(t)$ to be the time- t value of the cash flows accruing to the manager of firm j where j equals L , S , C , $S2$, or CD .

Since firm L from time 0 onward and firms S2, C and CD from time 2 onward each have the same 2-period projects indefinitely, the equity dividends for these firms satisfy simple expressions. In particular, the stationarity of the cash flows implies that the dividend is the same each period. Let d^L be the dividend paid by firm L from time 1 onward and d^j be the dividend paid by firm j from time 3 onward for $j = S, S2, C$ and CD . Recognizing that firm C's cash flow from time 2 onward is the sum of project S2's and project L's cash flows minus the coordination costs, we let $v^C = v^L + v^{S2} - c$, and $I^C = I^L + I^{S2}$. Similarly, firm CD consists of project L from time 2 onward, and so we let $v^{CD} = v^L$ and $I^{CD} = I^L$. Now NPV^C , NPV^{CD} , NPV_∞^C , and NPV_∞^{CD} are well defined using (1) and (2) with $j = C$ or CD . Finally, firm C and CD set aside the same depreciation allowance in periods 1 and 2, $a^L + a^S$.¹⁶ From time 3 onward, firm C sets aside $a^L + a^S$ while firm CD sets aside a^L .

Exploiting this notation and using (9) and (11), d^j satisfies:

$$d^j = \left[\frac{(1-\theta)(1-\delta)}{\delta} NPV_\infty^j \right] + \left[\frac{1-\delta}{\delta} I^j \right] \quad (21)$$

where $j = L, S2, C$ and CD . The first-bracketed term in (21) is the rent-sharing component of the dividend, d_{**}^j , while the second-bracketed term is the normal-return component, d_*^j . Furthermore, for firm $j = L$ from time 0 onward and for firm $j = S2, C, CD$ from time 2 onward, the equity and manager values can be expressed as

$$E^j(t) = (1 - \theta)NPV_\infty^j + I^j \quad (22)$$

and

$$M^j(t) = \theta NPV_\infty^j. \quad (23)$$

Note that $E^L(0)$ is the value of firm L's equity after I^L has been raised. Since project S1 can not be financed as a stand-alone project, the time-0 values of firm S's equity and managerial payoffs are both zero: i.e., $E^S(0) = M^S(0) = 0$.

The dividends of firm CD at time 1 and 2 are more complicated since the cash flows in the first 2 periods for this firm differ from those in subsequent periods. However, for a given θ , these dividends satisfy the following expression:

$$\delta d^{CD}(1) + \delta^2 d^{CD}(2) = [(1 - \theta)\{NPV^{S1} + NPV^L - c\delta(1 + \delta)\}] + [(I^S + I^L)(1 - \delta^2)]. \quad (24)$$

The first-bracketed term is the the rent-sharing component of the dividends and is equal to the fraction $(1 - \theta)$ of the NPV from projects L and S1, net of coordination costs. The second-bracketed term is the normal-return component of the dividends, and is equal to the difference between the initial investment outlay and the time-0 value of the next outlay. This second component, when added to the depreciation allowances set aside in the first two periods, has a time-0 present value equal to the initial investment of $[I^S + I^L]$ by the equityholders.

Using (24) we can write down the time-0 value of equity and managerial payoffs, respectively:

$$E^{CD}(0) = I^L + I^S + \delta^2[E^{CD}(2) - I^L + p(E^{S2}(2) - I^S)] + (1 - \theta)[NPV^{S1} + NPV^L - c\delta(1 + \delta)] \quad (25)$$

and

$$M^{CD}(0) = \delta^2[M^{CD}(2) + pM^{S2}(2)] + \theta[NPV^{S1} + NPV^L - c\delta(1 + \delta)] \quad (26)$$

Note that $E^{CD}(0)$ is the value of the merged firm equity, with divestiture, after I^S and I^L have been raised.

5.1 The Divestiture Decision

Given that firms L and S merged at time 0, the merged firm prefers to divest firm S2 at time 2 if

$$E^{CD}(2) + E^{S2}(2) \geq E^C(2), \quad (27)$$

and

$$M^{CD}(2) + M^{S2}(2) > M^C(2). \quad (28)$$

These conditions (the divestiture preferability conditions) ensure that managers of the merged firm are better off and the equityholders of the merged firm are not made worse off by divesting firm S2. Even though it is typically the manager (and not the equityholders) who makes the divestiture decision, condition (27) guarantees that equityholders do not dismiss him or liquidate the firm following the divestiture.

