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## Investor Protection and the Coasian View

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**Abstract**

Some legal regimes leave gaps in the protection provided by the law to firm investors. This paper considers the decision by a firm to opt out of the law and bridge those gaps using contracts. Examining the charters of a sample of Mexican firms, we find that private firms often enhance significantly the protection offered by the law to their investors, but public firms rarely do so. Motivated by these findings, we construct a model that endogenizes the degree of investor protection that firms provide, using as springboard the assumption that legal regimes differ in their ability to enforce *precisely filtering contracts*, namely, contracts that provide protection only in those cases where expropriation can occur. Our model generates predictions about the types of contracts that would be employed and the levels of investor protection that they would provide across different legal regimes in both private and in public firms.

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# 1 Introduction

Much evidence suggests that the level of investor protection provided by a legal system has important economic consequences. The higher is investor protection provided by the law, the more developed are the financial markets (La Porta et. al. 1997, 1999), and the faster is economic growth (King and Levine 1993, Beck et. al. 2000, Mahoney 2001).

This evidence is at odds with some basic theoretical considerations. A direct application of the Coase Theorem yields that, absent significant transaction costs, capital suppliers and users should negotiate, agree, and privately contract on the efficient level of investor protection, when that level is not provided by the law.[1] The possibility of filling in the gap left by the law by contractually "opting out" of it should, in principle, make the resultant investor protection efficient across all legal systems. This, in turn, should render immaterial the level of investor protection provided by the law, contrary to the findings.

This ostensible Coasian puzzle assumes, however, that different legal systems are equally adept at strict enforcement of contracts. A possible resolution to the puzzle then suggests that a legal system with low investor protection provided by law is associated with courts that are anemic in the enforcement of contracts that enhance investor protection (see Glaeser et. al. 2001, La Porta et. al. 1999, Djankov et. al. 2002).

We begin this paper by taking the previous argument to the testing ground of the Mexican legal system.[2] We first note that Mexican law provides scant protection to its investors and, therefore, leaves a need for contractual opting out to supply that protection privately. Now, if the Mexican legal system is also inept at enforcing contracts, then opting out of the law should rarely be observed; it would be of little use anyway. If, on the other hand, the Mexican legal system is adept at enforcing contracts, then opting out by private contracting should accompany virtually all types of capital supplied by investors to users. We find neither.

We construct a sample of firms that went public in the Mexican stock exchange from 1992 to 2000. For each firm in the sample, we examine the charter that was in effect at the time of the IPO and the charter preceding it.

We observe three regularities.

*First observation:* When privately held, over half the firms offer their investors significant protection beyond that provided by Mexican law. This is a clear manifestation of contractual opting out from the law. It also indicates reliance of the contracting parties on the Mexican courts to enforce those contracts.

[1] Easterbrook and Fischel 1991 provide an extensive discussion of this.

[2] Due to the natural importance of contractual opting out as a mechanism of improving investor protection, we do not deal with other means of achieving the same end, such as incorporation in a foreign country, international takeovers, or ADRs.

*Second observation:* When going public, virtually no firm provides significant investor protection to its public investors beyond that provided by the law. This seems to contradict the first observation. If supplemental private contracting of investor protection is needed in Mexico, and if the Mexican courts can be relied upon to enforce such contracts in private offerings, then why are similar contracts not written when Mexican firms go public?

*Third observation*: When providing protection to investors, the contingencies on which Mexican firms contract are relatively straightforward, especially when compared to U.S. investor protection contract provisions, which tend to be distinctly more intricate.[3] For example, Mexican firms employ simple financial restrictions on their behavior, while U.S. firms employ more sophisticated accounting based restrictions. Thus, whereas a Mexican firm would provide veto power to investors in cases of capital expenditures greater than a certain amount, a U.S. firm would include provisions that prohibit capital expenditures when the ratio of tangible to intangible assets falls below a certain level. Additionally, U.S. investor protection contracts employ inexplicit restrictions on firm actions that seem to rely on the courts' aptitude to enforce them judiciously in order to fulfill their protective purpose in a way that would not have been possible had those contracts, and therefore the courts, been restricted to consider only simple, explicit contingencies. By contrast, Mexican firms in our sample do not use similar inexplicit contingencies in their investor protection contracts. Instead, they contract on clearly delineated descriptions of firm behavior. To illustrate, U.S. firms would prohibit transactions with affiliates, unless their terms are at least as favorable as those that are obtainable in an arm's length transaction. On the other hand, when Mexican firms try to commit not to expropriate investors in sales that are unfavorable to the firm, they simply give veto power to investors in all transactions involving the sale or purchase of assets, brand names, technological know-how or patents.

Based on this motivational evidence, we present a model that endogenizes the degree of investor protection that firms provide in order to explain firm contracting behavior and to resolve the aforementioned Coasian puzzle. We consider a single agent, an insider, who initially wholly owns and controls a firm, through which he tries to raise equity from investors in order to finance a new project. To accomplish that, the insider may want to commit ex-ante not to expropriate investors ex-post by offering them an investor protection contract.

Rather than assume, as is commonly done in the literature, that legal regimes differ in the default level of protection that the law provides to investors, we assume instead that each regime is characterized by the set of contracts that it can enforce. Motivated by the observed difference in intricateness between U.S. and Mexican investor protection contracts, we assume that legal regimes differ in their ability to enforce *precisely filtering contracts*, i.e., those that provide

[3] For evidence on U.S. investor protection contract provisions see Berlin and Mester 1993, Kahan and Tuckman 1992, and Smith and Warner 1979.

protection only when it is necessary; in the eventualities that expropriation can occur, and only then.[4] A legal regime that is more adept at enforcing precisely filtering contracts will be said to have a higher filtering-precision.

For example, certain legal regimes can enforce a precisely filtering contract that provides rights to investors in all cases when "tunneling of assets occurs."[5] In other legal regimes, however, the only investor protection contract that is enforceable is that which provides rights whenever "assets are sold." This characterization of legal regimes according to their enforceable contract set is very much in the spirit of Coffee 2001, which refers to a "smell test" that courts in common law legal regimes can perform to detect expropriation, unlike civil law legal regimes that cannot.

Imprecisely filtering investor protection contracts may generate errors of two types. One type of error occurs when investors should have been protected by the contract, but are not; an underinclusion problem. The other type of error arises when investors are granted staying power over beneficial firm actions in eventualities when there is no danger of expropriation; an overinclusion problem. For example, a contract that, in order to protect investors, indiscriminately bars all sales of assets would prevent efficient ones as well.

Thus, with only imprecisely filtering contracts at his disposal, the insider faces a tradeoff in choosing the level of investor protection. On one hand, increasing investor protection generates two benefits: It increases the firm's pledgeable income, preventing possible ex-ante costs of underinvestment. It also reduces the extent of expropriation that, in and of itself, is assumed to be inefficient. On the other hand, increasing investor protection also generates costs by preventing the firm from taking efficient actions in some cases.[6]

We propose then that in a low filtering-precision legal regime, when *a small number of investors* provide capital *privately* to the firm, the insider, constrained to choose from a menu of imprecisely filtering contracts, would tend to offer to them contracts that are overinclusive. By doing so, the insider captures the attendant benefits without incurring the costs of preventing efficient actions due to the possibility of renegotiation that a small number of private investors presents. Once a situation arises in which the contract empowers investors to block the firm from taking an efficient action, renegotiation ensues, appropriate side-payments are made, and efficient actions are taken.

By contrast, when the number of investors is prohibitively large to allow successful renegotiation, as in a publicly held firm, the overinclusion cost associated with imprecisely filtering contracts remains. Insiders would then tend to shun overinclusion and they would tend to un-

[4] This assumption has by now been further corroborated through new evidence in Lerner and Schoar 2003.

[5] Johnson et. al. 2000 define tunneling as "the transfer of assets and profits out of firms for the benefit of those who control them."

[6] We use the term precisely filtering contract because it allows efficient actions while blocking expropriation.

derinclude instead. These implications of the model are consistent with our findings that firms in Mexico are more likely to provide rights to their private investors than to their public ones.

We use our model to predict cross country variation in investor protection provisions, like those aforementioned that are observed between Mexico and the U.S. We compare the types of investor protection contracts that are expected to be employed across different legal regimes for public and for private firms.

Our model implies that due to their inability to renegotiate contracts, public firms are disadvantaged by being constrained to using imprecisely filtering contracts, and hence the level of investor protection that they provide would be sensitive to the filtering-precision of the legal regime in which they operate. As filtering-precision decreases, the level of contractual protection provided by public firms will decrease as well. In contrast, since private firms are able to renegotiate their contracts, they find imprecisely filtering contracts to be good substitutes for precisely filtering contracts. Thus, private firms would tend to provide high levels of investor protection regardless of the filtering-precision of the legal regime in which they operate.

As the underlying filtering-precision of legal regimes would be difficult to observe directly, it is important to operationalize our theoretical predictions. First, our assumption about the variation in filtering-precision across different legal regimes should be reflected in a cross-country variation in the filtering-precision of contracts that firms actually use to provide protection to their investors.

Second, the level of contractual protection provided by public firms should be positively correlated with the filtering-precision of the contracts with which this protection is provided. That is, if we observe a legal regime in which public firms provide high levels of investor protection through private contracts, we would expect this protection to be provided through precisely filtering contracts. Moreover, while private firms should provide more protection to investors than public firms, the difference between the amount of investor protection provided by private firms and public firms should be smaller in legal regimes where precisely filtering contracts are employed.

To explain variation in investor protection provision by private firms, we introduce more structure in our model by considering the provision of effort by the insider. While the ability to renegotiate contracts solves all ex-post inefficiencies and hence allows all efficient actions to be taken, the use of renegotiable imprecisely filtering investor protection contracts would dampen the insider's ex-ante incentive to exert effort. The reason, in the spirit of Aghion and Tirole 1997, is that due to the power accorded to them by the imprecisely filtering contract over firm actions, investors would be able to extract during ex-post renegotiation some of the rents created by the insider's ex-ante effort. Essentially, investors are holding up the insider in those eventualities

where, although no expropriation occurs, the imprecisely filtering contract provides them with overinclusive rights.

