On The Choice of the Divestiture Method

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Abstract

Divestitures are an important aspect of modern corporate strategy. We develop a unified analytical framework to analyze factors governing the choice of method for divesting a subsidiary. We show how synergies of potential acquirers and private information held about the subsidiary-to-be-divested govern the choice of divestiture method. Our theory maps how each divestiture method affects the value of all of the parties to the transaction, and shows that the parent stub return provides a measure of the influence costs of the subsidiary. We provide empirical evidence related to predictions of our theory.

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Abstract

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Why Divestitures are Not Always Asset Sales

1. Introduction

■ A broad spectrum of research in finance relates to mergers and acquisitions and the market for corporate control. From the viewpoint of a corporate seller, there are important differences between the takeover of a firm in its entirety and the sale of a major corporate asset (including the role – or lack thereof – for shareholders). But the finance literature generally analyzes both types of activities by applying a framework in which bidders engage in an explicit or implicit competition for control of the entity. In actuality, voluntary divestitures account for almost half of global deal making (according to Dealogic), and there are some clearly recognizable cases of divestiture (e.g. spin-offs) that do not appear to fit easily into this bidder-oriented framework.[1]

In this paper, we provide a private information framework for analyzing how managers select the appropriate method for divesting an asset. We bring new perspective as to why a specific form of divestiture is adopted from the menu of available mechanisms. In intuitive terms, our work can be viewed as providing an economic answer to the question of why all divestitures do not take the form of an asset sale (putting aside institutional frictions such as taxes or accounting treatment). Our theory indicates the existence of a region where an asset sale (to an outside buyer) is the only equilibrium. However, the model also generates regions where, depending on private information, influence costs, and synergies of third party buyers, it is appropriate to employ an alternative method of divestiture.

Prior literature gives little guidance as to how a particular method of divesting an asset is chosen from among a menu of alternative transactions nor an explanation as to how divestiture

[1] In recent years the proportion of deals that are divestitures has varied between 40% and 50% (Financial Times, July 5, 2011, p.13).

method is related to the value of the asset. Most empirical research on divestitures limits its focus to the positive announcement effects of a given divestiture method on parent firm share price.[2] The broad scope of our theoretical framework allows us to analyze both how the type of divestiture is chosen and how it relates to the value of each of the parties to the transaction. Overall, we solve for the choice of divestiture method based on the private information held by parent and subsidiary managers and the potential synergies third parties can generate with the asset. The model yields predictions about the differential effects of alternative divestiture methods and implies that the return to the parent stub (the parent's non-subsidiary assets) is a measure of the subsidiary's influence costs.[3]

In prior literature, the positive effects of divestitures on parent firm value have been explained from two broad perspectives. One, an efficiency-based hypothesis (Hite and Owers (1983), Rosenfeld (1984), Jain (1985), Schipper and Smith (1983, 1986), Klein (1986), and Hite, Owers and Rogers (1987)) suggests that a parent divests an asset that can be better managed by another firm (or as an independent entity). A divestiture announcement signals greater future cash flows at the subsidiary, increasing its value, and parent value rises to reflect the increased value of its holding of subsidiary shares. Two, an influence cost hypothesis (Meyer, Milgrom, and Roberts (1992)) argues that managers of a poorly performing subsidiary have an incentive to distort or conceal information to influence parent decisions and seek to divert parent resources to protect their unit. Thus, news of a divestiture conveys negative information about subsidiary value, but the value of the parent stub (and in turn the parent) rises because influence costs are to be eliminated.

[2] For a concise review of empirical studies of parent returns at announcements of various types of divestitures, see Eckbo and Thoburn (2008).

[3] Our work provides perspective about gains from divesting control of an asset per se, which are apart from benefits that are related to initiating public trading in a subsidiary, such as having access to market-based costs of capital and managerial compensation.

Our theory integrates both approaches. Managers of the parent firm and managers of the subsidiary-to-be-divested have private information about the subsidiary's ability to generate future cash flows and to impose influence costs on the parent. In addition, there may be positive net synergies available in the form of complementarities between the subsidiary and a third party buyer. These complementarities can encompass industrial synergies with a potential acquirer's assets and/or the managerial ability of a new acquirer to lessen influence costs. Within this framework, we model the choice of divestiture method through a direct mechanism, which for purposes of intuition can best be viewed as being designed by an agent or advisory firm that gives guidance to the parent about the appropriate divestiture method for different realizations of parent and subsidiary information. However, we note that the use of such an agent is a heuristic device since the results do not depend on this setup.[4]

The model entails designing a mechanism that permits a deal between an informed seller (the parent) and an informed potential buyer (the subsidiary itself), or other potential buyers that are uninformed (dispersed investors or third-party buyers). We consider four divestiture methods: third party asset sales (AS) in which a synergistic buyer acquires the parent's interest in the subsidiary; subsidiary purchases (SP) in which the subsidiary buys the parent's stake; spin-offs (SO) which entail the distribution of the parent's shareholding in the subsidiary to parent shareholders through a pro rata non-cash dividend; and secondary stock offerings (SS) in which the parent sells its shares in the subsidiary to dispersed capital market investors via a public secondary seasoned stock offering.

The theory maps various configurations of private information on to methods of divestiture and generates a tableau of valuation effects for the subsidiary and parent stub (as well

[4] For example, it could simply be assumed that the parent has its own means of accessing the private information of other parties. This point is discussed in Section 2 below (page 12).

as for the parent). We show how the level of expected net complementarities (i.e., net synergies) of a potential third party acquirer affects the formulation of the direct mechanism that maps any realization of parent and subsidiary private information into the appropriate deal.

While our theoretical approach applies to all divestitures, an interesting aspect of our analysis is that it generates specific predictions about the information conveyed by the type of divestiture about the value of the subsidiary versus the parent stub. Thus, a practical extension of our model is an analysis of divestitures of publicly traded subsidiaries. For such a sample, observable pre- and post-divestiture market values for the subsidiary (and for the parent stub as well) provide metrics for the various wealth effects of each method of divestiture. These results can be related to our model's predictions.

Our theory indicates that there are three regions of solutions as summarized in the Chart:

Private information		Third party acquirer synergies		
Parent	Subsidiary	Small	Medium	Great
positive	positive	SO	SP	AS
positive	negative	SO	SO	AS
negative	positive	SP	AS	AS
negative	negative	SS	SS	AS

Two regions exhibit a richness of choices among divestiture mechanisms and indicate that the type of divestiture method is related to parent and subsidiary asymmetric information. In contrast, the third region encompasses equilibria where the level of third party complementarities is sufficiently great that all divestitures necessarily take the form of a third party asset sale (AS); other private information is irrelevant to the choice of divestiture method.

Our analysis shows that a divestiture via a secondary stock offering is related to double negative information from both the parent and the subsidiary, and has three implications: (1) no third party buyer with sizable enough synergies is available; (2) subsidiary manager information

is not positive enough to trigger a SP; and (3) parent information is not positive enough to induce the parent (shareholders) to maintain ownership through a spin-off. Thus, at the announcement of a SS, the subsidiary's market price should fall. The fact that the parent is willing to divest the asset at a discounted price, implies that the parent benefits from the elimination of influence costs imposed by the subsidiary. Thus, the market value of the parent stub should increase at the news of the secondary offering.

A spin-off is chosen when the parent has positive information but third party buyer synergies are not large enough to compensate for subsidiary negative information. Thus, parent shareholders retain ownership in a subsidiary that is worth more than the proceeds that would be generated by a secondary stock offering. The fact that the parent is willing to spin off the asset, which generates no cash payment, implies that the benefits of the spin-off are due to the elimination of influence costs. As a result, at a spin-off announcement, parent stub value should increase. Moreover, the market reaction for the subsidiary should be more favorable than for a secondary offering.

The opportunity for a SP provides an appropriate incentive for subsidiary managers to disclose their private information. Such a purchase is necessarily associated with positive subsidiary information and occurs at a fair price. Thus, the positive reaction of subsidiary value to the announcement of a SP indicates the relevance of subsidiary manager information about the subsidiary's intrinsic value. The parent's benefit is in the form of a premium received for its subsidiary stake, and not necessarily from eliminating influence costs.