If project S2 becomes available and the conglomerate divests firm S2, then coordination costs of c are avoided. For this reason, divestiture increases the time-2 value of the cash flows from projects L and S2. Since for a given θ more total value implies greater value for each party, both (27) and (28) are satisfied.

For the divestiture to take place the incentive compatibility and financing conditions must also be satisfied for both CD and S2 at time 2. However, conditions (17) and (18) which insure that projects L and S2 are sufficiently profitable to obtain equity financing also imply the satisfaction of conditions (13) and (15) for firm CD and firm S2 at time 2.¹⁷

Thus, managers can be made strictly better off by divesting, without making the merged firm's equity worse off, and without violating the financing or incentive compatibility conditions. The following proposition confirms this (see the Appendix for a formal proof).

Proposition 1 *For given $\theta > 0$ and $c > 0$, whenever conditions (3) and (17) to (20) are satisfied for firms S and L, then*

- i) both the managers and the equityholders of the merged firm prefer to divest project S2, with the preference being strict for the manager; i.e., (27) and (28) hold.*
- ii) the incentive compatibility and financing conditions (13) and (15) hold for the divested firm S2 and the divesting firm CD as stand-alones for all $t \geq 2$.*

5.2 The Merger Decision

Given that the conglomerate divests firm S2 at time 2, the managers of firms L and S prefer to merge at time 0 if

$$E^{CD}(0) \geq E^L(0) + I^S, \quad (29)$$

and

$$M^{CD}(0) > M^L(0) \quad (30)$$

Note that both $E^S(0)$ and $M^S(0)$ are 0, since firm S cannot survive as a stand-alone firm. It follows from conditions (29) and (30) (the merger preferability conditions) that the combined wealth of firm L's and firm S's equity is less than the value of firm CD's equity and similarly the time-0 value of the combined managerial cash flow from firms L and S is strictly less than that of firm CD. Again, while it is the manager who makes the merger decision, condition (29) guarantees that equityholders do not dismiss him or liquidate the firm following the merger decision.

Recognizing that $E^{CD}(2) = E^L(2)$, we can use (22) to rewrite (25)

$$E^{CD}(0) = E^L(0) + I^S + (1 - \theta)[NPV^{S1} + \delta^2 p NPV_{\infty}^{S2} - c\delta(1 + \delta)] \quad (31)$$

Similarly, we can use (23) and $M^{CD}(2) = M^L(2)$, to rewrite (26)

$$M^{CD}(0) = M^L(0) + \theta[NPV^{S1} + \delta^2 p NPV_{\infty}^{S2} - c\delta(1 + \delta)] \quad (32)$$

It follows from (31) and (32) (See the Appendix for a proof) that the merger preferability conditions are satisfied if and only if $\theta > 0$ and

$$NPV^{S1} + p\delta^2 NPV_{\infty}^{S2} - c\delta(1 + \delta) > 0 \quad (33)$$

The intuition for condition (33) is as follows. For a given θ , the only way that both the manager and equityholders can be made better off is if the total NPV of the merged firm CD exceeds that of firm L (NPV_{∞}^L). The merger's incremental effect on the total NPV of L has two components: the total NPV of firm S ($NPV^{S1} + p\delta^2 NPV_{\infty}^{S2}$); less the present value of the 2 periods of coordination costs ($c\delta(1 + \delta)$). Condition (33) says that the merger preferability conditions are satisfied only if the first component outweighs the second.

Given θ , the following condition is sufficient for the merged firm to be able to sustain equity financing at time 0, knowing that S2 will be divested at time 2:

$$\frac{\theta}{\delta}[(NPV_{\infty}^L + NPV^{S1} + p\delta^2 NPV_{\infty}^{S2} - c\delta(1 + \delta))] \geq v^L + v^{S1} - c. \quad (34)$$

This condition follows from combining the incentive compatibility and financing conditions faced by firm CD (see the Appendix for details). In particular, the left hand side is the present value at time 1 of the current and future equilibrium cash flows to be received by the manager. The right hand side is the current cash flow that the manager could get if he decided not to pay the equilibrium dividend at time 1. The manager prefers to pay the equilibrium dividend at time 1 if the left hand side exceeds the right hand side.

Condition (34) is equivalent to the condition that $M^{CD}(0)$ must exceed $\delta(v^L + v^{S1} - c)$.