Thus, when managerial initiative is important, an additional consideration is introduced when private firms decide what level of investor protection to offer. Providing protection through the use of imprecisely filtering contracts will increase the insider's pledgeable income and allow all efficient actions to be taken after renegotiation, but this comes at the cost of diminishing ex-ante insider effort. In private firms, it is no longer the case that withholding investor protection is dominated by providing it, regardless of the filtering-precision of the legal regime. Indeed, as the filtering-precision of the legal regime decreases, private firms will tend to provide less protection to investors. This is because as firms can employ only less precisely filtering contracts, investors' ability to extract rents by holding up the firm increases, and therefore the cost of insider effort reduction increases.

With this refinement of the model in mind, it is instructive to compare the disadvantage firms experience in raising capital along their lifetime when operating in low filtering-precision legal regimes. The model suggests that it is the young and the mature firms who would be particularly disadvantaged by the constraints of a low filtering-precision legal regime. Young firms will be disadvantaged because managerial initiative is likely to be of particular importance to them. But since the only way to increase their pledgeable income when raising capital is to provide investors with imprecisely filtering contracts, managerial initiative would be dampened. Mature firms would also be particularly affected in low filtering-precision legal regimes because the option of selling equity in the public markets, for example, for large additional capital expenditures or for diversification purposes, will be costly to them. This is due to their inability to renegotiate imprecisely filtering contracts with large numbers of investors.

On the other hand, the model suggests that during the middle of their life cycle, when the importance of managerial initiative decreases, firms will not be as disadvantaged when operating in low filtering-precision legal regimes. Indeed, by renegotiating imprecisely filtering contracts they do not suffer the loss of foregone opportunities, and since managerial initiative is of lower importance, its dampening is not as costly.

Therefore, in line with Rajan and Zingales 1998, the analysis has implications for the growth rate of firms in different legal regimes along their life-cycle. We predict that the growth rates of young firms and mature firms will be lower in countries with lower filtering-precision legal regimes, while the growth rates of middle-aged firms would not vary as much across legal regimes. Stated differently, the model suggests that firm demographics will vary across different legal regimes. In low filtering-precision legal regimes the distribution of firm size will be more heavily concentrated

on medium sized firms, while in higher filtering-precision legal regimes, this distribution will be more evenly spread out, with more weight on small and large firms.

### 1.1 Relation to existing literature

Much of the related research regarding the endogenous provision of investor protection by firms relates to the market for corporate control. This includes empirical studies such as Daines and Klausner 2001 and Field and Karpoff 2002, and theoretical studies such as Grossman and Hart 1988 and Bebchuk 1994. However, this branch of literature does not focus on the enhancement of investor protection through contractual opting out in legal regimes that provide lax investor protection.

Easterbrook and Fischel's 1991 classic treatment of the analysis of corporate law stresses the importance of the private provision of investor protection. In analyzing a firm's decision to provide investor protection, they refer to the cost of opportunistic holdup problems, exacerbated by large numbers of investors. They do not focus on the importance of the set of enforceable contracts in a legal regime as a determinant of the degree of protection that firms provide to their investors.

Ehrlich and Posner 1974 deal with the choice of promulgating legal rules as standards or bright line rules, focusing among other issues on the overinclusion costs associated with the use of such rules. As in our model, Coffee 1999 refers to these overinclusion costs as related to the choice of the degree of investor protection provided by firms. In addition, consistent with lower renegotiation costs, DeAngelo and DeAngelo 1994 provide evidence that private debt covenants are more restrictive than those of public debt in the United States. Unlike these studies, the focus of our paper is on the cross country determinants of the type of investor protection contracts that will be used and the level of protection that they provide, in both private and public firms.

Glaeser and Shleifer 2002 provide an historical explanation for the reason that legal regimes may differ in the set of contracts that their courts can enforce, discussing the different use of bright line rules and standards in common law and civil law legal regimes.

Finally, the financial contracting literature dealing with the costs and benefits of multiple creditors is related to our work in its focus on the problems arising in multi-party renegotiation (see, e.g., Bolton and Scharfstein 1994).

The paper proceeds as follows. Section 2 presents the motivational empirical evidence; based on it, section 3 presents the theoretical model of cross country firm contracting behavior; and section 4 concludes.

## 2 Empirical Evidence

Mexican law provides scant protection to investors. This is manifest in the low measure of protection offered by law to equity investors which places Mexico in the bottom 15% in the sample of 49 countries of La Porta et. al. 1998.[7] Therefore, when Mexican insiders join investors in writing their corporate charters of constitution that stipulate their governance, it should be expected that many will include opting out rules that aim to fill the gap between the existing and the optimal levels of investor protection.

In order to examine that, we assemble an initial sample comprising all the firms that went public between 1992 and 2000. Excluding financial and government owned firms leaves 63 firms.[8] By law, any firm undertaking an IPO in Mexico must file its charter of constitution and all modifications to it with the Mexican stock exchange (Bolsa Mexicana de Valores). For each firm in the sample, we look at the charter that was in effect just before the IPO. We call it the "private charter," as it provides rights to private investors. We also look at the charter that replaced the private charter at the time of the IPO. This charter provides rights to the public investors, and therefore we call it the "public charter."

We discard another 16 firms from the sample because information about them was lacking, leaving a final sample of 47 firms for which we have both the public and the private charters. In addition, our sample includes the ownership structure that was in effect at the time that each charter was written.

The analysis of contractual opting out in the private charters is aided by the fact that the distribution of the degree of investor protection beyond that provided by law is bi-modal in the sense that in almost all cases there is either a significant degree of opting out or no opting out at all.

The following is an example of a case in which the private charter provides additional investor protection (two other examples are included in Appendix A):

> In December 1996, GAMI Investments Inc., a subsidiary of Equity Group Investment Inc., purchases 8.3% of Grupo Azucarero Mexicano S.A. de C.V. for $25 million. GAMI Investments is issued a special class of shares — C shares. The charter states that a resolution in a shareholder meeting dealing with any of the following issues must be approved by the C shares:

[7] Mexico obtains a score of 1 out of 6 in their measure of equity protection. The average for countries with common law origin is 4, while for countries with French civil law origin it is 2.33. Mexico is part of the latter group. In June 2001, the Mexican law was reformed to provide additional protection to investors; firms in our sample were not operating under this new legal regime.

[8] Additionally, we did not include the single case in which a public firm spun-off a subsidiary.

- Merger or acquisition by Grupo Azucarero or any of its subsidiaries in one or more related transactions for an amount greater than $30 million

- Sale, rent, or transfer of more than 10% of Grupo Azucarero's or any of its subsidiaries' consolidated assets in one or more related transactions

- Share repurchase

- Modification to the charter

- Long term debt issuance

- Liquidation of the firm

- Removal or appointment of comptrollers or external auditors

- Voting shares of subsidiaries in any of the above issues

In addition, the C shareholders will appoint three members of the board, a majority of which must approve any board resolution dealing with the above issues.

We thus classify a firm as contractually opting out through its private charter when investors are provided substantial information and control rights, affording them redress against opportunistic insider behavior. These contractual opting out provisions include veto powers provided to specific classes; board representation; rights to appoint external auditors and comptrollers; supermajority attendance-quorum requirements and resolution-quorum requirements for shareholder meetings and board meetings; and supermajority requirements for resolutions dealing with specific cases such as capital expenditures, sale of assets, acquisitions, financing, compensation, general operational activities, and contract approvals.[9]

In addition, we examine ownership structures to identify firms with outside investors, because only those are expected to exhibit contractual opting out. We mark a firm as having outside investors if there are either two shareholders that do not belong to the same family, or else if no shareholder owns more than 95% of the shares. This is a very conservative criterion; a firm jointly owned by two brothers, say, one with 90% of the shares and the other with the remaining 10%, is still considered to have an outside investor.

We find that of the 47 firms in our sample, 39 had outside investors when they were privately held. Of these 39 firms, we find that 20—just over 50%—exhibit contractual opting out providing investor protection that is not granted by the law.

When those 47 firms went public, the private charters were replaced by public ones. In all but five of the those public charters, firms did not provide any protection to public investors beyond what was provided by law. Of those five firms, one firm provided significant additional

[9]There are six firms that provide only informational rights (mainly board representation to investors which would not have been provided by law). We do not classify these as cases of contractually opting out.

rights to its investors, two firms provided moderate levels of investor protection, while the final two provided negligible levels of investor protection.[10]

In sum, only one out of the 47 firms in our sample significantly enhanced the protection offered to its public investors through contractual opting out provisions, and two additional firms enhanced this protection in a non-negligible manner. Thus, while just over half of the private firms use contractual provisions to significantly enhance the protection offered to their investors, practically no public firm does the same for its public investors.[11]

These findings suggest that in a country where the legal system provides poor investor protection, firms do contractually opt out. Second, courts in such countries appear to be able to enforce at least some types of contracts that enhance investor protection.[12]

To gain further intuition about firm contracting behavior, it is instructive to compare the contracts found in our sample of Mexican firms to existing evidence on investor protection contracts used by firms in the U.S.[13] In general, it appears that U.S. contract provisions are far more complex than their Mexican counterparts, relying as they do on more sophisticated contingencies.

U.S. contracts often employ sophisticated accounting based restrictions on firm activities such as investment, asset sales, dividend payments and borrowing. For example, a provision might forbid an acquisition in which the post-acquisition ratio of intangible assets to tangible assets exceeds a certain level or might restrict dividend payments as a function of earnings. In contrast, Mexican contracts in our sample rely on straightforward value-based contingencies: a minority shareholder is provided power whenever an acquisition is conducted for an amount greater than a certain level, when capital expenditures exceed a certain level, or when the firm enters into a contract of a duration exceeding a certain minimum. Additionally, while a U.S. firm would place a limit on dividend payments which is based on firm earnings, a Mexican firm would provide power to minority shareholders in all cases of dividend payments.

[10] The charter of the first firm included significant investor protection provisions such as supermajority requirements and a right to arbitration according to the rules of the International Commerce Chamber. The charter of the second firm required a mandatory tender offer for 100% of the shares in case of a transfer of 51% of the shares, while the charter of the third firm stated that it would not lend or provide loan guarantees to its parents. The charters of the final two firms provided a single right stating that shareholders are not required to deposit shares prior to a shareholder meeting.