Third party asset sales occur in two circumstances. One, there is a third party acquirer that has synergies with the subsidiary that are sufficiently strong so as to make any considerations with respect to parent and subsidiary private information irrelevant. In this region an asset sale conveys no signal about parent and subsidiary private information, so the

subsidiary's market value should not be affected at the divestiture announcement. Two, there is a third party acquirer with intermediate levels of synergies and for which the subsidiary's private information is positive and the parent's is negative. In this setting, a positive market reaction to an AS indicates that the positive effect of the subsidiary's positive information is greater than the negative effect of the parent's information.

Overall, our empirical findings suggest that on average (1) the corporate environment is one where the synergies of potential third party acquirers are neither so large as to make asset sales the only appropriate divestiture method, with parent and subsidiary private information being irrelevant, nor so small as to make to make asset sales impossible; and (2) information that originates with subsidiary rather than parent managers entails the more relevant signal regarding the subsidiary's intrinsic value and influence costs.

The paper is organized as follows. The theoretical model is in Section 2. Section 3 develops the empirical implications of the theory. Section 4 discusses the development of a sample of divestitures of publicly traded subsidiaries and reports empirical findings related to the predictions of the model. Conclusions are in Section 5. Proofs are in the Appendix.

2. The model

We begin the analysis by considering two entities: the initial parent P and a subsidiary V, which is majority controlled but not wholly owned by the parent. The parent consists of two elements. First, the parent has full ownership of a set of operating assets W, which is termed the parent stub and denotes the parent's non-subsidiary operations. Second, the parent owns a majority stake in the subsidiary, that is, a proportion $\beta > 50\%$ of asset V, so ownership is shared with minority shareholders. Consistent with state corporation statutes, minority shareholders of the subsidiary are viewed as delegating to subsidiary managers the determination of actions that

are in their best interests and subsidiary managers' actions encompass their fiduciary responsibility, loyalty, and duty of care with respect to the best interests of the subsidiary, which include the interests of the minority shareholders. With the parent *P* in control of the subsidiary, the values of the parent stub and the subsidiary V are known and equal to w_0 and v_0, respectively. Thus, the initial wealth of parent shareholders is $w_0 + \beta v_0$.

At time 1, private information is available regarding the asset's future and its impact on the stub that induces the parent's decision to divest the asset. Namely, we denote with $\tilde{v}$ the random variable related to the subsidiary's ability to generate future cash flows, and with $d(\tilde{v})$, the effect that ownership of the majority stake β has on the value of the parent stub, that is, the net result of the industrial synergies between the assets of the parent *P* and the subsidiary, and the influence costs that result from efforts by managers of subsidiaries with poor prospects to affect parent organizational decisions to secure extra resources to protect the unit (Milgrom (1988), Milgrom and Roberts (1990), Meyer, et al (1992)). Influence costs represent real resources that are devoted to altering the distribution of gains rather than creating wealth, implying a loss in efficiency. We assume that $d(\tilde{v})$ is non-positive and increasing in $\tilde{v}$. Thus, the intrinsic value of the parent stub after the divestiture of the parent's full stake in the subsidiary becomes $\tilde{w} = w_0 - d(\tilde{v}) \geq w_0$. The lower the intrinsic quality of the asset $\tilde{v}$, the larger the gain $-d(\tilde{v})$ in the value of the parent stub that results from the divestiture.

If a third-party firm with complementarities *x* with the asset, buys the parent's majority stake β, the intrinsic value of the buyer's stub changes by $d(\tilde{v}) + x$. Depending on the level of these complementarities *x*, this amount can be positive or negative and encompasses any net synergistic effect on the buyer (that is, synergies net of influence costs for the buyer).

The information structure. We denote with $\left(\tilde{\Sigma},\tilde{\sigma}\right)\in\{H,L\}\times\{h,l\}$ the private information available at time 1. We assume that parent managers are informed about the realization of $\tilde{\Sigma}$ and subsidiary managers are informed about the realization of $\tilde{\sigma}$. Since managers act in the interest of shareholders, we shall refer directly to the "parent" and the "subsidiary". We make no assumption regarding what the parent (the subsidiary) knows about the realization of $\tilde{\sigma}$ (resp. $\tilde{\Sigma}$). In other words, $\tilde{\Sigma}$ represents what is surely known by the parent and possibly also known by the subsidiary, whereas $\tilde{\sigma}$ denotes what is surely known by the subsidiary and possibly, also known by the parent. Thus, our analysis applies whether or not the parent (the subsidiary) privately observes $\tilde{\sigma}$ (resp. $\tilde{\Sigma}$) in addition to $\tilde{\Sigma}$ (resp. $\tilde{\sigma}$). Third party acquirers and the public do not observe neither $\tilde{\Sigma}$ nor $\tilde{\sigma}$.

We adopt the convention that $\tilde{\Sigma}=H$ and $\tilde{\sigma}=h$ indicate positive news regarding the asset's value $\tilde{v}$ whereas $\tilde{\Sigma}=L$ and $\tilde{\sigma}=l$ indicate negative news.[5] Formally, let $v(\Sigma,\sigma) = E[\tilde{v}\,|\Sigma,\sigma]$, the expected value of $\tilde{v}$ for a given realization (Σ,σ) of private signals $\tilde{\Sigma}$ and $\tilde{\sigma}$; then, for $\Sigma\in\{H,L\}$ and $\sigma\in\{h, l\}$:

$$v(\Sigma, h) > v(\Sigma, l)$$

$$v(H,\sigma) > v(L,\sigma)$$

Denoting $d(\Sigma,\sigma) = E[d(\tilde{v})|\Sigma,\sigma]$, we then have

$$d(\Sigma, h) > d(\Sigma, l)$$

$$d(H,\sigma) > d(L,\sigma).$$

We assume that $\min\{ v(L,h) , v(H,l) \} \le v_0 \le \max\{ v(L,h) , v(H,l) \}$, implying that the disclosure of private signals affects the value of the divested asset in a non-trivial way. Depending on

[5] For simplicity we assume that parent and subsidiary private information is binomial. Assuming a larger number of possibles states would complicate the model without changing the main economic tradeoff underying our results.

whether $\tilde{\sigma}$ or $\tilde{\Sigma}$ is the more relevant signal, we distinguish two scenarios:

RS: The subsidiary is aware of the more relevant information:

$$v(H,l)<v_0< v(L,h) \text{ and } d(H,l) <d(L,h)$$

RP: The parent is aware of the more relevant information:

$$v(L,h)<v_0< v(H,l) \text{ and } d(L,h) < d(H,l)$$

Let $x^* >0$ and $x^{**} >x^*$ be two threshold levels of complementarities for a potential third party acquirer. Namely, x^* is such that $\beta v(H, h)=\beta v(L, h)+ d(L,h)+x^*$ and x^{**} is such that $\beta v(H, h)= \beta v(L,l) + d(L,l) + x^{**}$.

The divestiture procedure. At time 1, $\left(\tilde{\Sigma},\tilde{\sigma}\right)\in\{H,L\}\times\{h,l\}$ are realized and the parent recognizes that there is an expected benefit to be obtained by fully divesting its stake in the subsidiary. Divestiture can occur in two broad ways. Either the parent sells its stake to an acquirer entity or the shares are conveyed to dispersed investors. The second solution is always viable, through either a spin-off or a secondary stock offering, and both methods eliminate any net negative synergies $d(\tilde{v})$, i.e., the influence costs. In a spin-off, parent shareholders retain the parent's interest in the subsidiary, a stake that will generate a stream of cash flows whose present value is $\beta\tilde{v}$, while the proceeds to the parent from a secondary offering depend on the market's assessment of subsidiary value (which is contingent on news of the mandated filing announcement) and might differ from $\beta\tilde{v}$. In contrast, selling the parent's stake to a third party requires, first, that an acquirer with sufficiently strong complementarities is found, and second, that such a third party agrees to pay a price acceptable to the parent in an asymmetric information environment. These factors are not trivial. For example, consider a potential third party buyer whose level of complementarities with the subsidiary is $x>0$. If the buyer believes

that the parent and subsidiary both have negative information about the asset, the most the buyer will be willing to pay is $\beta v(L,l) + d(L,l) + x$, a sum that could be less than $\beta v(\Sigma,\sigma)$, the asset's value to parent shareholders in a spin-off.