Notice that this condition can be rewritten as

$$[\theta NPV_{\infty}^L - \delta v^L] + [\theta NPV^{S1} + \theta p \delta^2 NPV_{\infty}^{S2} - \delta v^{S1}] + [\delta c(1 - \theta(1 + \delta))] \geq 0 \quad (35)$$

The second term is negative from (20), while the first term is positive. The first term is equal to the slackness of firm L's incentive compatibility condition ($M^L(0) - \delta v^L$). To the extent that θNPV_{∞}^L exceeds δv^L , less extra value has to be available from project S1 and S2 to satisfy the incentive compatibility constraint for firm CD's manager. Consequently, if $[\theta NPV_{\infty}^L - \delta v^L]$ is higher, even less profitable projects can still obtain equity financing by merging with firm L.

The third term is the impact of the coordination costs on the incentive compatibility conditions for firm CD. Interestingly, this term can be positive or negative, depending on the magnitude of θ . The reason is that coordination costs have two offsetting effects on the manager's incentive compatibility conditions. First, a higher cost c means the total cash flow today is smaller, which reduces the gain to the manager from deviating from the equilibrium path. At the same time, a higher c reduces firm CD's NPV, which in turn reduces the present value of the equilibrium cash flows received by the manager. This dollar reduction in present value increases with θ . This second effect reduces the cost of deviating from the equilibrium path. Thus, when θ is high, this second effect dominates and coordination costs make it harder to satisfy the manager's incentive compatibility conditions (i.e., the third term is negative). The converse is true when θ is small and the third term is positive.

Whether or not the incentive compatibility constraint for firm CD's manager can be satisfied depends on four factors: (1) the slackness of the incentive compatibility constraint

for firm L's manager, $[\theta NPV_{\infty}^L - \delta v^L]$; (2) the potential profitability of S1 and S2; (3) the magnitude of the coordination costs, c ; and, (4) the size of the manager's NPV share, θ .

Notice that the cash flows of firm L only enter into condition (35) through the slackness of firm L's managerial incentive compatibility constraint $[\theta NPV_{\infty}^L - \delta v^L]$. However, this slackness is increasing in the manager's share of NPV (θ), and in the NPV of project L.

The control benefits provided to the manager by project L, $[\theta NPV_{\infty}^L]$, alleviate the agency conflict between management and claimholders, so that project S1 and S2 can be undertaken. Following the merger, equityholders can induce management voluntarily to limit consuming private benefits and to honor their claim to the cash flows of firm CD. For the manager to have sufficient control benefits, her dollar share of project L's NPV (θNPV_{∞}^L) must be sufficiently large relative to project L's cash flow, to offset the violation of firm S's incentive compatibility condition and the negative effects of the coordination costs (if any).

The discussion can be formalized by the following proposition.

Proposition 2 *For given $\theta > 0$ and $c > 0$, whenever conditions (3) and (17) to (20) hold for firms S and L, and conditions (33) and (34) are satisfied, then*

- i) Firms S and L prefer to merge at time 0 (knowing the combined firm will divest project S2 at time 2); i.e., the merger preferability conditions, (29) and (30), are satisfied.*
- ii) Firm CD's manager's incentive compatibility conditions (12) and (14) are satisfied.*
- iii) The merged firm prefers to divest project S2 at time 2.*
- iv) The incentive compatibility and financing conditions (13) and (15) hold for the divested firm S2 and the divesting firm CD as stand-alones for all $t \geq 2$.*

It has already shown that conditions (33) and (34) are necessary and sufficient for the two firms to be able to merge. The rest of the proof of Proposition 2 is straightforward and is, therefore, omitted. Note that condition (33) is feasible when projects S1 and S2 have positive net present values. Further (34) is feasible since the first term in the square brackets is positive and can be made arbitrarily large depending on the slackness of firm L's incentive compatibility condition, $[\theta NPV_{\infty}^L - \delta v^L]$.

6 Discussion: Generalizations and Empirical Implications

In the previous section, we presented a simple model with two states in which two firms rationally merged and the conglomerate subsequently divested (closed) one of its divisions in the good (bad) state. This model illustrates merging as a technology that allows marginally profitable projects to be undertaken. This section discusses empirical implications of the model and how the model can be generalized. First, the model can be used to characterize the cross-section of firms on the basis of degree of diversification and profitability. A discussion of how the model can be used in this way is contained in the first subsection. Second, the model generates implications for the time-series behavior of returns and profitability which are discussed in the second and third sections. Third, financing synergies can still be achieved when cash flows are partially verifiable and this extension is briefly discussed in the

fourth section. Finally, the model can be generalized to exploit the diversification benefits associated with merging. This generalization is briefly discussed in the final subsection.