[11] We find that in most cases the outside investors of the private firms do not leave the firm when the firm goes public. Out of the aforementioned 20 private firms that provided significant investor protection, five firms still provide significant protection to their private investors in their public charters. We do not know whether the remaining 15 firms stripped their investors of their rights since it is quite possible that these rights were transferred to a private shareholders' agreement. It should be added that the possibility of a private shareholders' agreement only enforces our finding that contractual opting out does occur with private investors. Of course, private shareholder agreements cannot be written with public investors, so we observe all rights provided to these investors.

[12] An argument can be made that even though these contracts are written, they will not be enforced. The great detail within charters and the high variability between them seem to suggest otherwise. Furthermore, two firms out of the 20 that opt out allow the use of arbitration according to the rules of the International Chamber of Commerce for the enforcement of their charters. This would suggest that the remaining 18 firms choose to use Mexican courts for the enforcement of their charters.

[13] See Footnote 3 above for sources.

Further, U.S. contracts employ vaguely defined restrictions on firm actions, which when properly enforced by courts, enable firms to provide power to investors in complex contingencies which would be difficult to describe contractually. In contrast, Mexican firms in our sample do not employ similar vague contingencies, contracting instead on clearly delineated descriptions of firm behavior. Thus, while a U.S. contract might allow asset sales only in the course of normal business activity, a Mexican contract will provide veto power to minority shareholders whenever the firm sells more than a specified percentage of its assets, or whenever assets are sold for a value greater than a certain amount. Moreover, while a U.S. firm may place restrictions on affiliated transaction by demanding that they occur at terms which are at least as favorable as what could be obtained by an arm's length transaction, Mexican contracts provide power to minority investors in any purchase or sale of brand name, know how, or patent by the firm.

The finding that different contract provisions are used in the U.S. and Mexico may suggest that courts in different legal regimes differ in their ability to enforce contracts, and hence firms may be constrained to different sets of contracts when providing protection to their investors. In the next section we present a model motivated by these observations that endogenizes the choices of investor protection enhancement across different legal regimes in private and in public firms.

# 3 The Model

## 3.1 Setup

Consider a firm faced with an opportunity to invest in a positive NPV project. Choosing to invest an amount $I > 0$ in the project yields a return of $g(I)$, with $g' > 0$ , $g'' < 0$, $g(0) = 0$, and $g'(0) > 1$. We assume that the firm is cash constrained, so that any amount invested must be raised through outside equity.[14] For simplicity, we assume that the firm is initially wholly owned by a single agent, whom we call the insider. We also assume that all agents are risk neutral, that the discount factor is 1, and that capital markets are perfectly competitive.

After having sold the equity, the insider has the opportunity to expropriate firm funds. We assume, as is standard in the literature, that expropriation is wasteful and therefore inefficient (see Burkart et. al. 1997). Formally, we assume that the insider can divert a fixed fraction $s$ of the return, from which a part that is equal to a fixed fraction $c$ of the return is wasted.

We further assume that the insider can expropriate wealth from the firm only when he takes a certain action **A**, which, in itself, may well be efficient in some states of nature. For example, **A** could be the sale of firm assets, which is efficient in many situations, but also presents the insider with the opportunity to expropriate through the practice of tunneling. Formally, we assume that

[14] While we focus on equity financing, allowing the firm to raise external capital by issuing debt does not change the results.

with probability $p$ the action **A** is efficient, and if taken, it yields an additional positive gross return of $B$. To simplify the analysis, we assume that the insider cannot expropriate from the additional benefit $B$. Obviously, when the firm forgoes an efficient action it does not get the attendant benefit. We will call that the *cost of forgone opportunities*.

As a benchmark to the analysis that follows, we spell out the first best outcome of our model. Clearly, the first best level of investment $I^{FB}$ solves $g'(I^{FB}) = 1$. Next, since expropriation is inefficient, it never occurs in the first best outcome. Also, the first best outcome dictates that action A is taken whenever it is efficient. Finally, since, as we assume, capital markets are perfectly competitive, the insider captures the full NPV of the project, yielding him an expected payoff of $g(I^{FB}) - I^{FB} + pB$. Due to the simplifying assumption that the insider cannot expropriate from the additional benefit $B$, we make the assumption that $I^{FB} > pB$, so that the insider cannot raise and invest $I^{FB}$ by issuing equity against the benefit $B$.

We further assume that every legal regime is characterized by a different set of contracts that can be enforced in a court of law. In each regime, the only contracts that are used are from this set, which we call the enforceable contract set. This is relevant to the insider who may benefit from committing not to expropriate. In that case, the insider will offer to his investors a contract from the enforceable set describing the degree of protection he is ready to grant them.

We consider a continuum of legal regimes indexed by a filtering-precision parameter $\varphi$ that can take values between 0 and 1. In a legal regime with filtering-precision $\varphi$, courts can enforce what we term the $\neg\mathbb{EX}(\varphi)$ contract. This contract effectively bans expropriation altogether by restricting the insider's ability to act freely within the firm. However, the restriction may also have the undesired effect of preventing the firm from taking action **A** when it is efficient to do so. When enforcing $\neg\mathbb{EX}(\varphi)$, a court in a legal regime of filtering-precision $\varphi$ is adept at passing through, or filtering, an efficient action **A** with probability $\varphi$, so that the firm can take that action while still banning expropriation. Consequently, we will say that a legal regime is *more precisely filtering* than another, if its filtering-precision parameter is greater than that of the other. We will similarly say about the contract in the former regime that it is more precisely filtering than the contract in the latter regime.

In the extreme, in a regime with $\varphi = 0$, the only enforceable investor protection contracts are those that completely ban action **A**, efficient or otherwise. In the other extreme, in a regime with $\varphi = 1$, courts can verify when expropriation occurs, and can enforce contracts which specifically ban expropriation without banning the action **A**. For example, in a $\varphi = 0$ legal regime, the only contract that is enforceable is one that bans asset sales above a certain amount. On the other hand, a contract banning affiliated transactions at favorable conditions would only be enforceable at a higher filtering-precision legal regime. It should be noted that the set of enforceable contracts

changes with $\varphi$, which is reflected in the dependence on $\varphi$ of the formulation of the $\neg\mathbb{EX}(\varphi)$ contract.

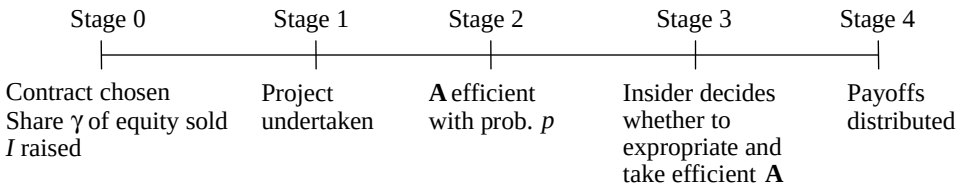
We assume that the insider may also choose not to offer investor protection at all. To ease notation, we identify this choice with the null contract that allows the firm to take the action **A** unfettered, and we designate it by $\mathbb{A}$. In sum, when operating in a legal regime with filtering-precision $\varphi$, the insider can choose between two contracts to provide investors: the $\neg\mathbb{EX}(\varphi)$ contract or the $\mathbb{A}$ contract.

Using this setting, we analyze an insider's optimal decisions in a public firm and in a private firm across legal regimes with different filtering-precisions. In a public firm, equity is sold to a dispersed group of atomistic investors, whereupon contract renegotiation is very difficult; it is ruled out in our model. In a private firm, on the other hand, equity is sold to a small number of investors—referred to in this paper as *the investor*—and therefore contracts can be renegotiated. Both in the case of a private firm and in the case of a public firm, we examine how the insider folds back the corresponding decision tree, and then compare and contrast the solutions.

### 3.2 Public firm

Consider an insider operating in a legal regime with filtering-precision $\varphi$. The timeline is shown in Figure 1, while the full decision tree is shown in Figure 2. At Stage 0, the insider decides whether to offer the $\mathbb{A}$ contract, or the $\neg\mathbb{EX}(\varphi)$ contract. He then offers for sale a share $\gamma$ of the firm to outside investors. Being competitive by assumption, the investors react by bidding for that share an amount $I$ that is equal to the amount that they expect to receive, which, in turn, is determined by the contract they are offered. This implies that the investors do not share in the project's NPV, which goes entirely to the insider. We will call that equality between the investors' payment and their return expectation, the *competitive financing constraint*. The insider decides to sell that share $\gamma$ of the firm that maximizes the NPV, which he fully captures, subject to the competitive financing constraint.[15]

**Figure 1.** The timeline




At Stage 1, the firm invests the $I$ it has raised in the project, and at Stage 2, Nature reveals whether taking action **A** is efficient or is not.

[15] The same is true in the other cases that we analyze below.