The parent retains an agent or advisor that is tasked with facilitating the divestiture. More precisely, the roles of the agent are to advise the parent about, first, the search for a third party potential acquirer; second, how to credibly disclose private information when appropriate; and third, determining the appropriate method of divestiture and the terms of the proposed transaction. The agent is assumed to be a corporate advisor with a reputation for providing unconflicted advisory services that seeks to assure that all parties have no regret about a transaction and is paid an exogenously determined fee upon the completion of the divestiture. It is worth stressing that the agent has no institutional power to enforce any transaction. If a transaction is consummated, it is because each relevant party involved in the deal finds it in its interest. Furthermore, the agent does not know the realizations of $(\tilde{\Sigma},\tilde{\sigma})$; it is only aware that the parent is informed about $\tilde{\Sigma}$ and that the subsidiary is informed about $\tilde{\sigma}$.

We model the process as follows:

At $t = 2$, the parent and the subsidiary communicate to the agent their private signals $\tilde{\Sigma}$ and $\tilde{\sigma}$, respectively. We assume that the agent has no way to verify whether the parent and/or the subsidiary truthfully report their private information. At the same time, the agent participates in the search for a third party potential acquirer. We denote with $F(x)$ the probability that an acquirer whose industrial synergies are not larger than x is identified. We assume that the probability of identifying an acquirer with sufficiently strong complementarities is positive but less than one. Formally,

$$0 < F(x^*) < 1.$$

At this stage, the outcome of the search is observed by the agent, the parent, and the subsidiary, but it is not made public.[6]

At $t = 3$, the agent proposes a method for divesting the parent's stakeholding and suggests the terms of the transaction. This proposal depends on the parent and subsidiary information reported in $t = 2$ and that gleaned from the search for a third party buyer.

At $t = 4$, the relevant parties that are to be involved in the type of transaction suggested by the agent update their beliefs about $\tilde{v}$ and then decide whether or not to follow the advice of the agent and implement the proposed transaction.

As the agent's reputation and the payment of its fee are contingent on the relevant parties agreeing to the transaction that it proposes, the task of the agent can be seen as designing a direct mechanism that, given the outcome of the search for a third party buyer, generates a deal for any realization of the parent's and the subsidiary's private signals. This task entails finding a mechanism that is ex post incentive compatible and ex post individually rational.[7] Ex post incentive compatibility requires that no matter what a stakeholder believes is the other stakeholder's private signal, it is optimal for the stakeholders to always truthfully transmit their information to the agent given that they expect the other party to do the same. In other words, even if the agent cannot verify whether the parent and the subsidiary reported the truth, it is in the parent's and the subsidiary's self interests to truthfully report their information, even if they know that their information will be communicated to the other parties and will affect the outcome of the transaction.

Ex-post individual rationality implies that after learning the other party's private signal

[6] While the exact level of x might remain privately known by the potential acquirer, it can be easily shown that agent strategy can be fine tuned to guarantee it is always optimal for the acquirer to truthfully report to the agent whether $x<x^{*}$, $x^{*} \leq x \leq x^{**}$, or $x>x^{**}$.

[7] Ex post incentive compatibility is discussed by Holmstrom and Myerson (1983) and is often used to provide a more robust solution concept in mechanism design (Crémer and McLean (1985)).

and the structure of the deal suggested by the agent, it is in each party's best interest to follow the advice and engage in the deal. Thus, while the agent can only suggest the terms of the deal, the terms are chosen such that the parties do not regret completing the deal. Ex post mechanisms enjoy parsimoniousness and robustness because the agent only needs to extract the stakeholder's private signals. Knowledge as to what a stakeholder thinks about the other stakeholder's information plays no role. We assume that the agent is retained by the parent so within the class of ex-post mechanisms the agent will choose the one with greater parent shareholder profit.

It is worth stressing that our use of an agent-type description of the model is heuristic rather than being critical for the results. For instance, let us fix the information structure as described above and consider a process where there is no agent, but the parent uses other means to search for a potential third party buyer, investigate the subsidiary and its willingness to buy the parent's stake, and then proposes the terms of divestiture that interested parties can accept or decline. Then in any ex-post equilibrium of the game among parent, minority shareholders, third-party buyer, and dispersed investors, the mapping from the parent and subsidiary information and third party synergies into divestiture method should be the one described below in Proposition 1. In Proposition 1, we show that such an ex-post mechanism exists and that it involves the following divestiture methods that differ with respect to the identity of the buyer of the parent's stake in the subsidiary.

Spin-off (SO henceforth): The parent conducts a divestiture by distributing its shareholdings in asset V to parent shareholders through a pro rata non-cash dividend. In this case, the post-transaction wealth of the parent shareholders is

$$P_{SO} = w_0 + E[\beta\tilde{v} - d(\tilde{v}) \mid SO]$$

and the post-transaction value of the subsidiary for the minority shareholders is

$$S_{SO} = (1 - \beta)\, E[\tilde{v} \mid SO].$$

Secondary stock offering (SS henceforth): The parent sells its shares in the subsidiary to dispersed capital market investors in a public secondary seasoned stock offering. Let C_{SS} be the revenue from the sale of parent-held shares. Then the post-transaction value of the parent is

$$P_{SS} = w_0 - E[d(\tilde{v})| SS] + C_{SS}$$

Post-transaction value of the subsidiary for the minority shareholders is

$$S_{SS} = (1 - \beta) E[\tilde{v} | SS].$$

Subsidiary purchase (SP henceforth): The parent sells its stake in V to the subsidiary. The parent receives a payment of C_{SP} from the subsidiary, and the minority shareholders of the subsidiary gain full ownership of the asset V, with the subsidiary using its cash and/or debt to finance the purchase. The post-transaction value of the parent is

$$P_{SP} = w_0 - E[d(\tilde{v})| SP, C_{SP}] + C_{SP}.$$

The post-transaction value of the subsidiary is

$$S_{SP} = E[\tilde{v} | SP, C_{SP}] - C_{SP}.$$

Because the parent has a controlling interest in the subsidiary, corporation law views this method of divestiture as an interested party transaction that has a potential for bias with respect to the transaction terms. Thus, unlike the other divestiture methods, a subsidiary purchase requires approval by minority shareholders and must meet other legal provisions not applicable to other types of divestitures.[8]

Third-party asset sale (AS henceforth): The parent sells its stake in the subsidiary (without the participation of minority shareholders) to a third-party firm.[9] Industrial complementarities between the third party's assets and the subsidiary allow the buyer firm to

[8] More formally, a subsidiary purchase of the parent's interest is a form of interested party transaction in which a majority of directors can be deemed to stand on both sides of the transaction, triggering protective standards such as those specified in Weinberger vs. UOP, Inc. 457 A2nd 701 (Del. 1983).
[9] There is no shareholder vote, given the business judgment rule and a parent's right as shareholder to sell its shares.

utilize the subsidiary's resources more effectively than the parent. For this method of divestiture, the post-transaction value of the parent is

$$P_{AS}(x) = w_0 - E[d(\tilde{v}) | AS, C_{AS}(x)] + C_{AS}(x)$$

where $C_{AS}(x)$ is the price paid by an acquirer whose level of industrial complementarities with the asset is x. The post-transaction value of the subsidiary for the minority shareholders is

$$S_{AS} = (1 - \beta) E[\tilde{v} | AS, C_{AS}(x)].$$

The change in the value of the third-party buyer is

$$\Delta B_{AS} = E[\beta \tilde{v} + d(\tilde{v}) + x | AS, C_{AS}(x)] - C_{AS}(x).$$

Proposition 1: *Let $\{\Sigma', \sigma'\}$ be the information communicated by the parent P and the subsidiary S to the agent. The unique ex post incentive compatible and ex post individually rational direct mechanism involving divestiture methods SO, SP, AS and SS is:*

(a) If no third party potential acquirer with industrial complementarities $x > x^*$ is identified, then

- *If $\Sigma' = H$, the agent will suggest a spin-off of the parent's stake*
- *If $\{\Sigma', \sigma'\} = \{L, h\}$, the agent will suggest that the subsidiary buy the parent's stake for $C_{SP} = \beta v(L, h)$.*
- *If $\{\Sigma', \sigma'\} = \{L, l\}$, the agent will suggest a secondary stock offering of the parent-held shares. In this case, the proceeds of the stock offering will be $C_{SS} = \beta v(L, l)$.*

(b) If a third party acquirer with industrial complementarities $x^* \leq x < x^{**}$ is identified, then

- *If $\{\Sigma', \sigma'\} = \{H, h\}$, the agent will suggest that the subsidiary buy the parent's stake for $C^*_{SP} = \beta v(H, h)$.*
- *If $\{\Sigma', \sigma'\} = \{L, h\}$, the agent will suggest an asset sale of the parent's stake to a third party for $C^*_{AS} = C^*_{SP}$.*

- *If* $\{\Sigma', \sigma'\} = \{H, l\}$, *the agent will suggest a spin-off of the parent's stake.*
- *If* $\{\Sigma', \sigma'\} = \{L, l\}$, *the agent will suggest a secondary stock offering of the parent-held shares. In this case, the proceeds of the stock offering will be* $C^{*}_{SS} = \beta v(l, b) = C_{SS}$.