6.1 Cross-sectional Implications

Up until now, the model has focussed on two particular firms S and L. The distinguishing characteristic of firm S which drives the financing synergy is the low profitability of its projects. In contrast, the level of profitability of firm L only affects its ability to create financing synergy through the control benefits of firm L's manager. Thus, firm L needs to be sufficiently profitable to be financed as a stand-alone, and to provide its manager with sufficient control benefits.

Consequently, our model suggests that a manager who enjoys large control benefits is more willing to undertake mergers that generate financial synergies. In particular, a manager with large control benefits is prepared to take over a positive net present value project with such low profitability that it would be rejected as a takeover target by a manager enjoying smaller control benefits. Thus, our model implies that a merger undertaken to alleviate financial distress is more likely to involve a firm whose manager has large control benefits.

A second, fairly immediate implication of our model is that conglomerates can appear less profitable than similar portfolios of stand-alone entities. Since our theory predicts that one of the firms involved in a conglomerate acquisition will underperform, this and coordination costs may make the conglomerate as a whole underperform. The only additional assumption needed concerns the propensity of profitable firms to merge with distressed firms.

In particular, this propensity must not be positively correlated with reported profitability. Otherwise, firms that merge would have greater reported profitability than those that do not. This assumption seems reasonable since higher control benefits for the manager imply less profitable equity, holding total project profitability constant. More precisely, holding NPV_{∞}^L fixed, the managerial control benefits increase in θ , while the firm's reported profitability, $(1 - \theta)NPV_{\infty}^L$, decreases in θ .

As discussed in the introduction, the implication of lower profitability of conglomerates relative to portfolios of stand-alones is consistent with the so-called "conglomeration discount" that has been documented empirically. However, our model suggests that the lack of profitability causes the merger rather than the converse, which has been the interpretation adopted in the literature.

Another cross-sectional implication follows from the desire of firms to avoid coordination costs. The big disadvantage of a conglomerate merger is the associated coordination costs. However, it is difficult for financing synergies to be captured by firms in the same industry since financial distress is likely to be industry specific rather than firm specific. In addition, related mergers are often motivated by economic synergy. Thus, our story is likely to apply to a larger fraction of conglomerate than related mergers.¹⁸ Empirical evidence suggests that unrelated mergers are less profitable than related mergers. If economic synergies are driving related mergers but financing synergies are driving a fraction of unrelated mergers, then one would expect unrelated mergers to result in less profitable firms than related mergers.

6.2 Time-series Implications

In addition to our cross-sectional predictions on the characteristics of firms that are likely to benefit from financial synergy, our model also has strong time-series implications concerning the waves of conglomerate mergers and subsequent divestitures undertaken by the same firms. The model predicts that conglomeration undertaken by firms to exploit financial synergies increases in periods of low profitability, and when managers are entrenched and enjoy large control benefits. Since profitability, entrenchment and control benefits are all high during expansions and low during recessions, it is difficult to predict how conglomeration activity changes over the business cycle in the context of our model. For this reason, the model is not necessarily inconsistent with evidence (see, for example, Gaughan, 1996) that conglomerate merger activity generally increases during expansions. With respect to divestitures, the model predicts that they become more frequent in periods of increased profitability.

It is worth noting an interesting analogy between the time-series implications of our model and those of the Diamond (1991) model for bank loans and directly placed debt. When real rates increase relative to future profitability, the moral hazard problem between managers (borrowers) and claimholders becomes more severe and more companies find themselves in temporary distress. Two different ways to alleviate this agency problem are monitoring by banks (Diamond (1991)) and conglomerate mergers (the present paper). Hence in periods of lower profitability (1) demand for bank loans increases and higher-rated borrowers choose to borrow from banks (Diamond (1991)); (2) opportunity for conglomeration increases since more distressed firms can be rescued by merging with firms whose managers are entrenched

and enjoy large control benefits (the present paper). However, as discussed in the introduction, the use of conglomeration to achieve financing synergies may have decreased with the recent emergence of vulture funds.