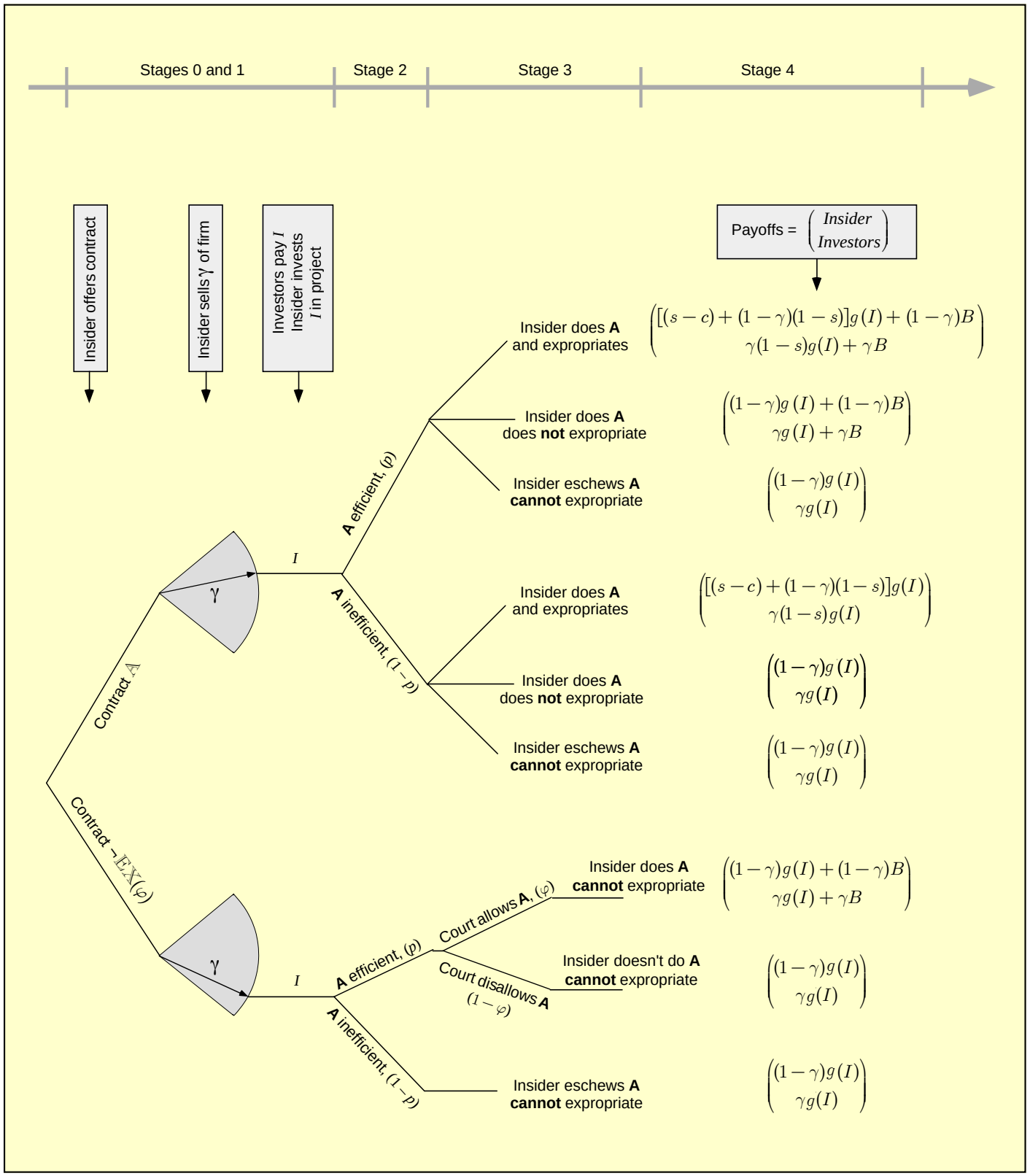



**Figure 2.** Insider's decision tree; public firm in a legal regime of filtering-precision $\varphi$. The Jensen-Meckling condition follows from comparing the insider's payoff on the uppermost branch to his payoff on the branch just below it.

At Stage 3, if no protection was offered via the contract $\mathbb{A}$ at stage zero, the insider can either take action **A** and expropriate from the returns; take **A** and not expropriate; or refrain from taking **A,** whereupon expropriation is impossible. If, on the other hand, contract $\neg\mathbb{EX}(\varphi)$ was signed, then the insider cannot expropriate. Also, using the $\neg\mathbb{EX}(\varphi)$ contract, when the action **A** is efficient, and can thus lead to an additional benefit of $B$, then with probability $\varphi$ the court can recognize that, and will allow the firm to take action **A** and reap the additional benefit. Finally, at Stage 4, the firm prorates the funds that remain to its insider and outside shareholders.

We solve this decision tree by backward induction. At Stage 3, after a history that includes having written the contract $\neg\mathbb{EX}(\varphi)$, and having sold a share $\gamma$ of the firm for $I$, the insider is barred from expropriation. When the action **A** is efficient, the court allows the firm to take the efficient action with probability $\varphi$, and bans it with probability $(1-\varphi)$. In the latter case, the firm would have liked to renegotiate the $\neg\mathbb{EX}(\varphi)$ contract in order to implement action **A,** but since the firm is public, it cannot do so. This is the cost of forgone opportunities imposed by the less than perfect filtering-precision of the legal regime. On the other hand, there is the benefit that the insider's commitment not to expropriate holds up, and the expropriation inefficiency is eliminated. The firm therefore earns in expectation $g(I)+p\varphi B$, and splits it; $(1-\gamma)(g(I)+p\varphi B)$ go to the insider, and $\gamma(g(I)+p\varphi B)$ go to the investors.

We recede now to Stage 0. Anticipating their share in the returns, the investors agree to pay $I=\gamma(g(I)+p\varphi B)$ for their share $\gamma$ of the firm. This competitive financing constraint makes $I$ a function of $\gamma$, and implies that the insider gets $(1-\gamma)(g(I)+p\varphi B)=g(I)-I+p\varphi B$; the whole NPV. The insider, therefore, selects a $\gamma$ that maximizes the NPV subject to the constraint, i.e. he solves the problem

$$\begin{aligned} &Max_{\gamma}\{g(I)-I+p\varphi B\} \\ &\text{s.t.}\ \ I=\gamma(g(I)+p\varphi B). \end{aligned} \tag{1}$$

Since no expropriation occurs under the $\neg\mathbb{EX}(\varphi)$ contract, the insider's pledgeable income is high, and hence we show that the insider will successfully raise and invest $I^{FB}$. Formally, we have

**Proposition 1** *In a public firm, in a legal regime with filtering-precision $\varphi$, when using the $\neg\mathbb{EX}(\varphi)$ to curb expropriation, the insider invests the first best amount, but takes action **A** when it is efficient only with probability $p\varphi$, and, therefore, the NPV falls short of the first best by $p(1-\varphi)B$, the cost of forgone opportunities.*

**Proof** See Appendix B.

To complete the solution of the decision tree, we go back to Stage 3 to the end of an alternative history that includes having written the $\mathbb{A}$ contract (instead of the $\neg\mathbb{EX}(\varphi)$ contract), and having sold a share $\gamma$ of the firm for $I$. The insider is then allowed to implement action **A**. The insider

actually implements action **A** whenever it is efficient, and, irrespective of its efficiency, exploits **A** to expropriate if and only if

$$\gamma > \frac{c}{s}. \tag{2}$$

This is the standard Jensen-Meckling condition that states that an agency cost arises only when the insider owns a small enough fraction of the cash flow.[16]

Receding now to Stage 0, we solve for the insider's optimal share $\gamma$ of the firm that he wants to sell. First, the insider has to maximize his expected payoffs by choosing $\gamma$ under two alternatives: (a) $\gamma \in (c/s, 1]$, whence the insider plans to expropriate at Stage 3; or (b) $\gamma \in [0, c/s]$, whence the insider plans *not* to expropriate at Stage 3. The insider then compares his maximal payoffs under the two alternatives, and selects the greater between the two by choosing its corresponding $\gamma$.

*Under alternative (a)*, the insider solves

$$\begin{array}{c} Max_{\gamma \in (\frac{c}{s}, 1]} \{(1-c)\, g(I) - I + pB\} \\ \text{s.t.} \;\; I = \gamma[(1-s)\, g(I) + pB], \end{array} \tag{3}$$

where the maximand is the insider's expected payoff, and the RHS of the competitive financing constraint is the expected payoff to the investors under the current alternative (a).

Expropriation is reflected in two ways in this maximization problem. First, the $(1-c)$ factor in the maximand represents the expropriation waste. Second, the competitive financing constraint becomes tighter. As reflected by the $(1-s)$ factor, investors know that they will be expropriated from. Therefore, they are willing to provide less financing (smaller $I$) for any given firm share $\gamma$. When $s$ is large enough, the tight financing constraint leads to an underinvestment problem.

*Under alternative (b)*, the insider solves

$$\begin{array}{c} Max_{\gamma \in [0, \frac{c}{s}]} \{g(I) - I + pB\} \\ \text{s.t.} \;\; I = \gamma[g(I) + pB], \end{array} \tag{4}$$

where the maximand and the constraint are the analogs of those in alternative (a). In this case, there are obviously no inefficiencies associated with expropriation, since it does not occur. However, the financing ability of the insider is limited by the fact that the fraction of the firm sold may not exceed $c/s$.

For the rest of the paper, we assume that the parameters of the model are such that the insider is led to select the optimal $\gamma$ in $(c/s, 1]$, i.e., that the more interesting alternative (a) obtains. The agency problem is then severe enough, so that selling a fraction $\gamma$ of the firm that

[16] Equation (2) follows from comparing the insider's payoff on the uppermost branch of Figure 2 to his payoff on the branch below it.

does not lead to subsequent expropriation causes a severe underinvestment problem.[17] We now have the following

**Proposition 2** *In the public case, when using the $\mathbb{A}$ contract, for all $p$ and $B$ there exists an $\overline{s}$ such that for $s > \overline{s}$ the insider raises an amount less than $I^{FB}$.*

**Proof** See Appendix B.

Proposition 2 and maximization problem (3) indicate that not providing investor protection to investors in a public firm (i.e., using an $\mathbb{A}$ contract) involves a cost and a benefit. The cost is the waste caused by expropriation (captured by the $(1-c)$ factor in the maximand of (3)) and the possible ex-ante cost of underinvestment. The benefit is that actions are taken whenever they are efficient, so that the insider captures the full value $pB$ associated with the efficient action.

Thus, in choosing between the $\neg\mathbb{EX}(\varphi)$ contract and the $\mathbb{A}$ contract at Stage 0, the insider faces the following tradeoff: Using the $\mathbb{A}$ contract allows implementation of efficient actions capturing the attendant benefits, but it causes an underinvestment problem when expropriation is severe enough, and also wastes resources through expropriation. By contrast, using the imprecisely filtering $\neg\mathbb{EX}(\varphi)$ contract allows an efficient level of investment without wasting resources through expropriation. However, this contract will occasionally also prevent the execution of efficient actions. This cost of the $\neg\mathbb{EX}(\varphi)$ contract, however, is decreasing in the filtering-precision $\varphi$ of the legal regime. As filtering-precision increases, courts are more adept at enforcing contracts which distinguish eventualities in which expropriation has occurred from those in which the insider is undertaking an efficient action, and hence the insider will be prevented from implementing the efficient action with smaller probability.

We thus have the following proposition.