(c) If a third party acquirer with industrial complementarities $x \geq x^{**}$ *is identified, then the agent will suggest an asset sale of the parent's stake to such third party for* C^{**}_{AS}, *where* $\beta v(H, h) \leq C^{**}_{AS} \leq \beta v(L, l) + d(L,l) + x$.

The Chart below summarizes divestiture process outcomes depending on the level of synergies of the third party potential buyer and parent and subsidiary private information:

Parent Σ	*Sub* σ	*Case (a):* $x < x^{*}$	*Case (b):* $x^{*} < x < x^{**}$	*Case (c):* $x > x^{**}$
H	*h*	*SO*	*SP*	*AS*
H	*l*	*SO*	*SO*	*AS*
L	*h*	*SP*	*AS*	*AS*
L	*l*	*SS*	*SS*	*AS*

Let us develop the intuition for this structure. First, Case (c) occurs in the presence of potential third party buyers whose complementarities x with the subsidiary are sufficiently strong to make irrelevant for determining the divestiture method all considerations regarding the intrinsic value of the subsidiary $\tilde{v}$ and the influence costs $d(\tilde{v})$ it imposes. In this case the parent revenue from divestiture is maximized with an AS at a mutually profitable transaction price. While such a situation is possible, it can be regarded as unlikely for relatively large subsidiaries where it can be presumed that a priori uncertainty on $\tilde{v}$ is comparatively strong.

In Cases (a) and (b) parent and subsidiary information plays a crucial role for determining the divestiture method. Note that to induce truth telling from a party, the ownership in the subsidiary that this party retains after communicating positive information cannot be small in

comparison with the ownership associated with negative information. Since the minority shareholders increase their ownership only if the outcome is SP, it follows that the parent's stake will be sold to the subsidiary only if the subsidiary holds positive information. This consideration guarantees that subsidiary managers holding negative information are not tempted to report a positive signal to the agent. Similarly, since a spin-off is the only case in which the parent shareholders do not decrease their ownership in the subsidiary, a spin-off must be associated with positive parent information.

When both the parent and subsidiary have negative information, and no potential buyer with sufficient complementarities is identified (Case (a)), the only available divestiture method is a SS. As a consequence, even when a potential buyer with sizeable but not huge complementarities is present (Case (b)), a SS is the only viable transaction for double negative information. To see this point, note that if in Case (b) a SS were to be proposed in the presence of some positive information, say for $(\tilde{\Sigma},\tilde{\sigma}) = (H,l)$, then the market would rationally anticipate this situation, and the parent's revenue from a secondary offering would be strictly included between $\beta v(L,l)$, the subsidiary value when SS occurs in Case (a), and $\beta v(H,l)$, the subsidiary value when SS occurs in Case (b). However, in this instance the parent would prefer to spin off the asset when $(\tilde{\Sigma},\tilde{\sigma}) = (H,l)$. We conclude that a SS represents the last resort divestiture method and is adopted only in the presence of double negative information. Thus, the selling price in a SS must reflect this type of information and will be equal to $\beta v(L, l)$.

Given subsidiary negative information, a parent with positive information will prefer a SO to a SS. This result follows because a SO allows the parent to distribute to its shareholders subsidiary shares with an intrinsic value of $\beta v(H, l)$, whereas a SS generates proceeds of only $\beta v(L,l)$.

In the absence of a third party potential acquirer (Case (a)), a SP occurs when the subsidiary information is positive and the parent information is negative. The transaction price is fair and equals $\beta v(L,h)$. This logic guarantees that when the parent's information is positive, it prefers to spin off the asset and generate $\beta v(H,h)$ for its shareholders rather than selling its stake to the subsidiary for $\beta v(L,h)$. Note that the possibility of the subsidiary acquiring the parent's stake guarantees that the subsidiary has the correct incentive to reveal its information, information that when negative and concordant with the parent's information will trigger a SS.

When a third party buyer is present and its complementarities are sufficient in size to make an asset sale feasible but are below x^{**} (Case (b)), it becomes more profitable to associate a third-party asset sale with negative information for the parent and positive information for the subsidiary. Given third party synergies $x>x^{*}$, the selling price can achieve $\beta v(H,h)> \beta v(L,h)$. In the case of double positive information, the asset will be sold to the subsidiary at the fair price of $\beta v(H,h)$. To clarify this point, note that ex post incentive compatibility must hold, i.e., truth telling is optimal even if the parent knows the subsidiary's private information. Thus, parent revenue from an asset sale must equal the parent's revenue if it had reported different information; otherwise, the parent would report the signal generating the higher revenue regardless of its actual information. If an asset sale were to occur when the subsidiary has negative information and the parent has positive information, the resulting revenue to the parent could not exceed $\beta v(L, l)$, that is, the maximum revenue from a secondary offering, which occurs when both parties' information is negative. However, a parent would lose money by selling the asset at $\beta v(L,l)$ if it has a positive signal. Similarly, if an asset sale were to occur when both the parent and subsidiary have positive information, then SP would have to be associated with negative parent information. Because of ex post incentive compatibility, parent revenue from an

asset sale cannot exceed $\beta v(L,h)$, the maximum price the subsidiary is willing to pay in SP, given that such an outcome is related to the signal profile (L,h), but a payment of $v(L,h)$ is not sufficient for a parent with positive information.

3. Empirical implications

Note that prior to a divestiture the market value of the parent is $w_0 + \beta v_0$ and the total market value of the subsidiary is v_0. For a given divestiture method $M \in \{AS, SP, SS\}$ let C_M be the payment to the parent. We denote with $q(M) = C_M / \beta v_0 - 1$ the per share premium that is paid to the parent in a divestiture of type M. For $M \in \{AS, SO, SP, SS\}$, we denote as $r_v(M)$ the excess share price return on a subsidiary that is divested via method M. We denote with $r_w(M)$ the excess return on the value of the parent stub. The model implies that market reaction of parent and subsidiary stock prices to the announcement of a divestiture will depend on the method of divestiture and also on the market's belief about the level of potential acquirer synergies.

Let us first consider Case (b), i.e., an environment where the synergies of potential third party acquirers are neither so large to make an asset sale the only appropriate divestiture method, nor so small as to make an asset sale impossible. This case is interesting because it encompasses the full spectrum of the four alternative divestiture methods, with the choice of the method of divestiture depending on both parent and subsidiary information as well as third party synergies.

The largest increase in subsidiary value is realized when the subsidiary buys the parent-held shares. This divestiture method occurs when both the parent and subsidiary have positive private information about the subsidiary, so the increase in the market value of the subsidiary reflects this dual positive information, implying $r_v(SP) > 0$. The price paid to the parent for its stake in the subsidiary is consistent with this high subsidiary value and hence $q(SP) = r_v(SP)$;

that is, the premium paid to the parent is equal to the return observed for subsidiary shares. Thus, the subsidiary pays a fair price for the parent's stake, and there is a large increase in subsidiary value that reflects the dual positive private information about the subsidiary conveyed by the transaction. As $-d(H,h)$ is small, the change in parent stub value is small because dual positive private information about the subsidiary implies that influence costs are small, that is $r_w(SP)$ is close to zero.

At the opposite extreme is the case of a secondary stock offering of the parent-held shares, which occurs when both parties have negative private information. In this instance, given this negative signal, subsidiary value falls sharply at news of the filing of the offering $r_v(SS)<0$. The proceeds that the parent will gain from the market-based sale of its shares will then reflect the dual negative information embedded in the decision to opt for a secondary stock offering. Hence, the per share discount (negative premium) the parent will receive will be negative and reflect the fall in the market value of the subsidiary: $q_v(SS) = r_v(SS)<0$. The negative information about the subsidiary implies that the influence costs imposed on the parent by the subsidiary, $d(L,l)$, are high, so the loss to the parent associated with the decline in the value of its subsidiary stake when the offering is announced is mitigated by the gain to the parent from eliminating the large influence costs. As $-d(L,l)$ is large, there is a large increase in the implied value of the parent stub from the expected elimination of the influence costs; i.e., $r_w(SS)>0$. Thus, despite the negative information about subsidiary value, there can be an increase in parent value.