6.3 Stock Price Reaction

Furthermore, our model also offers implications concerning stock price response following a divestiture decision. In our model, divestiture only occurs when firm S becomes sufficiently profitable. Thus, the model is consistent with evidence that the announcement of a bust-up is treated as good news by the market. Interestingly, here the division's improved profitability causes its divestiture rather than the reverse.

The only additional assumption needed concerns the timing of the information arrival in the model. In particular, the manager must learn of the availability of the profitable follow-up project, and announce the resulting divestiture, before investors learn about the project's availability. By the same argument, the closing of project S2 would be interpreted as bad news and would be accompanied by a negative price response.

6.4 Extending the Model to Partially Verifiable Cash Flows

This paper presents a model in which operating cash flows are completely unverifiable. This assumption is made for simplicity only. The theory only requires that one firm's cash flows be sufficiently unverifiable that it cannot obtain financing.

In the model presented above, firm S is assumed to have a 2-period project with a cash

flow v^{S1} each period that is completely unverifiable. However, suppose some fraction μ of this cash flow is verifiable. This verifiable component can be thought of as a 2-period, zero-NPV project with a cash flow of μv^{S1} per period and requiring an outlay of $\mu v^{S1}[\delta(1 + \delta)]$. The analysis presented in the paper would still hold but now project S1 should be replaced by the unverifiable component of project S1: so v^{S1} is replaced by $(1 - \mu)v^{S1}$ and I^{S1} is replaced by $I^{S1} - \mu v^{S1}[\delta(1 + \delta)]$. So long as the verifiable component μ is sufficiently small and (20) holds, firm S still has trouble obtaining financing.¹⁹ With low μ , the initial investment not recoverable using the verifiable cash flow is sufficiently high that the manager would just take the unverifiable cash flow at time 1.

The model's generalizability to firms with partially verifiable cash flows broadens its potential application, since larger firms have many restrictions against managerial manipulation of cash flows. What matters is the portion of the outlay that cannot be recovered using the verifiable cash flows. The model only applies when this unrecoverable portion of the outlay is sufficiently large to make the unverifiable cash flow component a marginally profitable project. Thus, while our model is a plausible explanation for many conglomerate mergers, it is not applicable to mergers where neither firm is facing problems associated with verifiability of cash flows. In particular, our model is unlikely to apply to mergers involving large Fortune 500 companies, since μ for these firms is likely to be high.

6.5 Exploiting the Diversification Benefits of Mergers

In this paper, our focus is on a marginally profitable project merging with a project that generates deterministic cash flows. Hence there are no diversification benefits associated with the merger. Their absence highlights that that these benefits are not driving the financing synergy that we document. However, volatile cash flows make it harder for a project to obtain financing (Fluck (1998)). A project with volatile cash flows may not be profitable enough to meet the higher incentive payments needed in high cash flow states to satisfy the manager's incentive compatibility conditions. Hence, since conglomeration often reduces cash flow volatility, the merged firm may be able to obtain equity financing, even though one or both of its divisions is unable to raise funds as a stand-alone. By reducing the volatility of the cash flows, conglomeration relaxes the manager's incentive compatibility constraint and creates the potential for financing synergy.

7 Conclusion

This paper develops a theory of mergers and divestitures wherein the motivation for mergers stems from the inability of firms to finance marginally profitable, possibly short-horizon projects as stand-alone entities due to agency problems between managers and potential claimholders. A conglomerate merger can be viewed as a technology that allows marginally profitable projects, that investors would otherwise reject, to obtain financing. Once profitability improves, the financing synergy ends and the acquirer divests assets to avoid coor-

dination costs. As a result, divestiture decisions are interpreted by the market as good news which is consistent with empirical evidence.

This theory is consistent with two seemingly contradictory empirical findings: 1) mergers increase the combined value of the acquirer and target; and, 2) diversified firms are less valuable than more focused stand-alone entities. It may also be applicable to the recent spate of mergers between biotechnology and pharmaceutical companies.

Future work will examine conditions under which two firms prefer to merge when there are diversification benefits associated with the merger. Another potential application is to a firm's decision whether to pursue a project internally or externally. The model seems particularly well suited to this problem since an individual project is likely to have cash flows that are difficult to verify.