**Proposition 3** *For every $p$, $B$, $s$ and $c$ there exists a filtering-precision threshold level $\varphi^* \geq 0$ which satisfies:*

*(i) For all $\varphi < \varphi^*$ the insider chooses the $\mathbb{A}$ contract at Stage 0.*

*(ii) For all $\varphi \geq \varphi^*$ the insider chooses the $\neg\mathbb{EX}(\varphi)$ at Stage 0.*

*(iii) $\frac{\partial\varphi^*}{\partial p} \geq 0$, $\frac{\partial\varphi^*}{\partial B} \geq 0$, $\frac{\partial\varphi^*}{\partial s} \leq 0$, and $\frac{\partial\varphi^*}{\partial c} \leq 0$.*

**Proof** See Appendix B.

Proposition 3 states that, on average, firms within higher filtering-precision legal regimes would provide higher protection to their investors through the use of more precisely filtering contracts.

[17] Formally, for all $s$ there exists a $\overline{c}$ such that for $c < \overline{c}$, the insider selects at Stage 0 a $\gamma$ greater than $c/s$. Thus, we require that $c$ is small enough compared to $s$, so that expropriation is relatively efficient. Clearly, with $c = 0$ (expropriation ex-post efficient) the insider would always want to expropriate, regardless of $\gamma$.

The intuition is that the payoff from choosing the $\neg\mathbb{EX}(\varphi)$ contract is increasing in $\varphi$, as the firm will be more likely to take the action **A** when it is efficient, while the payoff from choosing the $\mathbb{A}$ contract is independent of $\varphi$. Also, the comparative statics in part (iii) of the proposition are understood by the fact that the benefit of the $\mathbb{A}$ contract increases whenever (a) the expected benefit to taking the efficient action is greater, (b) the underinvestment problem due to expropriation is less severe, and (c) the waste associated with expropriation decreases.[18]

### 3.3 Private firm

The insider's decision tree in this case is similar to that of the public firm in the same regime, except for the all-important possibility of contract renegotiation that we insert in the decision tree at Stage 2.5, between Stages 2 and 3. The solution is again by backward induction.

Once again, consider a firm operating in a legal regime with filtering-precision $\varphi$. After a history that comprises $\neg\mathbb{EX}(\varphi)$, $\gamma$, and $I$, at Stages 0 and 1, and an efficient **A** at Stage 2, the insider and the private investor face a joint surplus of $B$. With probability $\varphi$, the efficient action **A** is allowed and the insider implements it. With probability $1-\varphi$ the action **A** is banned, but—unlike in a public firm—the insider and the investor can capture the surplus by renegotiating the $\neg\mathbb{EX}(\varphi)$ contract. Indeed, they optimally do. After they successfully renegotiate, assuming Nash Bargaining with power $\mu$ to the investor, they sign a new contract, which stipulates (i) that expropriation is generally still barred, but action **A** is allowed on the specific occasion at hand for capturing the surplus $B$, and that (ii) the investor shall get a share $\mu B$ from this surplus. In line with the incomplete contracting literature, we assume here that in contrast to when contracting ex-ante (at Stage 1), the use of action **A** in an efficient manner is verifiable ex post (see Hart 1995 for an extensive discussion).[19]

Effectively, the investor is relinquishing his right vis-a-vis the firm in return for a payoff. In doing so, he is providing slack in those cases in which the courts can only enforce a contract that is too stringent.

Finally, since the $\neg\mathbb{EX}(\varphi)$ contract bans it, the insider will never expropriates in this case.

[18] It is noteworthy that we assumed that when a firm awards a $\neg\mathbb{EX}(\varphi)$ contract to its atomistic public investors, they will, in fact, enforce it. This assumption needs some justification, as each small investor would prefer not to sue, when he bears the potentially substantial costs of doing so, while the benefits spread thinly to all other investors. One mechanism that can solve this free rider problem is the class action lawsuit. An alternative mechanism operates when investors accumulate shares at prices that do not fully incorporate the pending enforcement of the investor protection contract. This can be justified either by the assumption that shares can be accumulated secretly, or by the assumption that an accumulator can hide his order for shares within liquidity induced trades as in Kyle 1985. We provide the details in an earlier version obtainable from the authors.

[19] For example, while it is impossible to stipulate ex ante in a contract all the contingencies whereupon the sale of firm assets is efficient and the fair prices for such transactions, it *is* possible to describe and contract ex post on the efficiency and sale prices in a particular case, once it materializes.

Receding now to Stage 0, the insider solves

$$\begin{aligned} &Max_{\gamma}\ \{g(I) - I + pB\} \\ &\text{s.t.}\ \ I = \gamma g(I) + pB[(1-\varphi)\mu + \varphi\gamma], \end{aligned} \tag{5}$$

where the maximand is the insider's expected payoff (whole NPV), and the RHS of the competitive financing constraint is the expected payoff to the investor in the current situation.

Similar to the proof of Proposition 1, it can be shown that the solution of this maximization problem is $I^{FB}$, the first best level of investment. This, together with no expropriation and taking action **A** whenever it is efficient, implies

**Proposition 4** *Regardless of the filtering-precision of the legal regime $\varphi$, providing the $\neg\mathbb{EX}(\varphi)$ contract to investors in a private firm achieves the first best outcome, because that contract is renegotiated when necessary.*

**Proof** See Appendix B.

Back to Stage 3, but after an alternative history that comprises contract $\mathbb{A}$ (instead of $\neg\mathbb{EX}(\varphi)$), $\gamma$, and $I$; the situation is almost completely analogous to the case of the public firm in the same regime after the same history. We will assume then the interesting case in which the insider's optimal $\gamma$ falls in $(c/s, 1]$ , and therefore he would be expected to expropriate.

But he does not. The reason is that also in this situation, the insider and the investor can and do bargain over a surplus that is created as the investor convinces the insider not to expropriate and to save the associated waste $cg(I)$ for the benefit of both in return for a "bribe." Specifically, with Nash Bargaining, assuming a bargaining power of $\mu$ to the investor, the expected payoff to the investor is $\gamma(1-s)g(I) + \gamma pB + \mu cg(I)$, and to the insider it is $[(s-c) + (1-\gamma)(1-s)]g(I) + (1-\gamma)pB + (1-\mu)cg(I)$.[20]

Receding now to Stage 0. The insider solves

$$\begin{aligned} &Max_{\gamma}\ \{g(I) - I + pB\} \\ &\text{s.t.}\ \ I = \gamma(1-s)g(I) + \gamma pB + \mu cg(I), \end{aligned} \tag{6}$$

where the maximand is his expected payoff from the bargaining agreement, which is also equal to the whole NPV from the project, and where the RHS of the competitive financing constraint is the investor's expected payoff from the same bargaining agreement.

[20] To see this, note that if bargaining breaks down the insider expropriates and his outside option payoff is $[(s-c) + (1-\gamma)(1-s)]g(I) + (1-\gamma)pB$ in expectation, while that of the investor is $\gamma(1-s)g(I) + \gamma pB$. But if they *do* agree, then the total pie becomes $g(I) + pB$, which is larger than the sum of the disagreement payoffs by a surplus of $cg(I)$.

It is clear why the expropriated fraction $s$ would appear in the competitive financing constraint when expropriation materializes on the equilibrium path, as in (3) above. But here, expropriation never materializes on the equilibrium path. Nevertheless, $s$ plays a role in (6). The reason is that at the time of renegotiation, the insider still has the outside option (as a credible threat off the equilibrium path) to expropriate $sg(I)$ at the cost of wasting $cg(I)$. Thus, through renegotiation, the insider gets $(s-c)g(I)$ while dividing $cg(I)$ with the investor.

As $s$ increases, the insider's pledgeable income decreases, the financing constraint in (6) tightens, and an underinvestment problem arises. However, since no expropriation occurs, there is no ex-post waste of resources. Formally, we have that

**Proposition 5** *In a private firm, when using the $\mathbb{A}$ contract, there exists a $c^*$ such that for $c < c^*$, for all $p$ and $B$, there exists an $s^*$ such that for $s > s^*$ the insider invests an amount less than $I^{FB}$.*

**Proof** See Appendix B.

Proposition 5 states that whenever the expropriation problem is potentially severe (large $s$), providing no investor protection (using contract $\mathbb{A}$) generates an underinvestment problem. The requirement in the proposition for the expropriation technology to be efficient (i.e. a small $c$) stems from the competitive financing constraint in maximization problem (6): as $c$ increases, the insider's pledgeable income increases due to the funds that investors obtain in the renegotiation to avert expropriation. If $c$ is large enough, there will be cases in which the insider will be able to invest the first-best amount. Following from Propositions 4 and 5 is

**Proposition 6** *When selling securities to private investors, providing investor protection (using $\neg\mathbb{EX}(\varphi)$) weakly dominates not providing it at all (using the $\mathbb{A}$ contract). This dominance is strict when the $\neg\mathbb{EX}(\varphi)$ contract involves an underinvestment problem.*

**Proof** See Appendix B.

Proposition 6 is a direct result of the fact that regardless of whether protection is provided to private investors (under both $\mathbb{A}$ and $\neg\mathbb{EX}(\varphi)$), the firm takes the efficient actions, and expropriation never occurs. The difference is that the first best level of investment is achieved with imprecisely-filtering investor protection (the $\neg\mathbb{EX}(\varphi)$ contract), but an underinvestment problem may occur when investor protection is not provided (the $\mathbb{A}$ contract).

### 3.4 Solution Summary

The insider faces different tradeoffs when offering protection to investors depending on the filtering-precision of the legal regime in which he operates, and depending on whether equity

is sold to private or to public investors. An insider of a public firm, in a regime with filtering-precision $\varphi$, faces a tradeoff when deciding what investor protection to offer—imprecisely filtering protection (the $\neg\mathbb{EX}(\varphi)$ contract) or no protection at all (the $\mathbb{A}$ contract). Each has its own advantages and disadvantages. On the one hand, providing protection allows implementation of the first best level of investment and prevents expropriation and its associated waste, but it may preclude efficient actions and their attendant benefits. On the other hand, providing no protection at all entails the costs associated with expropriation—underinvestment and waste—but allows taking efficient actions more often than when the investors are protected, capturing their benefits. The optimal choice, to provide protection or not to do so, depends on the relative magnitudes of these effects. However, as the filtering-precision of the legal regime in which the firm operates increases, the loss of foregone opportunities associated with providing protection decreases since more precisely filtering contracts become available. Thus, the magnitude of the benefit of providing investor protection to public investors increases with the filtering-precision of the legal regime and hence more protection will be provided.