Spin-offs and third-party asset sales represent intermediate situations that occur when the two private signals are discordant. Hence, the changes in subsidiary value associated with each of these transactions lie between the large decline in value at a secondary stock offering and the large increase in value at a subsidiary purchase. The sign of this change in a spin-off is opposite to that in an asset sale and will depend on whether subsidiary or parent information is the more

relevant (scenario RS or RP). Similarly, influence costs lie between the small magnitude associated with subsidiary purchases and the greater magnitude associated with secondary offerings. To induce truth telling by the parent, the revenue from the sale of its subsidiary stake to a third-party firm must be the same as in a subsidiary purchase, despite the lower value of the asset being sold to a third party, whereas the return on subsidiary value as a result of a spin-off should be above the premium (which is typically negative, i.e., a discount) in a secondary offering. These implications are summarized in the following Corollary:

Corollary 1*: If third party potential acquirer synergies are expected to belong to the interval* $[x^*, x^{**}]$ *then*

$$q(SS) = r_v(SS) < 0 \qquad (1)$$

$$r_v(SS) \leq r_v(SO) \qquad (2)$$

$$r_v(SP) = q(SP) = q(AS) > 0 \qquad (3)$$

Under RS:

$$r_v(SS) \leq r_v(SO) < 0 < r_v(AS) \leq r_v(SP), \qquad (4)$$

$$0 \leq r_w(SP) \leq r_w(AS) \leq r_w(SO) \leq r_w(SS) \qquad (5)$$

Under RP:

$$r_v(SS) \leq r_v(AS) < 0 < r_v(SO) \leq r_v(SP), \qquad (6)$$

$$0 \leq r_w(SP) \leq r_w(SO) \leq r_w(AS) \leq r_w(SS). \qquad (7)$$

Let us now consider Case (a), an environment where acquirers with sufficient synergies cannot be found. In contrast to Case (b), for a spin-off to occur there only needs to be parent positive information, which is reflected in a positive reaction of subsidiary value, $r_v(SO) > 0$. The influence costs imposed on the parent by the subsidiary must be greater than zero (otherwise

there would be no rationale for the parent to spin off the subsidiary), so the value of the parent stub will increase at the announcement of the spin-off: $r_w(SO)>0$. The subsidiary buys the parent-held shares when the subsidiary has positive information, whereas the parent's information is negative. Thus, the change in subsidiary value associated with a subsidiary purchase depends on whether parent or subsidiary information is the more relevant. As in Case (b), a secondary stock offering of the parent-held shares occurs when both parties have negative private information, so the market reaction to a secondary stock offering will be as in Case (b). These implications are summarized in the following corollary:

Corollary 2*: If third party potential acquirer synergies are expected to be smaller than* x^* *then*

$$q(SS) = r_v(SS) < 0 \leq r_v(SO), \qquad (8)$$

$$r_v(SP) = q(SP), \qquad (9)$$

$$0 \leq r_w(SO) \leq r_w(SS). \qquad (10)$$

Under RS:

$$0 < r_v(SP). \qquad (11)$$

Under RP:

$$r_v(SP) < 0. \qquad (12)$$

Finally, we consider Case (c). Here third party acquirer synergies are expected to be large enough to outweigh the effect of all uncertainties regarding the subsidiary's intrinsic value. Thus, irrespective of parent and subsidiary information, the asset will be divested through an asset sale. While the per share premium paid to the parent will be large $q(AS)= C_{AS}^{**}/v_0 - 1 \geq v(H,h)/v_0 - 1 > 0$, the transaction does not disclose any subsidiary or parent private information

regarding $\tilde{v}$; hence, $r_v(AS)=0$, i.e. the excess return on a share of subsidiary stock is nil.[10] Then we have

Corollary 3*: If third party potential acquirer are expected to be larger than* x^{**} *then*

$$0 = r_v(AS) < q(AS).$$

In broad terms, the literature suggests that the positive return to parents observed in previous studies of specific types of divestures can be attributed to an increase in subsidiary value (due to synergies or efficiency gains) or alternatively to an increase in parent stub value (reflecting the elimination of influence costs). Our model incorporates both factors as a basis for parent gains, and indicates that the positive returns to parents at divestitures can be disaggregated into a positive return to parent stubs that varies in magnitude (but not in sign) in accordance with the type of divestiture, and a return to the subsidiary that varies considerably in both sign and magnitude depending on the type of divesture and whether parent or subsidiary information is the more relevant. Thus, our empirical work is oriented primarily to generating estimates of the direction of the effect of alternative methods of divestitures on the value of the subsidiary to be divested, and secondarily on the magnitude of the positive return to the parent stub.

4. Empirical results

Sample development. Although our theory can be applied to the full spectrum of divestitures, a cogent feature is that the model disaggregates the parent return to a divestiture announcement into changes in value for the subsidiary and the parent stub, with the latter providing a measure of influence costs.[11] Since these metrics are not observable in divestitures of wholly-owned subsidiaries, we evaluate the effects of divestitures of publicly traded

[10] We also note that in the presence of a potential buyer with such strong synergies, a parent might be induced to sell an asset even if it does not impose influence costs. As a result, this case is the only one where the sign of the return to the parent stub need not necessarily be positive.

[11] As in other explanations of divestitures, our theory predicts the rise in parent value that is reported in empirical studies of each type of divestiture, so this prediction does not provide a satisfactory basis for evaluating our theory.

subsidiaries. We identify 545 publicly traded subsidiaries over the period 1973 to 2005 by examining proxy statements and press reports. We search through year-end 2010 for divestitures in which their parent firms fully divest such majority interests in one transaction. There are 153 such events in the final sample. [12] The data reported in Table I are measured prior to divestiture announcements.[13] Firm size (in constant dollars) and the percentage of parent firm value represented by its subsidiary holdings are calculated one week before the announcement. Transaction size relative to parent market value is similar across the types of divestiture. Subsidiaries trade as parent-controlled entities on average for 5.4 years. For each divestiture method, subsidiaries show normal stock price performance in the six-month period before the announcement.[14] We find no evidence of abnormal operating performance (not reported in the table) for each set of parents and subsidiaries, relative to their benchmark firms, for the three years prior to divestiture, using the methodology of Barber and Lyon (1996).

Alternative methods of divestiture: valuation effects. Our theory implies that a divestiture via a secondary offering is associated with double negative information so the value of the subsidiary should fall at the offering announcement (equations (1) and (8)). The negative information is associated with large $-d(\tilde{v})$ so parent stub value should increase at the offering announcement due to the elimination of influence costs (equations (7) and (10)). In calculating implied stub returns, parent-held subsidiary shares are valued at the transaction price for subsidiary purchases and third-party sales, and at the market price for spin-offs and secondary

[12] Divestitures that do not identify the buyer or disclose the transaction price, that are related to bankruptcy, or that result from regulatory or judicial mandate are excluded. We also exclude combination-type divestitures because they cannot be allocated to a single category.
[13] The data are obtained from the National Stock Summary, the Wall Street Journal, Factiva, Moody's Industrial Manuals, SEC filings, Standard and Poor's Stock Reports, and Lexis-Nexis.
[14] Excess returns are obtained using the market model, where day 0 is the initial divestiture announcement, the pre-event estimation period is -240 to -121, and the CRSP value-weighted index is used as the market return. The results are robust with respect to alternative event study methods and estimation periods.

stock offerings.[15]

In Table II there is a strong negative subsidiary return, -6.89% (t-statistic of -8.85). This decrease in subsidiary value is necessarily reflected in the premium (that is, a discount) the parent sustains in the offering since the shares are sold to the public at the market price that applies after the offering (filing) information is revealed. There is a significant increase in parent stub value, 3.98% (t-statistic of 3.75), implying a high level of influence costs, which is indicative of the high hurdle to selling such an asset to a third-party buyer. Given the decline in the value of the parent's subsidiary stake, the model's prediction about the direction of the change in parent value is ambiguous; i.e., there are differing signs for the subsidiary and parent stub returns. In our sample, the overall gain in parent firm value is 1.44% (t-statistic of 2.37).