8 Appendix

Proof that (17) and (18) are sufficient for (13) and (15) to hold for firms S2 and L:

(i) Proof that (17) and (18) are sufficient for (13) to hold for firms S2 and L. Substitute for d_*^j and a^j into (13) using (9) and (4) to obtain:

$$\theta \frac{v^j - \frac{(1-\delta)I^j}{\delta} - \frac{\delta I^j}{1+\delta}}{1-\delta} \geq v^j$$

Assuming $\theta \neq 0$ gives:

$$v^j - \frac{(1-\delta)I^j}{\delta} - \frac{\delta I^j}{1+\delta} = v^j - \frac{I^j}{\delta(1+\delta)} \geq \frac{(1-\delta)}{\theta} v^j$$

Rearranging gives

$$v^j \geq \frac{I^j}{\delta(1+\delta)(1 - (1-\delta)/\theta)}.$$

(ii) Proof that (17) and (18) are sufficient for (15) to hold for firms S2 and L. Using (11) and (2), we can rewrite (15) as follows:

$$(1-\theta)[v^j - \frac{I^j}{\delta(1+\delta)}] \geq 0.$$

From the proof of (i), we know that (17) and (18) imply the following for $j = S2, L$:

$$v^j - \frac{I^j}{\delta(1+\delta)} \geq \frac{(1-\delta)}{\theta} v^j.$$

Since the right-hand side of this expression must be positive, condition (15) follows immediately for $j = S2, L$. \square

Derivation of condition (20):

Given θ , the manager's payoff from project S2 in time-2 dollars is θNPV_{∞}^{S2} and the time-1 value of that payoff is $\theta\delta NPV_{\infty}^{S2}$. Since project S2 realizes with probability p , the time-1 expected value of this payment is $\theta\delta p NPV_{\infty}^{S2}$.

Given that the claimholders have agreed not to take any of project S1, the manager's payoff from project S1 in time-1 dollars is $\frac{NPV^{S1}}{\delta}$. Thus, the time-1 value of his future equilibrium payoffs is

$$\theta\delta p NPV_{\infty}^{S2} + \frac{NPV^{S1}}{\delta}.$$

The manager is not willing to comply with the equilibrium if the present value of his future equilibrium payoffs are less than the current cash flow realization, v^{S1} . Thus, (20) holds. \square

Proof that $\theta > 0$ and (33) is necessary and sufficient for (29) and (30) to both hold:

(i) Proof that $\theta > 0$ and (33) is sufficient for (29):

Using (31), we can rewrite (29) as

$$E^L(0) + (1 - \theta)[NPV^{S1} + p\delta^2 NPV_{\infty}^{S2} - c\delta(1 + \delta)] \geq E^L(0).$$

Subtracting $E^L(0)$ from both sides gives

$$(1 - \theta)[NPV^{S1} + p\delta^2 NPV_{\infty}^{S2} - c\delta(1 + \delta)] \geq 0.$$

As required, this inequality is true if $\theta > 0$ and (33).

(ii) Proof that $\theta > 0$ and (33) is necessary and sufficient for (30):

Using (32), we can rewrite (30) as

$$M^L(0) + \theta[NPV^{S1} + \delta^2 p NPV_{\infty}^{S2} - c\delta(1 + \delta)] > M^L(0).$$

Subtracting $M^L(0)$ from both sides gives:

$$\theta[NPV^{S1} + \delta^2 p NPV_{\infty}^{S2} - c\delta(1 + \delta)] \geq 0.$$

This inequality is satisfied if and only if $\theta > 0$ and (33) holds.

(iii) Finally, (i) and (ii) together establish that $\theta > 0$ and (33) are necessary and sufficient for (29) and (30) to both hold simultaneously. \square

Proof that condition (34) is sufficient for firm CD to sustain equity finance:

Firm CD can sustain outside equity financing if (12) is satisfied for all t and (14) holds.

(i) Proof that (34) is sufficient for (12) to hold for firm CD. If (12) holds for $t = 1$, then it holds for all t . Thus, (12) is satisfied if

$$\frac{\delta^2(v^L - d^L - a^L)}{1 - \delta} + \frac{\delta^2 p(v^{S2} - d^{S2} - a^S)}{1 - \delta} + \delta(v^{S1} + v^L - c - d^{CD}(2) - a^S - a^L) +$$

$$(v^{S1} + v^L - c - d^{CD}(1) - a^S - a^L) \geq v^L + v^{S1} - c.$$

Using (1), (2), and (4), we can rewrite this expression:

$$\frac{1}{\delta}[\delta^2(NPV_{\infty}^L - I^L - \frac{\delta^3}{1 - \delta}d^L) + p\delta^2(NPV_{\infty}^{S2} - I^S - \frac{\delta^3}{1 - \delta}d^{S2}) +$$

$$NPV^L + NPV^{S1} - c\delta(1 + \delta) + (I^L + I^S)(1 - \delta^2) - (\delta d^{CD}(1) + \delta^2 d^{CD}(2)) \geq v^L + v^{S1} - c.$$