On the other hand, the insider of a private firm has a clear choice. Regardless of the investor protection he provides, either imprecisely filtering or none at all, due to the possibility of contract renegotiation, the firm eventually takes efficient actions and the insider does not expropriate. However, providing imprecisely filtering investor protection ($\neg\mathbb{EX}(\varphi)$) is more attractive, since providing no protection ($\mathbb{A}$) may lead to an underinvestment problem. The insider would therefore choose to provide protection through the $\neg\mathbb{EX}(\varphi)$ contract, and would do so regardless of the filtering-precision of the legal regime in which the firm operates.

This analysis explains our empirical findings in Mexico. Under the premise that the Mexican legal regime is of particularly low filtering-precision, firms can only offer investor protection contracts that filter very imprecisely (low $\varphi$). This premise is also consistent with the type of contracts that are employed by Mexican firms. In public firms the benefits of taking efficient actions will therefore tend to outweigh the costs of underinvestment and waste associated with expropriation, so that little investor protection will be provided. On the other hand, consistent with the model, firms will find it optimal to provide investor protection to their private investors even when constrained to the use of imprecisely-filtering contracts, since the possibility to renegotiate with private investors acts to supplement the deficient filtering capabilities of those contracts to allow taking of all efficient actions.

### 3.5 Predictions

Our model facilitates the comparison of the types of contracts that would be employed and the levels of investor protection that they would provide across different legal regimes in both private and in public firms.

Due to the possibility of renegotiation, private firms find imprecisely filtering contracts to be good substitutes for precisely filtering contracts. Thus, we predict that private firms would provide similar levels of investor protection in different legal regimes, but in doing so they would employ different types of contracts. As the filtering-precision of the legal regime in which the firm operates increases, they would use more precisely filtering contracts.

In contrast, public firms, which cannot easily renegotiate the terms of a contract in place, are disadvantaged when they are constrained to imprecisely filtering contracts, and therefore we predict that the level of investor protection provided by public firms would depend on the filtering-precision of the legal regime in which they operate, with more investor protection provided in higher filtering-precision legal regimes ($\varphi > \varphi^*$).

An alternative way to view our results is the following. Across all legal regimes, private firms would tend to provide more protection to investors than public firms. However, since the sensitivity of the level of investor protection to the filtering-precision of the legal regime is greater in public firms than in private firms, the difference in investor protection between private firms and public firms would be more pronounced in legal regimes which are less capable of enforcing precisely filtering contracts.

As the underlying filtering-precision of legal regimes would be difficult to observe directly, it is important to operationalize our theoretical predictions. First, our assumption that filtering-precision varies across legal regimes should be reflected in a cross-country variation in the filtering-precision of contracts that firms actually use to provide protection to their investors.

Second, the degree of contractual protection that public investors receive should be positively correlated with the filtering-precision of the contracts with which this protection is provided. That is, if we observe a legal regime in which public firms provide high levels of investor protection through private contracts, we would expect this protection to be provided through precisely filtering contracts. Further, while private firms should provide more protection to investors than public firms, the difference between the amount of investor protection provided by private firms and public firms should be smaller in legal regimes where precisely filtering contracts are employed.

Finally, we predict that if in a legal regime—denote it by X—public firms do not tend to provide protection to investors while private firms do provide protection, we would not expect to find a different legal regime—say legal regime Y—in which public firms provide protection

through contracts that are less precisely filtering than the contracts used in legal regime X. Indeed, such a finding would serve to contradict our theory: as we would conclude that legal regime X is more precisely filtering than legal regime Y, and yet we could not explain why public firms in legal regime X chose not to use the same imprecisely filtering contracts used by public firms in legal regime Y.

In testing these predictions, it is important to note that in order to streamline the analysis, our model assumes a perfect Coasian environment: the law does not provide investor protection by default, and all such protection is voluntarily provided through contracts. Thus, when analyzing the data, one would need to control for the default level of investor protection provided by the law in various legal regimes.

### 3.6 Insider Initiative

We have shown that private firms will always weakly prefer to employ the $\neg\mathbb{E}\mathbb{X}(\varphi)$ contract, and regardless of the filtering-precision of the legal regime in which the firm operates, these contracts allow the insider to obtain the first best outcome. This is so because private firms can renegotiate the imprecisely filtering investor protection contracts when the need arises, and can clear their strictures to achieve the same first best outcome that can be achieved with more precisely filtering contracts. We have used this observation to explain why under the low filtering-precision Mexican legal regime a large proportion of private firms provide investor protection, while public firms virtually do not, and to generate prediction regarding the cross-country use of investor protection enhancement contracts by firms. However, it remains to be explained why some private firms do not find it optimal to provide investor protection contracts, as we observe in our sample of Mexican firms.

To explain this observation, we introduce more structure into the model in the form of insider initiative. When the returns to the firm's actions are sensitive to the amount of effort that the insider decides to exert, his incentives will be dampened by the availability of only imprecisely filtering contracts, even when those can be renegotiated. In the spirit of Aghion and Tirole 1997 and Burkart et. al. 1998, this effect is due to a hold up problem, whereby the investor extracts some of the rents due to the insider's ex-ante initiative during the bargaining over the surplus created by allowing the firm to take an efficient action when an imprecisely filtering contract already in effect bans it. Therefore, in a low filtering-precision legal regime, a private firm would optimally provide investor protection when its returns are less sensitive to the insider's initiative; while another private firm, whose insider initiative is important enough, may find it optimal to withhold investor protection.

Formally, to model a private firm insider's initiative, we assume that at Stage 2 of the insider's decision tree there are a number of potential projects associated with the action **A**, which, initially, are indistinguishable to the insider, and from which the insider would only be able to select one. For example, the action **A** may be thought of as a strategic decision to acquire another firm, and each project then represents a different target.

We assume that with probability $(1-p)$ none of the projects are efficient, while with probability $p$, one and only one of the projects is efficient, and, when selected, yields an additional benefit $B$. To rule out the case where the insider would optimally choose to perform a project at random we assume that there is always a project which yields a payoff of $-\infty$.

We introduce an additional stage, 2.5, in which the insider can exert a nonverifiable effort $e \in [0,1]$ to obtain information about each project. We assume that when exerting effort $e$, the insider learns the value of all projects with probability $e$, while with probability $(1-e)$ the insider learns nothing. The cost of exerting effort $e$ is $\frac{1}{2}ke^2$, where $k$ parameterizes the cost of insider initiative. Stages 3 and 4 are similar to that in the model presented in the previous section.

At this point, it is useful to describe in greater detail the process of renegotiation between the insider and the investor before an efficient action is allowed to be implemented, in order to endogenize and compare the shares of the surplus captured by the insider when using different types of investor protection contracts.

Consider first the case of a private firm where no investor protection has been granted ($\mathbb{A}$), and where the more interesting Jensen-Meckling condition $\gamma > c/s$ holds. With probability $pe$ the insider knows the value of all projects and observes that one of them is efficient. Since the insider controls the firm, he decides whether to implement the efficient project by taking the action **A**. The insider can decide to be content with the extant sharing contract, take action **A**, and get $(1-\gamma)B$ out of its returns. On the other hand, the insider can decide to use his discretion to threaten the investor with not taking action **A** at all. We assume that in that eventuality the insider has enough bargaining power to extract $(1-\mu)B$ of the return to action A, leaving $\mu B$ to the investor, with $\mu \in [0,1]$. (When the bargaining protocol is a "take it or leave it" offer, and preferences are self regarding, then $\mu = 0$.) Therefore, the insider decides to renegotiate the extant sharing contract when $(1-\mu) > (1-\gamma)$. Hence, the insider share of the return to the efficient action **A** is $[1-\min(\gamma,\mu)]B$, leaving $min(\gamma,\mu)B$ to the investor.

With probability $(1-e)$ the insider does not become informed of the value of the projects, and as explained above, he chooses not to take any for fear of taking the project with $-\infty$ payoff, while with probability $e(1-p)$ the insider is informed of the value of each project but sees that none are efficient, and hence once again does not take any of them.

In addition, as in the original model, the insider will never actually expropriate, instead renegotiating with the investor over the surplus $cg(I)$ created by avoiding expropriation. The insider will therefore obtain a Stage 4 expected payoff of $[(s-c)+(1-\gamma)(1-s)]g(I)+[1-\min(\gamma,\mu)]peB+(1-\mu)cg(I)-\frac{1}{2}ke^2$. Anticipating this expected payoff, the insider will exert effort at Stage 2.5 satisfying $e=\min[\frac{[1-min(\gamma,\mu)]pB}{k},1]$

Therefore, at Stage 0, the insider will solve

$$\begin{gathered} Max_{\gamma}\ \{g(I)-I+peB-\tfrac{1}{2}ke^2\} \\ \text{s.t.}\ \ I=\gamma(1-s)g(I)+\min(\gamma,\mu)peB+\mu cg(I) \\ e=\min[\tfrac{[1-min[\gamma,\mu]]pB}{k},1]. \end{gathered} \tag{7}$$

Consider now the case of a private firm in a legal regime with filtering-precision $\varphi$, where investor protection has been granted through the $\neg\mathbb{EX}(\varphi)$ contract. Since the $\neg\mathbb{EX}(\varphi)$ bans it, the insider will never be able to expropriate. As in the case of the $\mathbb{A}$ contract, with probability $(1-e)+e(1-p)$ the insider will not undertake any additional project at Stage 3, either because he cannot distinguish between them or because he observes that they are all inefficient. With probability $pe$ the insider observes that one of the projects is efficient. Due to the contract provided to investors, with probability $\varphi$ the contract will allow the project to pass through (recall that all projects involve taking the action $\mathbf{A}$,) and so, similar to the case described above, the project will be taken, with $[1-\min(\gamma,\mu)]B$ going to the insider and $\min(\gamma,\mu)B$ to the investor. On the other hand, with probability $(1-\varphi)$ the contract bans the project, so that the insider must first renegotiate with the investor in order to clear the ban. Assuming the same bargaining powers as in the previous case, once renegotiation occurs and the project implemented, the insider's agreement share will then be $(1-\mu)B$ and the investor's will be $\mu B$.