Consistent with the theory, at subsidiary purchase announcements the two-day average excess return to subsidiaries is strongly positive, 7.36% (t-statistic of 7.89), and is significantly greater than the return at secondary offerings ($p = 0.00$). The subsidiary average return is close to the mean of the premiums (transaction price relative to undisturbed exchange market price) paid to parent firms, 7.16% ($p = 0.96$ for the difference), a finding consistent with equation (3) which postulates that in a subsidiary purchase the expected subsidiary return should equal the premium paid for the parent's stake. There is a non-significant effect on parent stub value, 0.53% (t-statistic of 0.49)), that is significantly smaller than the effect on the stub at secondary offerings ($p < 0.01$). This finding is consistent with equation (7) of Corollary 1, and indicates that the increases observed in parent values reflect the premiums received for the sale of subsidiary stakes rather than elimination of subsidiary influence costs. This result is consistent with the implications of Case (b) of the model and suggests that a subsidiary purchase is associated with

[15] The t-statistic for the parent stub tests the difference between the two-day parent excess return and the calculated return to the parent based on the null hypothesis that stub value remains unchanged at the divestiture announcement.

dual positive information about the subsidiary; hence, the low influence costs. The parent excess return is positive and significant, 1.85% (t-statistic of 2.59), and not significantly different ($p = 0.41$) from the parent return observed for divestitures via secondary offerings.

In the absence of a potential third-party acquirer with sufficient synergies to make an asset sale feasible, the model implies that a spin-off reflects positive information from the parent, independent of the subsidiary's information. When such a potential acquirer exists, divestiture by spin-off also occurs when there is mixed private information; specifically, negative information held by the subsidiary and positive information held by the parent (since the spin-off continues parent shareholder ownership). In this case, the sign of the change in subsidiary value (positive/negative) depends on which entity (parent/subsidiary) holds the more important information. We find the excess return to subsidiaries in spin-offs is negative and highly significant, -4.59% (t-statistic of -6.87). The negative result is consistent with Case (b) and suggests that the subsidiary holds the more relevant private information about subsidiary value (equation (4)). Consistent with equation (2) of Corollary (1), an implication of Case (b), the subsidiary return is more favorable at spin-offs than at secondary offerings ($p = 0.09$).

The strongly negative return to subsidiaries is not consistent with efficiency-type explanations for spin-offs (Hite and Owers (1983), and Schipper and Smith (1983)), where parent wealth gains are assumed to reflect an increase in subsidiary value. Instead, the positive return to parents, 3.83% (t-statistic of 7.61), is due solely to the large gains in parent stub value, 5.22% (t-statistic of 4.62). Thus, a spin-off conveys negative information about the subsidiary, but parent value increases because substantial influence costs are eliminated (as also occurs in a secondary offering). The parent stub return, the metric for influence costs, is not significantly different from secondary offerings ($p = 0.41$). The magnitude of influence costs explains why entities divested via a secondary offering or a spin-off are not good candidates for asset sales,

since a third-party acquirer would require such a high level of offsetting complementarities.

Our model implies that if third-party synergies are sufficiently large, asset sales convey no informational signal about subsidiary value; the synergistic gains flow to the parent and the buyer. However, when third party synergies lie in the intermediate range, the model implies that third party asset sales occur when there is mixed private information; specifically, positive information held by the subsidiary and negative information held by the parent, so the sign of the change in subsidiary value depends on the relative importance of the two signals. For the third-party asset sales, the subsidiary return is significantly positive, 1.41% (t-statistic of 2.31). Thus, on average there is a positive signal about subsidiary value that is greater than at secondary offerings ($p < 0.01$) or spin-offs ($p = <0.01$) but less than at subsidiary purchases ($p <0.01$). These results are consistent with Corollary 1, suggesting that Case (b) describes the environment in which most divestitures occur. The positive subsidiary return is consistent with inequality (4) of Corollary (1) and, together with the negative subsidiary return at spin-offs, is consistent with the conclusion that in mixed signal cases, the subsidiary holds the more relevant information.

The effect on the parent stub in third-party sales is small and not significant, 0.35% (t-statistic of 0.30). Within the context of our model, this result suggests that influence costs are modest for subsidiaries divested via asset sales (given the positive signal about subsidiary value). Thus, the gains in parent value reflect premiums paid by third parties for the parent-held stakes and not the elimination of influence costs. This result is similar to subsidiary purchases and consistent with the inequalities (5) in Corollary (1). The average premium paid to parents, 7.61%, is not significantly different from the 7.16% average premium paid in subsidiary purchases ($p = 0.94$), consistent with equality (3) in Corollary 1, which postulates that the parent

must be paid the same premium in subsidiary purchases and third-party sales.[16] The excess return to parents, 0.87% (t-statistic of 2.01), is similar to the 1% returns to sellers reported in prior asset sale studies (e.g., Rosenfeld (1984), Jain (1985), and Hite, et al (1987)).

Overall, the empirical findings are consistent with the predictions of the model for the region in which third party acquirer synergies are neither too small to prevent an asset sale nor sufficiently great to exclude all other divestiture methods. The signs of the market reactions at spin-offs and asset sales suggest that for mixed information cases the subsidiary holds the more relevant information. Our findings suggest that alternative divestiture methods convey differential information signals about subsidiary value and that the return to the parent stub, a gauge of the influence costs, differs significantly across divestiture methods.

5. Conclusions

Previous literature provides little guidance as to how a specific method of divestiture is chosen from among a menu of alternative transactions, nor is there any formal modeling to explain how the choice of divestiture method is related to subsidiary value. In this paper, we develop an information-based theory that provides a framework for analyzing this choice. In this theory, managers of the parent firm and managers of the subsidiary-to-be-divested have private information about the subsidiary's ability to generate future cash flows and to impose influence costs on the parent. There may also be positive net synergies available in the form of complementarities between the asset and a potential third party buyer. The theory maps various configurations of private information on to methods of divestiture and generates a tableau of share price effects for the subsidiary and the parent stub. We show how the level of expected net complementarities of a potential third party acquirer plays a role in obtaining a direct mechanism

[16] For the 16 third-party buyers with CRSP data, there is also a positive average excess return, 1.52% (t-statistic of 2.10) , which is consistent with the presence of synergies between subsidiaries and the assets of third-party buyers.

that generates a deal for any realization of parent and subsidiary private signals. We use this approach to analyze the effects of each type of divestiture on the values of the subsidiary, the parent, and the parent's non-subsidiary activities (the stub). The model predicts how the valuation effects of divestiture vary systematically by type of divestiture, and indicates that the change in value of the parent stub is a measure of influence costs. We obtain empirical evidence that can be interpreted within the framework of the model.

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Table I
Descriptive Statistics for Divestitures of Corporate Majority Interests in Public Subsidiaries

Descriptive statistics for divestitures of corporate majority interests in publicly traded subsidiaries, disaggregated into four types of transactions: subsidiary purchases of parent majority interests, sales of parent majority interests to unaffiliated third parties (without a tender offer to minority shareholders), secondary seasoned stock offerings, and spin-offs; controlled subsidiaries and parent firms are listed on NYSE, ASE, or Nasdaq during the period 1973 through 2005. Market value, reported in 1997 dollars, is calculated as the number of shares outstanding multiplied by stock price one week prior to the divestiture announcement. Parent ownership is the proportion of total subsidiary shares owned prior to the announcement. Years traded is the length of the period over which the controlled entities are publicly traded prior to the divestiture announcement. Data are obtained from Standard and Poor's Stock Reports and Guides, the National Stock Summary, proxy statements, and from articles from the Wall Street Journal, Dow Jones News Retrieval, and Lexis-Nexis. Cumulative excess returns in percent for the period prior to announcement are obtained using the market model where the excess return is the difference between the arithmetic return and the conditional expected return, derived as the prediction value obtained from a least squares regression estimated over the pre-event period, -240 to -121, where day 0 is the date of the initial public report of the transaction.