Now (24) provides an expression for $[\delta d^{CD}(1) + \delta^2 d^{CD}(2)]$, while (9) and (11) provide expressions for d_{\star}^j and $d_{\star\star}^j$ respectively. Using (24), (9), (11) and the fact that $d^j = d_{\star}^j + d_{\star\star}^j$, we can rewrite the above expression:

$$\frac{\theta}{\delta}[\delta^2 NPV_{\infty}^L + p\delta^2 NPV_{\infty}^{S2} - \delta c(1 + \delta) + NPV^L + NPV^{S1}] \geq v^L + v^{S1} - c.$$

Finally, using (1) and (2), this expression can be rewritten

$$\frac{\theta}{\delta}[NPV_{\infty}^L + p\delta^2 NPV_{\infty}^{S2} - \delta c(1 + \delta) + NPV^{S1}] \geq v^L + v^{S1} - c.$$

which is (34).

(i) Proof that (34) is sufficient for (14) to hold for firm CD. Using (6), we can rewrite (14)

for firm j:

$$\sum_{\tau=1}^{\infty} \delta^{\tau} E[d_{\star\star}^j(t + \tau)] \geq 0.$$

Using (7), (1) and (2), we can rewrite this expression for firm CD as follows:

$$(1 - \theta)(NPV_{\infty}^L + p\delta^2 NPV_{\infty}^{S2} - \delta c(1 + \delta) + NPV^{S1}) \geq 0$$

This inequality holds if (34) holds since the right hand side of (34) is positive. \square

Proof of Proposition 1:

Part (i):

To show that (27) holds, we first use (22) and (2) for $j = CD, S2$

$$E^{CD}(2) + E^{S2}(2) = (1 - \theta) \left[\frac{\delta(v^L + v^{S2})}{1 - \delta} - \frac{I^L + I^S}{1 - \delta^2} \right] + (I^L + I^S).$$

Then we use (22) and (2) for $j = C$ to obtain

$$E^C(2) = (1 - \theta) \left[\frac{\delta(v^L + v^{S2} - c)}{1 - \delta} - \frac{I^L + I^S}{1 - \delta^2} \right] + I^L + I^S.$$

Hence, $E^{CD}(2) + E^{S2}(2) \geq E^C(2)$ whenever $c > 0$.

To show that (28) holds, we first use (23) and (2) for $j = CD, S2$:

$$M^{CD}(2) + M^{S2}(2) = \theta NPV_{\infty}^{CD} + \theta NPV_{\infty}^{S2} = \theta \left[\frac{\delta v^L + v^{S2}}{1 - \delta} - \frac{I^L + I^S}{1 - \delta^2} \right].$$

Then we use (23) and (2) to obtain for $j = C$

$$M^C(2) = \theta \left[\frac{\delta(v^L + v^{S2} - c)}{1 - \delta} - \frac{I^L + I^S}{1 - \delta^2} \right].$$

Hence, $M^{CD}(2) + M^{S2} > M^C(2)$ whenever $c > 0$ and $\theta > 0$.

Part (ii): We showed above that (17) and (18) imply that (13) and (15) hold for firms S2 and L. Thus, (13) and (15) hold for firm S2 and firm CD from period 2 onward, since firm CD is firm L after period 2. \square

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9 Footnotes:

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¹ The fraction of divestitures in Mitchell and Lehn's study is lower than in the other studies. The likely reason is that they only follow their sample for two years after the last acquisition.

² Using accounting data on the gain or loss on sale from the divestiture, Kaplan and Weisbach report that on average targets are divested at 143 percent of their pre-acquisition market value (after adjusting for the increase in the S&P500 index over the time period). Consistent with this story, John and Ofek (1995) find that the typical divested division is performing as well as the industry at the time of the divestiture.

³ While the model presented below assumes that all cash flows are unverifiable, section 6.4 discusses how the model can be extended to allow the cash flows to be partially verifiable.