Note that the investor gets at least as large a share of the return of the efficient project (when $\gamma\geq\mu$), and sometimes a strictly larger share of those returns (when $\gamma<\mu$) under the $\neg\mathbb{EX}(\varphi)$ contract relative to the share that he gets under the $\mathbb{A}$ contract.

The insider's expected payoff at Stage 4 will therefore be $(1-\gamma)g(I)+[\varphi(1-\min(\gamma,\mu))+(1-\varphi)(1-\mu)]peB-\frac{1}{2}ke^2$. The insider will thus exert effort satisfying $e=\min[\frac{1-\mu+\varphi(\mu-\min[\gamma,\mu])]pB}{k},1]$.

We have that at Stage 0, the insider will solve

$$\begin{gathered} Max_{\gamma}\ \{g(I)-I+peB-\tfrac{1}{2}ke^2\} \\ \text{s.t.}\ \ I=\gamma g(I)+[\varphi\min(\gamma,\mu)+(1-\varphi)\mu]peB \\ e=\min[\tfrac{[1-\mu+\varphi(\mu-\min[\gamma,\mu])]pB}{k},1] \end{gathered} \tag{8}$$

Since when $\gamma<\mu$, the insider extracts less of the expected returns of the efficient project under the $\neg\mathbb{EX}(\varphi)$ contract than under the $\mathbb{A}$ contract, the insider would exert less effort under

the former. In addition, when $\gamma \geq \mu$ the insider's share of the surplus is equal to $\mu$ both under the $\neg\mathbb{EX}(\varphi)$ and under the $\mathbb{A}$ contracts, and so he would exert the same level of effort in both cases. It follows that with respect to effort, *holding $\gamma$ constant*, the $\mathbb{A}$ contract weakly dominates the $\neg\mathbb{EX}(\varphi)$ contract.

On the other hand, as in the analysis without the effort consideration, the $\mathbb{A}$ contract involves a smaller pledgeable income as compared to the $\neg\mathbb{EX}(\varphi)$ contract, so that, *holding effort constant*, the insider would be able to raise any given amount of investment $I$ by selling a smaller fraction $\gamma$ to the investor under the $\neg\mathbb{EX}(\varphi)$ as compared to the $\mathbb{A}$ contract. Therefore, since insider effort is decreasing in the share $\gamma$ owned by the investor, it is not the case that effort exertion will always be higher under the $\mathbb{A}$ contract as compared to the $\neg\mathbb{EX}(\varphi)$ contract.

Also, as in the analysis in the original model in Section 2.3, the $\mathbb{A}$ contract involves underinvestment when $s$ is large enough. The insider will therefore trade off the underinvestment and the optimal effort effects when deciding which contract to offer to the investor. Indeed we have that

**Proposition 7** *For each set of parameters of the model, there exists a $\overline{\varphi} \geq 0$ such that for $\varphi < \overline{\varphi}$ the $\mathbb{A}$ contract dominates the $\neg\mathbb{EX}(\varphi)$ contract, while for $\varphi \geq \overline{\varphi}$ the $\neg\mathbb{EX}(\varphi)$ contract dominates the $\mathbb{A}$ contract. Also, for all $k > 0$, there exists an $\overline{s}$ and $\overline{\mu}$ such that for all $s < \overline{s}$ and $\mu > \overline{\mu}$ we have that $\overline{\varphi} > 0$.*

**Proof** See Appendix B.

Thus, once insider initiative is considered, the $\neg\mathbb{EX}(\varphi)$ contract will no longer dominate the $\mathbb{A}$ contract. Further, unlike in the base line model, private firms are no longer indifferent to the filtering-precision of the legal regime in which they operate, as precisely filtering contracts are required to curb expropriation without inhibiting insider initiative. Indeed, it is instructive to examine the disadvantage that firms experience in raising capital throughout their life cycle when operating in low filtering-precision legal regimes. The model suggests that it is the young firms and the mature firms that are particularly constrained in raising capital when operating in a low filtering-precision legal regime. Young firms are constrained because it is in those firms that managerial initiative is likely to be of particular importance, and since the only way to increase their pledgeable income is to provide investors with imprecisely filtering contracts, managerial initiative will be dampened. Mature firms are also particularly affected in low filtering-precision legal regimes, because the option of selling equity in the public markets, for example, for large additional capital expenditures or for diversification purposes, is costly to them. This is due to their inability to renegotiate imprecisely filtering contracts with large numbers of investors.

On the other hand, the model suggests that during the middle phase of their life cycle, when the importance of managerial initiative decreases, firms are not as disadvantaged when operating in low filtering-precision legal regimes. Indeed, by renegotiating imprecisely filtering contracts they do not suffer the loss of foregone opportunities, and since managerial initiative is of lower importance, its dampening is not as costly.

Taken together, the analysis has implications for the growth rate of firms in different legal regimes along their life-cycle, in line with Rajan and Zingales 1998. We predict that the growth rates of young firms and mature firms will be lower in countries with lower filtering-precision legal regimes. On the other hand, growth rates of middle-aged firms, or firms where managerial initiative is of lesser importance, will not vary as much across different legal regimes.

Alternatively, the above predictions can be recast in terms of the demographics of firm size across different legal regimes. We expect that in low filtering-precision legal regimes the distribution of firm size will be more heavily concentrated on medium sized firms, since, as described above, in these legal regimes, young, small firms would find it hard to raise capital while mature firms would find the option of going public to be more costly. By contrast, in higher filtering-precision legal regimes, we expect the distribution of firm size to be more spread out across both smaller and larger firms.

# 4 Conclusion

It has been demonstrated that the better is investor protection that is provided by law, the more developed are the financial markets and the faster is economic growth. However, if there exists some efficient target level of investor protection, then, from a Coasian perspective, suppliers and users of capital should achieve that level voluntarily by opting out from the law, signing contracts that fill in the gap between the default and the efficient levels of protection. In doing so, total levels of investor protection should become equalized across different legal systems, rendering immaterial the level of investor protection offered by law, contrary to the findings. A resolution of this Coasian puzzle that is offered in the literature suggests that legal systems that provide poor investor protection by law are also those that are incapable of enforcing contracts that enhance investor protection.

In this paper, we took this argument to the testing ground of the Mexican legal system, where the law provides poor investor protection. Looking at a sample of Mexican firms, we observe three regularities: First, when privately held, over half of the firms in the sample significantly enhance the protection offered to their investors through contracts. This finding indicates an expectation that such contracts can and would be enforced when necessary. Our second finding,

which seems at odds with the first, is that when going public, virtually no firm provides significant investor protection to its public investors beyond the default level provided by law. Thus, investor protection appears to be both necessary and enforceable by contracts, yet it is not provided by the public firm. Our third observation is that the contingencies on which Mexican firms contract are straightforward, especially when compared to U.S. investor protection contract provisions which seem to be far more complex.

In order to explain the Coasian puzzle in a way that is consistent with the Mexican experience and to explain firm contracting behavior across different legal regimes, we present a model that endogenizes the degree of investor protection that firms provide. At the base of the model is our assumption that legal systems differ in their ability to enforce precisely filtering contracts that provide protection in those cases where expropriation can occur and only in those cases. When only imprecisely filtering contracts can be enforced, a public firm faces a tradeoff in choosing the level of investor protection. On the one hand, increasing investor protection generates two benefits: It increases the firm's pledgeable income, preventing possible ex-ante costs of underinvestment. It also reduces the extent of expropriation that, in and of itself, is assumed to be inefficient. On the other hand, increasing investor protection also generates contract overinclusion costs by preventing the firm, at times, from taking efficient actions.

A private firm would face a similar tradeoff, except that due to its small number of investors, contract renegotiation becomes possible. Therefore, in those eventualities when investors' imprecisely filtering contractual rights would have prohibited the private firm from taking an efficient action, the parties would circumnavigate the problem by renegotiating the blocking clauses to allow taking of the efficient action. Thus, the overinclusion costs associated with provision of imprecisely filtering investor protection is greatly mitigated in a private firm relative to a public firm, and therefore, in a legal regime that can enforce only imprecisely filtering contracts, private firms would tend to provide imprecisely filtering investor protection more often than public firms.

Since the tradeoffs facing private and public firms when providing investor protection vary with the filtering-precision of the legal regime in which they operate, our model can be used to explain cross country variation in investor protection provisions. Our model implies that due to their inability to renegotiate contracts, public firms are disadvantaged by being constrained to using imprecisely filtering contracts, and hence the level of investor protection that they provide would be sensitive to the filtering-precision of the legal regime in which they operate. As filtering-precision decreases, the level of contractual protection provided by public firms will decrease as well. In contrast, since private firms are able to renegotiate their contracts, they find imprecisely filtering contracts to be good substitutes for precisely filtering contracts. Our model then implies that private firms would tend to provide high levels of protection to their investors regardless

of the filtering-precision of the legal regime in which they operate. However, as the filtering-precision of the legal regime in which the firm operates increases, they would use more precisely filtering contracts.

To explain variation in investor protection provision in private firms, we introduce managerial effort to the model. Our main result is that while the ability to renegotiate imprecisely filtering contracts solves the ex-post inefficiency, whereby some efficient actions are not taken, it does not solve the ex-ante inefficiency of managerial effort reduction. Thus, private firms in low filtering-precision legal regimes will face a tradeoff in their choice of investor protection provisions: using imprecisely filtering contracts increases pledgeable income but decreases managerial initiative.

Taking these effects into account, our model suggests that, when raising capital, operating in low filtering-precision legal regimes is particularly detrimental for young and mature firms. Middle aged firms, where the importance of managerial initiative has decreased and who have yet to require access to public capital markets, will not be as adversely affected.

On a more general level, our model suggests that a possible driving force behind the empirical findings relating the level of investor protection provided by law to economic variables, such as growth and financial market development, is the filtering-precision of the contracts that are enforceable in each legal system.