	Subsidiary Purchase Mean (Median)	Sale to Third party Mean (Median)	Secondary Offering Mean (Median)	Spin-off Mean (Median)
Market Value (1997, m.)				
Subsidiary	262.6 (72.6)	365.9 (47.8)	974.3 (652.7)	1525.4 (518.1)
Parent	3231.5 (913.3)	2641.2 (505.5)	8480.3 (3205.7)	4931.3 (1062.6)
Parent Ownership	56.4% (52.0%)	61.0% (55.5%)	55.6% (53.0%)	70.6% (80.0%)
Parent Stake/Parent Market Value	21.10% (12.9%)	14.2% (8.8%)	23.2% (12.1%)	38.8% (36.5%)
Years Traded	6.4 (5.5)	6.4 (4.0)	4.5 (3.3)	4.6 (2.5)
Pre-event Return (-120, -2)				
Subsidiary	-0.49%	1.40%	-9.14%	-2.24%

Table II
Excess Returns to Subsidiaries, Parents, and Parent Stubs by Type of Divestiture Method

Two-day excess returns, in percent, to subsidiaries, parent firms, combined excess returns, and returns to parent stubs (the non-subsidiary operations of parents) at announcements of divestitures of corporate majority interests in public subsidiaries, by type of divestiture transaction: subsidiary purchases of parent majority interests, sales of corporate majority interests to unaffiliated third parties (without a tender offer to minority shareholders), secondary seasoned stock offerings, and spin-offs. Subsidiaries and parent firms are listed on NYSE, ASE, or Nasdaq during the period 1973 through 2005. Day 0 is the date of the initial public report of the transaction. Excess returns are estimated using the market model where the excess return is the difference between the arithmetic return and the conditional expected return, derived as the prediction value obtained from a least squares regression estimated over the pre-event period, -240 to -120. Combined returns are defined as parent returns plus gains to minority shareholders scaled by parent firm value. Parent stub returns are obtained by valuing the parent's majority interest at the transaction price for subsidiary purchases and third-party sales and at the market price for spin-offs and secondary stock offerings. Also reported are the sample size, N, the median return, and the proportion of returns that are positive. Statistical significance for the mean is obtained using the t-statistic for the 2-day excess return, and the Wilcoxon signed ranks test for the median return, and is indicated by * at the 10% level, ** at the 5% level, and *** at the 1% level. The t-statistic for the parent stub mean return is a test of the difference between the observed two-day excess returns to the parent and the calculated returns to the parent based on the null hypothesis that the value of the parent's non-subsidiary operations remains unchanged in response to an announcement of the divestiture.

	N	Mean Return	t-statistic	Median Return	% Positive
Subsidiary Purchase					
Subsidiary	26	7.36%***	(7.89)	5.39%***	0.81
Parent	23	1.85%**	(2.59)	1.40%**	0.61
Parent Stub	22	0.53%	(0.49)	-0.02%	0.50
Sale to Third Party					
Subsidiary	36	1.41%**	(2.31)	1.00%	0.56
Parent	36	0.87%**	(2.01)	0.89%*	0.61
Parent Stub	32	0.35%	(0.30)	-0.10%	0.47
Secondary Offering					
Subsidiary	32	-6.89%***	(-8.85)	-6.96%***	0.06
Parent	40	1.44%**	(2.37)	0.86%*	0.63
Parent Stub	30	3.98%***	(3.75)	4.33%***	0.80
Spin-off					
Subsidiary	44	-4.59%***	(-6.86)	-4.03%***	0.11
Parent	39	3.83%***	(7.61)	2.99%***	0.79
Parent Stub	39	5.22%***	(4.64)	3.60%***	0.82

Appendix

Proof of Proposition 1: Consider first the simplest case: a potential acquirer with complementarities x larger than x^{**} has been identified. Then it is unambiguous that the complementarities are sufficiently strong that an asset sale can occur at price C^{**}_{AS} regardless of what the buyer thinks about the parent and subsidiary private signals. Thus, in this case the choice to divest with an AS discloses no information to the third party buyer or to the public.

Consider now Cases (a) and (b). For a given message profile $\{\Sigma,\sigma\}$, let $(\beta^*_{\Sigma,\sigma}, c^*_{\Sigma,\sigma}, B^*_{\Sigma,\sigma}, C^*_{\Sigma,\sigma})$ and $(\beta_{\Sigma,\sigma}, c_{\Sigma,\sigma}, B_{\Sigma,\sigma}, C_{\Sigma,\sigma})$ be the deal proposed by the agent depending on the presence of a potential acquirer with complementarities that are between x^* and x^{**} or smaller than x^*, respectively. Here $\beta_{\Sigma,\sigma}$ and $\beta^*_{\Sigma,\sigma}$ represent the post-deal ownership of parent shareholders in the asset V, whereas $c_{\Sigma,\sigma}$ and $c^*_{\Sigma,\sigma}$ denote the cash received by the parent. Similarly, for the minority shareholders $B_{\Sigma,\sigma}$ and $B^*_{\Sigma,\sigma}$ represent the post-deal ownership in the asset V, whereas $C_{\Sigma,\sigma}$ and $C^*_{\Sigma,\sigma}$ denote the cash received. The change in the value of the parent stub $d(\tilde{v})$ materializes only if the parent fully divests its participation in the asset, which would imply $\beta_{\Sigma,\sigma} = 0$ and $\beta^*_{\Sigma,\sigma} = 0$. However, influence costs can also be eliminated through a spin-off, a pro-rata distribution of the parent's participation in the subsidiary to the parent's dispersed shareholders. Thus, we must add the additional constraint $\beta_{\Sigma,\sigma} \in \{\beta, 0\}$ and $\beta^*_{\Sigma,\sigma} \in \{\beta, 0\}$, where $\beta_{\Sigma,\sigma} = \beta$ or $\beta^*_{\Sigma,\sigma} = \beta$ corresponds to a spin-off and $\beta_{\Sigma,\sigma} = 0$ or $\beta^*_{\Sigma,\sigma} = 0$ corresponds to the other divestiture methods. This structure imposes a constraint on the possible values of $B_{\Sigma,\sigma}$ and $B^*_{\Sigma,\sigma}$ that will equal 1 for a subsidiary purchase and $1 - \beta$ otherwise. To summarize, the direct mechanism must satisfy $\beta_{\Sigma,\sigma} \in \{\beta, 0\}$, $B_{\Sigma,\sigma} \in \{1, 1-\beta\}$, $\beta^*_{\Sigma,\sigma} \in \{\beta, 0\}$, $B^*_{\Sigma,\sigma} \in \{1, 1-\beta\}$ for all $\Sigma \in \{H, L\}$ and $\sigma \in \{h, l\}$. Ex post implementation requires that, given any realization of the other party's signal, each party prefers to truthfully communicate its signal.

For all $\Sigma \in \{H, L\}$, $\sigma \in \{h, l\}$, $\Sigma' \in \{H, L\}$ and $\sigma' \in \{h, l\}$, the parent incentive compatibility constraints are

$$\beta_{\Sigma,\sigma} v(\Sigma,\sigma) - d(\Sigma,\sigma) + c_{\Sigma,\sigma} \geq \beta_{\Sigma',\sigma} v(\Sigma,\sigma) - d(\Sigma,\sigma) + c_{\Sigma',\sigma} \tag{1.A}$$

$$\beta^*_{\Sigma,\sigma} v(\Sigma,\sigma) - d(\Sigma,\sigma) + c^*_{\Sigma,\sigma} \geq \beta^*_{\Sigma',\sigma} v(\Sigma,\sigma) - d(\Sigma,\sigma) + c^*_{\Sigma',\sigma} \tag{2.A}$$

in the absence and presence of a third party buyer, respectively. Similarly, the subsidiary incentive compatibility constraints are

$$B_{\Sigma,\sigma} v(\Sigma,\sigma) + C_{\Sigma,\sigma} \geq B_{\Sigma,\sigma'} v(\Sigma,\sigma) + C_{\Sigma,\sigma'}, \tag{3.A}$$

$$B^*_{\Sigma,\sigma} v(\Sigma,\sigma) + C^*_{\Sigma,\sigma} \geq B^*_{\Sigma,\sigma'} v(\Sigma,\sigma) + C^*_{\Sigma,\sigma'}, \tag{4.A}$$

in the absence and presence of a third party buyer, respectively.