⁴ In addition, a project may also fail to raise outside equity because (1) it is finitely-lived and marginally profitable; or (2) its cash flows are highly volatile.

⁵ Whether a firm has an absolute advantage in obtaining external financing for another firm or project is also an important issue in the theory of financial intermediation. In Diamond (1984) firms can raise more financing through a financial intermediary than by

directly placed debt since the benefits from diversification within an intermediary can not be attained through diversification across intermediaries by principals. In Myers and Rajan (1994) a firm with a liquidity overhang problem has an advantage in obtaining financing for less liquid projects. The incremental debt capacity the firm generates by taking on a less liquid project exceeds the debt capacity the project has on its own.

⁶ Kaplan and Weisbach (1992) find exactly this result for both successful and unsuccessful divestitures. The authors also report that divestiture rates are four times higher when targets are not in businesses highly related to those of the acquirers. If the financial synergy described in our paper drives unrelated acquisitions while economic synergy drives related acquisition, one would expect to see exactly this result.

⁷ The same is not true for bidders. For their sample of corporate acquisitions between 1982 and 1986, Mitchell and Lehn (1990) report an average negative stock price effect for companies whose acquisitions were divested by 1988, and an average positive stock price effect otherwise; Kaplan and Weisbach report a similar difference for their sample. Since our model is silent on how the value gain from merging is split between the bidder and the target, this empirical evidence concerning the gains to bidders neither supports nor refutes our theory.

⁸ Recent evidence reported by Berger and Ofek (1995) and Lang and Stulz (1994) indicates that this value loss is smaller for related diversifications. Our model is consistent with these empirical findings since unrelated diversifications are the ones most likely to be driven by the presence of marginally profitable projects that can not be financed as stand-alone entities.

If most unrelated diversifications involve marginally profitable projects while most focused firms do not, then one would expect to see the observed regularity that unrelated diversified firms are less valuable than focused firms.

⁹ This assumption is for simplicity only. Fluck (1998) establishes the sustainability of infinitely-lived equity with positive liquidation values after the investment.

¹⁰ This assumption suggests that our model is most applicable to situations where firm S is a smaller firm. However, it is possible to extend the model to the case in which the operating cash flows are partially verifiable. This extension is discussed in section 6.4.

¹¹ In particular, long-term debt imposes a set of incentive compatibility conditions that include those imposed by equity. The additional condition imposed by long-term debt relates to the manager's ability to steal the depreciation allowance in the first period of a project but still make the debt repayment. Since the long-term debtholders have control rights that are conditional on default, they know the manager has pocketed the depreciation allowance but cannot do anything until period 2. Equityholders, on the other hand, possess unconditional control rights and so can fire the manager at time 1.

¹² A firm with general cash flows is considered in this and the next subsection to ensure that the analysis applies to the merged firm. However, simpler expressions can usually be obtained for firms S2 and L, due to the stationarity of their cash flows. These simpler expressions are also presented.

¹³ Fluck shows that the only equity that can be sustained is of unlimited life. Her result follows from the inability of finitely-lived investment opportunities to provide the manager

with an incentive not to consume $v^j(t)$ every period. Put simply, in the last period of the equity's life, the manager consumes $v^j(t)$. Firing is not a credible threat since firing is costly to the equity and the new manager has the same incentive as the old manager. Since the manager knows that she consumes $v^j(t)$ in the last period, in the next to last period the manager can consume all of $v^j(t)$ since firing again is not a credible threat.

¹⁴ Note that at time t for $t = 2, 4 \dots$, firm L would have a cash reserve of I^L as a result of setting aside the depreciation allowance at times $t-1$ and t .

¹⁵ In fact, investors would be willing to liquidate firm S as long as the firm had *any* positive cash reserves. This is so, because for firm S the manager's incentive compatibility condition is violated, and, consequently, the manager of firm S will find it optimal to divert the firm's cash flows, pay no dividends, and make no investment. By liquidating the firm, equityholders can foreclose the depreciation account, otherwise they would get zero.

¹⁶ This assumption is made for simplicity and without loss of generality.

¹⁷ Note that from time 2 onward, firm CD is the same as firm L. Hence, conditions (13) and (15) apply to firm CD from time 2 onward.

¹⁸ However, a related merger where one of the firms is distressed is more likely to be motivated by financing synergy than the average related merger.

¹⁹ It must be the case that the verifiable component of project S1 can be undertaken if and only if the unverifiable component is undertaken also.