Finally, in future research, it may be useful to endogenize the reason for the difference in the enforceable contract set across legal regimes. One possibility would point to the importance of corruption in the legal system as a prime determinant of its filtering-precision. According to this, high filtering-precision contracts would be less "corruption proof" than low filtering-precision contracts. For example, bribing a judge not to enforce a straightforward contract that bans "all sales of assets" would be more difficult than bribing a judge not to enforce an interpretation prone contract that "prevents asset sales at terms worse than what could be obtained in an arms length transaction." Thus, as corruption in the legal system increases, its ability to enforce precisely filtering contracts deteriorates.

# Appendix A

**Investor Protection Provided to Private Investors: Additional Examples**

1. In November 1993, Bell Atlantic Latin America Holdings Inc. purchases 23.17% of Grupo Iusacell S.A. de C.V. It is issued a special class of shares — B shares. The charter states that any resolution taken in a shareholder meeting must be approved by the B class. In addition, the B class will appoint five out of the 17 members of the board. Any resolution taken by the board must be approved by at least one of these five members. Finally, the B class has the right to approve one of the three comptrollers of Iusacell.

2. Fondo de Optimizacion de Capitales S.A. de C.V. purchases 47.65% of Agro Industrial Exportadore S.A.de C.V. The requirement for a resolution in a shareholder meeting dealing with any of the following issues is raised from 50% to 76%:

a) Sale, rent, or transfer of any business or asset, tangible or intangible, in any non-customary transaction for an amount greater than 5% of the firm's asset value

b) Equity and long-term debt issuance

c) Share repurchase

d) Approval of the compensation of the board members and comptrollers

e) Approval of financial statements

f) Approval of dividend payment

g) Appointment of firm auditors

In addition, any board resolution dealing with any of the following issues must be approved by board members representing 76% of the shares:

a) Appointment removal and compensation of officers

b) Approval of annual budgets and business plans, as well as their modifications

c) Approval, modification, or renewal of any contract in which any shareholder is directly or indirectly involved

d) Approval of accounting procedures

e) Appointment of external auditors and their compensation

f) Sale, rent, or transfer of any business, property, or asset, tangible or intangible, in any non-customary transaction for an amount greater than 10% of the firm's asset value

# Appendix B

**Proof of Proposition 1** To solve the maximization problem we write the Lagrangian

$$\mathcal{L} = g(I) - I + p\varphi B + \lambda[\gamma(g(I) + p\varphi B) - I].$$

Clearly, at the optimum we have that $I > 0$ and $1 \geq \gamma > 0$. Thus, taking partial derivatives with respect to $I$ and $\gamma$ we obtain the two first order conditions

$$g'(I) - 1 + \lambda[\gamma g'(I) - 1] = 0$$

and

$$\lambda\gamma \geq 0, \text{with equality if } \gamma < 1.$$

We begin by checking whether $\gamma = 1$ is a solution to the maximization problem. Plugging $\gamma = 1$ into the F.O.C. with respect to $I$, we obtain that the solution must satisfy $g'(I^*) - 1 = 1$. On the other hand, from the competitive financing constraint we have that $g(I^*) + p\varphi B = I^*$, which, by the properties of $g(\cdot)$, implies $g'(I^*) < 1$. Thus, $\gamma = 1$ cannot be a solution to the maximization problem.

The remaining solution has $\gamma < 1$, and thus $\lambda = 0$. Plugging this into the F.O.C. with respect to $I$, we see that at the optimum $g'(I) = 1$, or $I = I^{FB}$.

**Proof of Proposition 2** With an $\mathbb{A}$ contract, when $s = 1$ the insider will suffer from an underinvestment problem, as he will be able to raise only $pB$, which by assumption is less than $I^{FB}$. The result then stems immediately from the fact that the insider's pledgeable income $(1-s)\,g(I) + pB$ is decreasing and continuous in $s$.

**Proof of Proposition 3** Define the value functions and Lagrangians associated with the maximization problems (1) and (3) to be:

$$\begin{aligned} V_1(p, B, \varphi) &\equiv Max_{\gamma}\{g(I) - I + p\varphi B\} \\ &\quad \text{s.t. } I = \gamma(g(I) + p\varphi B), \\ \mathcal{L}_1 &= g(I) - I + p\varphi B + \lambda_1[\gamma(g(I) + p\varphi B) - I], \end{aligned}$$

and

$$\begin{aligned} V_2(p, B, c, s) &\equiv Max_{\gamma \in (\frac{c}{s}, 1]} \{(1-c)\,g(I) - I + pB\} \\ &\quad \text{s.t. } I = \gamma[(1-s)\,g(I) + pB], \\ \mathcal{L}_2 &= (1-c)\,g(I) - I + pB + \lambda_2[\gamma[(1-s)\,g(I) + pB] - I], \end{aligned}$$

respectively.

By definition, the insider strictly prefers the $\neg\mathbb{EX}(\varphi)$ contract to the $\mathbb{A}$ contract if and only if $V_1(p,B,\varphi)-V_2(p,B,c,s)>0$. By the Value Function Theorem, we have that $\frac{\partial V_1}{\partial \varphi}=pB+\lambda_1\gamma pB=pB$ ,where, from the proof of Proposition 1, the last equality stems from the fact that $\lambda_1=0$. Thus, $\frac{\partial V_1}{\partial \varphi}>0$. Since, $\frac{\partial V_2}{\partial \varphi}=0$, we have that $\frac{\partial (V_1-V_2)}{\partial \varphi}>0$. By continuity of $V_1-V_2$, we have that there exists a $\varphi^*$ satisfying parts (i) and (ii) of the proposition.

In proving part (iii) of the proposition we assume for simplicity that $\varphi^*$ is strictly between 0 and 1, and thus satisfies $V_1(p,B,\varphi^*)-V_2(p,B,c,s)=0$. With this equation, defining $\varphi^*$ implicitly as a function of $s$, we have by the Implicit Function Theorem that $\frac{\partial \varphi^*}{\partial s}=\frac{\partial V_2}{\partial s}/\frac{\partial V_1}{\partial \varphi}$. Since $\frac{\partial V_2}{\partial s}=-\lambda_2\gamma s g(I)\leq 0$ (by the set up of the Lagrangian $\lambda_2\geq 0$), and $\frac{\partial V_1}{\partial \varphi}>0$, we have that $\frac{\partial \varphi^*}{\partial s}\leq 0$, as required. The proof of $\frac{\partial \varphi^*}{\partial c}\leq 0$ is similar.

Finally, from $V_1(p,B,\varphi^*)-V_2(p,B,c,s)=0$, by the Implicit Function Theorem we also have that

$$\frac{\partial \varphi^*}{\partial B}=\frac{\frac{\partial V_2}{\partial B}-\frac{\partial V_1}{\partial B}}{\frac{\partial V_1}{\partial \varphi}}.$$

Taking the partial of $\mathcal{L}_1$ with respect to $B$, we have that $\frac{\partial V_1}{\partial B}=p\varphi$ (recall that $\lambda_1=0$.) Taking the partial of $\mathcal{L}_2$ with respect to $B$ we have that $\frac{\partial V_2}{\partial B}=p+\lambda_2\gamma p$. Since by the setup of the Lagrangian, $\lambda_2\geq 0$, we thus have that $\frac{\partial V_2}{\partial B}-\frac{\partial V_1}{\partial B}\geq 0$, and therefore, since $\frac{\partial V_1}{\partial \varphi}>0$, we have that $\frac{\partial \varphi^*}{\partial B}\geq 0$, as required. The proof of $\frac{\partial \varphi^*}{\partial p}\geq 0$ is similar.

**Proof of Proposition 4** The proof that investment is at the first best level is identical to that of Proposition 1. Additionally, since in the case of a private firm the insider does not expropriate and takes the action **A** when it is efficient, the $\neg\mathbb{EX}(\varphi)$ contract achieves the first best outcome.

**Proof of Proposition 5** With an $\mathbb{A}$ contract, when $c=0$ and $s=1$ the insider will suffer from an underinvestment problem, as he will be able to raise only $pB$, which by assumption is less than $I^{FB}$. The result then stems immediately from the fact that the insider's pledgeable income $(1-s)\,g(I)+pB+\mu c g(I)$ is decreasing in $s$ increasing in $c$ and continuous in both of these variables.

**Proof of Proposition 6** This proposition is a direct result of Propositions 4 and 5.

**Proof of Proposition 7** The proof proceeds along the lines of that of Proposition 3. Defining the lagrangians of maximization problems (7) and (8) by $V_1(\varphi)$ and $V_2(\varphi)$ respectively, it is easy to see that $\frac{\partial V_1}{\partial \varphi}=0$ and $\frac{\partial V_2}{\partial \varphi}>0$. Thus, since the insider strictly prefers the $\neg\mathbb{EX}(\varphi)$ contract to the $\mathbb{A}$ contract if and only if $V_2(\varphi)-V_1(\varphi)>0$, by the continuity of $V_2-V_1$ we have that there exists a $\overline{\varphi}$ as described in the proposition.

To prove the second part of the theorem, consider the insider's maximization problem under the $\neg\mathbb{EX}(\varphi)$ and the $\mathbb{A}$ contracts at a legal regime with filtering-precision $\varphi = 0$. At the points $s = 0$ and $\mu = 1$, the insider strictly prefers the $\mathbb{A}$ contract to the $\neg\mathbb{EX}(0)$ contract. This is for two reasons. First, with $s = 0$, there is clearly no underinvestment when using the $\mathbb{A}$ contract. Second, with $\mu = 1$, under the $\neg\mathbb{EX}(0)$ contract the insider's effort level will be 0, while that under the $\mathbb{A}$ contract will be $\min[\frac{(1-\gamma)pB}{k}, 1]$. Since the first best level of effort is $\min[\frac{pB}{k}, 1]$ there will be underprovision of effort under the $\neg\mathbb{EX}(0)$ contract as compared to the $\mathbb{A}$ contract. Now for any set of parameters where the $\mathbb{A}$ contract is strictly preferred to the $\neg\mathbb{EX}(0)$ contract, we have that $\overline{\varphi} > 0$, since $V_2 - V_1$ is increasing in $\varphi$. The result then follows immediately from the continuity of $V_2 - V_1$ with respect to $s$ and $\mu$.

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