Inequalities (1.A) and (2.A) imply the following constraints:

$$\beta_{H,\sigma} \geq \beta_{L,\sigma}, \text{ with } c_{H,\sigma} = c_{L,\sigma} \text{ if } \beta_{H,\sigma} = \beta_{L,\sigma}; \tag{5.A}$$

$$\beta^*_{H,\sigma} \geq \beta^*_{L,\sigma}, \text{ with } c^*_{H,\sigma} = c^*_{L,\sigma} \text{ if } \beta^*_{H,\sigma} = \beta^*_{L,\sigma}; \tag{6.A}$$

Inequalities (3.A) and (4.A) imply

$$B_{\Sigma,h} \geq B_{\Sigma,l}, \tag{7.A}$$

$$B^*_{\Sigma,h} \geq B^*_{\Sigma,l}, \tag{8.A}$$

Ex-post individual rationality requires that for all realizations of private signals the parties are willing to accept the agent's proposal. Since the parent can always guarantee $\beta\, v(\Sigma,\sigma) - d(\Sigma,\sigma)$ by opting for a spin-off, its participation constraints are

$$\beta_{\Sigma,\sigma} v(\Sigma,\sigma) - d(\Sigma,\sigma) + c_{\Sigma,\sigma} \geq \beta\, v(\Sigma,\sigma) - d(\Sigma,\sigma), \tag{9.A}$$

$$\beta^*_{\Sigma,\sigma} v(\Sigma,\sigma) - d(\Sigma,\sigma) + c^*_{\Sigma,\sigma} \geq \beta\, v(\Sigma,\sigma) - d(\Sigma,\sigma), \tag{10.A}$$

for all $\Sigma \in \{H, L\}$ and $\sigma \in \{h, l\}$. If (Σ,σ) is such that a subsidiary purchase is proposed, the

subsidiary's participation constraints are

$$B_{\Sigma,\sigma}\, v(\Sigma,\sigma) + C_{\Sigma,\sigma} \geq (1-\beta)\, v(\Sigma,\sigma), \tag{11.A}$$

$$B^{*}_{\Sigma,\sigma}\, v(\Sigma,\sigma) + C^{*}_{\Sigma,\sigma} \geq (1-\beta)\, v(\Sigma,\sigma), \tag{12.A}$$

If (Σ,σ) is such that a third-party asset sale is proposed, the acquirer participation constraint is

$$\beta v(\Sigma,\sigma) + d(\Sigma,\sigma) + x \geq C^{*}_{\Sigma,\sigma}, \tag{13.A}$$

We will show that by appropriately proposing each of the four divestiture methods described in Section 2, the agent can design a mechanism that is both ex-post individually rational and ex-post incentive compatible.

Constraints (5.A) and (6.A) imply that:

Remark 1: a spin-off must be related to the presence of parent positive information about the value of the asset.

Similarly, constraints (7.A) and (8.A) imply that:

Remark 2: a subsidiary purchase occurs only if the signal of the subsidiary reports positive information about the value of the asset.

Thus, when both the parent and subsidiary have negative information the transaction is either an asset sale or a secondary offering.

Let us consider first the case where no third party potential acquirer has been identified (Case (a)). Since an asset sale is not possible, Remarks 1 and 2 imply that in the case of double negative information, the asset must be divested with a secondary offering. Note that it is impossible for a secondary offering to be adopted when $(\Sigma,\sigma)\neq(L,l)$. To see this point, from among the values of (Σ,σ) leading to a SS, let (Σ',σ') be the one associated with the maximum $v(\Sigma,\sigma)$. If $(\Sigma',\sigma')\neq(L,l)$ then the proceeds from the SS are $C_{SS} = E[\tilde{v} \mid SS] < \beta v(\Sigma',\sigma')$, where the strict inequality follows from

the fact that with probability $F(x^*)>0$ there is no third party buyer and the SS is always associated with $(\Sigma,\sigma) = (L,l)$. However, for (Σ',σ') the parent is better off with a spin-off, which generates $\beta v(\Sigma',\sigma')>C_{SS}$, that is, the constraint (9.A) would be violated. This reasoning and Remarks 1 and 2 leave two candidate configurations for the direct mechanism proposed by the agent in the absence of a third party acquirer:

	$\Sigma = H$	$\Sigma = L$
$\sigma = h$	SP	SP
$\sigma = l$	SO	SS

Configuration 1

	$\Sigma = H$	$\Sigma = L$
$\sigma = h$	SO	SP
$\sigma = l$	SO	SS

Configuration 2

Consider first Configuration 1. It results that $\beta_{H,h} = \beta_{L,h} = 0$, and hence it must be that $c_{H,h} = c_{L,h}$ because of condition (5.A); that is, when $\sigma = h$, the parent's revenue must be the same for $\Sigma = H$ and for $\Sigma = L$. Let us denote this revenue as c. The parent participation constraint when $(\Sigma,\sigma)=(H,h)$ implies $c \geq v(H,h)$ whereas the subsidiary participation constraint $(\Sigma,\sigma)=(L,h)$ requires $c \leq v(H,l)$; thus a contradiction. Consider now Configuration 2. It corresponds to the one described in point (a) of the proposition. It is straightforward to see that for this configuration, all constraints (A.1), (A.3), (A.5) and (A.7) are satisfied only for the values of C_{SP} and C_{SS} detailed in the Proposition.

Now suppose that a potential acquirer with complementarities x between x^* and x^{**} has been identified (case (b)) and suppose that in the case of double negative information the asset is sold to this potential acquirer. This structure leaves three candidate configurations for the direct mechanism proposed by the agent:

	$\Sigma = H$	$\Sigma = L$
$\sigma = h$	SS	SP
$\sigma = l$	SO	AS

Configuration 3

	$\Sigma = H$	$\Sigma = L$
$\sigma = h$	SP	SS
$\sigma = l$	SO	AS

Configuration 4

	$\Sigma = H$	$\Sigma = L$
$\sigma = h$	SO	SP
$\sigma = l$	SS	AS

Configuration 5

Note that for each of these configuration SS is associated with $(\Sigma', \sigma') \neq (L, l)$ and this is impossible for the argument detailed above. Hence, suppose that a potential acquirer with complementarities x between x^* and x^{**} is identified and that in the case of double negative information the asset is divested with a secondary offering. This structure leaves three candidate configurations for the direct mechanism proposed by the agent:

	$\Sigma = H$	$\Sigma = L$
$\sigma = h$	AS	SP
$\sigma = l$	SO	SS

Configuration 6

	$\Sigma = H$	$\Sigma = L$
$\sigma = h$	SO	SP
$\sigma = l$	AS	SS

Configuration 7

	$\Sigma = H$	$\Sigma = L$
$\sigma = h$	SP	AS
$\sigma = l$	SO	SS

Configuration 8

We will show that, if potential acquirer complementarities x are not smaller than x^*, then only Configuration 8 is compatible with the parties' constraints (2.A), (4.A), (6.A), (8.A) and (10.A).

Consider first Configuration 6. It results that $\beta^*_{H,h} = \beta^*_{L,h} = 0$, and hence it must be that $c^*_{H,h} = c^*_{L,h}$ because of condition (6.A); that is, the parent's revenue must be the same in an AS and in a SP. Let us denote this revenue as c. For the subsidiary purchase, we have – $C^*_{L,h} = c^*_{L,h} = c$. However, the subsidiary participation constraint requires $c \leq \beta v(L, h)$ whereas the participation constraint for the parent in the asset sale is $\beta v(H, h) \leq c$, and these two inequalities are not compatible. Consider now Configuration 7. In this case, $\beta^*_{H,l} = \beta^*_{L,l} = 0$, and hence condition (6.A) implies $c^*_{H,l} = c^*_{L,l}$. We denote as c the parent's revenue when $\sigma = l$. Note that in the case of a secondary stock offering the parent's revenue cannot exceed the market value of its participation in V given the information impounded by the divestiture method. Because a secondary offering occurs only when $(\Sigma,\sigma)=(L,l)$, regardless of whether a third party buyer is identified, we have $c = c^*_{L,l} \leq E[\ \tilde{v}\ |SS\ ] = \beta v(L, l)$. However, the parent's participation constraint in an asset sale requires $\beta v(H, l) \leq c^*_{H,l} = c$. These two inequalities are not compatible. Consider now Configuration 8. Note that in this case $\beta^*_{H,h} = \beta^*_{L,h} = 0$, and hence it follows that $c^*_{H,h} = c^*_{L,h} = c$. In this case the subsidiary participation constraint in a subsidiary purchase requires $c \leq \beta v(H, h)$, the acquirer participation constraint in an asset sale requires $c \leq \beta v(L, h) + d(L, h) + x$, and the parent's participation constraint requires $\beta v(H, h) \leq c$ in the subsidiary purchase and $\beta v(L, h) \leq c$ in the asset sale. Thus, in order to satisfy all parties' participation constraints it must be that $c = \beta v(H, h)$, that is to say, $C^*_{SP} = C^*_{AS} = \beta v(H, h)$. This is acceptable for the third party buyer only if $C_{AS} \leq \beta v(H,h) + d(L,h) + x$, which requires $d(L, h) + x \geq \beta(v(H, h) - \beta v(L, h)$ and this condition is true only if the third party's complementarities x are larger than x^*.

Q.E.D.