

# Corporate Governance, Shareholder Conflicts, and Audit Quality

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## Abstract

A spate of high profile corporate failures, such as Enron and WorldCom, have led to strong regulatory responses not only for corporate governance but also for accounting and audit. One of the stated aims of these policies on corporate governance is to protect outside shareholders' claims on firms' assets. The presence of conflicts amongst shareholders is however not a sufficient condition for policy intervention. This paper introduces an analytical model investigating the desirability of mandatory corporate governance requirements in the presence of shareholder conflicts.

The model consists of three risk-neutral actors: an entrepreneur maximizing his welfare, an auditor maximizing the expected profit from his audit, and a group of unanimous potential investors. The entrepreneur is setting up a firm to exploit an investment opportunity. This investment opportunity requires an initial capital outlay and generates an uncertain cash-flow. The investment opportunity incorporates an option to liquidate the firm prior to the realisation of the cash-flow. Auditors have a technology which aids in distinguishing between firms which do benefit and firms which do not benefit from being liquidated. In the event the firm is not liquidated, the entrepreneur however derives some private benefits. The entrepreneur furthermore needs outside financing via an issue of equity. The cost of outside equity thus depends on the entrepreneur's choice of corporate governance. The entrepreneur can set up the firm under either a weak or a strong corporate governance regime. Under a strong governance regime, the firm has an independent audit committee, deciding whether or not to appoint an auditor and selecting the quality of any audit, and an independent board of directors implementing the auditor's recommendations. Under this regime, both the audit committee and the board of directors are assumed to take the decisions maximizing the value of the firm. In contrast, under a weak governance regime, the entrepreneur takes the decisions maximizing his own welfare.

The paper provides conditions under which the entrepreneur selects weak as opposed to strong corporate governance. We find no instance of governance failure and hence no case for intervention as long as the market for audit services is fully competitive. When this market is not fully competitive,

governance failures, in which the entrepreneur selects the weak governance regime when the strong governance regime maximizes economic welfare, may however arise.

**Keywords:** Corporate Governance, Audit Quality, Shareholder Conflicts.

# 1 Introduction

A spate of high profile corporate failures, such as Enron, WorldCom, and Tyco, have led to strong regulatory responses not only for corporate governance but also for accounting and audit. In the US, the response has involved the passing of The Public Company Accounting Reform and Investor Protection Act 2002 (Sarbanes-Oxley Act<sup>1</sup>) establishing inter alia new corporate governance standards for directors and the board and rules to ensure the independence of auditors. In the context of this Act, the SEC approved new corporate governance rules<sup>2</sup> requiring listed companies to have a majority of their boards comprised of independent directors and audit committees comprised entirely of independent directors [Tsaganos, Bard, and Moore (2003)]. In the UK, the response has involved<sup>3</sup> a review into the role and effectiveness of non-executive directors, [Higgs report (2003)], and the development of guidance for audit committees, [Smith report (2003)]. The Higgs report called inter alia for at least half the members of the board to be independent non-executive directors<sup>4</sup> <sup>5</sup>. The Smith report called inter alia for the audit committee to consist solely of independent non-executive directors.

One of the stated aims of the development of a coherent policy on corporate governance is to protect the outside shareholders' claim on the firm's assets. The presence of conflicts amongst shareholders is however not a sufficient condition for policy intervention. The welfare of the small shareholders may for instance be voluntarily internalized by the dominant shareholder.

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<sup>1</sup>The Act also establishes a Public Company Oversight Board for independent statutory regulation of the auditing profession.

<sup>2</sup>These rules furthermore impose significant responsibilities on listed companies' nominating, compensation, and audit committees.

<sup>3</sup>In the UK, the response has also involved a review by the DTI of the current arrangements for the regulation of the accountancy and audit professions [Dewing and Russell (2004)].

<sup>4</sup>The Financial Reporting Council however amended this proposal by stating that companies outside the FTSE350 should not have to have at least half independent directors.

<sup>5</sup>The Higgs report however retains the 'comply or explain' approach, first introduced in the Cadbury report (1992), and operating as follows: "listed companies have to report on how they apply the Code's principles and to state whether they comply with the detailed provisions and, if not, why not" [Dewing and Russell (2003)].

Mandatory corporate governance requirements may furthermore introduce ex-post restrictions on the behaviour of the dominant shareholder affecting adversely ex-ante welfare. This paper investigates the desirability of mandatory corporate governance requirements in the presence of shareholder conflicts. It provides conditions under which an entrepreneur requiring equity financing selects weak as opposed to strong corporate governance. It investigates moreover whether the entrepreneur's choice of corporate governance regime is efficient or distorted. And finally, it provides conditions under which debt financing is superior to equity financing as far as the entrepreneur and economic welfare are concerned.

The paper introduces a model consisting of three risk-neutral actors: an entrepreneur maximizing his welfare, an auditor maximizing the expected profit from his audit, and a group of unanimous potential investors referred to as the financial market. The entrepreneur is setting up a firm to exploit an investment opportunity (also referred to as a project). This investment opportunity requires an initial capital outlay and generates a cash-flow which is a random variable. The investment opportunity incorporates an option to abandon the project (and liquidate the firm) prior to the realisation of the cash-flow. Auditors have a technology which aids in distinguishing between projects which are successful and projects which are unsuccessful (and should be abandoned from a financial perspective). In the event the project is not abandoned, the entrepreneur however derives some private benefits. The entrepreneur, who has a shortfall of funds to invest, needs outside financing via an issue of equity. The cost of outside equity thus depends on the entrepreneur's choice of corporate governance. The entrepreneur can set up the firm under either a weak or a strong corporate governance regime. Under a strong governance regime, the firm has an independent audit committee, deciding whether or not to appoint an auditor and selecting the quality of any audit, and an independent board of directors implementing the auditor's recommendations. Under this regime, both the audit committee and the board of directors are assumed to take the decisions maximizing the value of the firm. In contrast, under a weak governance regime, the entrepreneur takes the decisions maximizing his own welfare.

When the market for audit services is perfectly competitive, the entrepreneur fully internalizes economic welfare. There is thus no governance failure and no need for external intervention. Under the strong governance regime, the firm is liquidated as long as the financial gain from liquidation is non negative. Only the excess of the financial gain from liquidation over the private benefit lost however contributes to economic welfare. Under the strong governance regime, the quality of audit supplied is hence ex-post inefficient as it is too high compared with that maximizing economic welfare. Under the weak governance regime, the entrepreneur liquidates the firm if his share of the financial gain from liquidation exceeds the private benefit lost in the event of liquidation. The choice of audit quality obtaining in the presence of outside equity under the weak governance regime is hence ex-post inefficient as it is too low compared with that maximizing economic welfare, with the distortion decreasing in the entrepreneur's retained equity stake. In the absence of any required investment, the entrepreneur thus selects the weak governance regime and abstains from issuing any equity. In the presence of a required investment, when the private benefit is low enough, the entrepreneur selects the weak governance regime, in which he hires an auditor, as long as the required investment is small enough and selects the strong governance regime as long as the required investment is high enough. In contrast, when the private benefit is high enough, the entrepreneur selects the weak governance regime, in which he hires an auditor, as long as the required investment is small enough and selects the weak governance regime, in which he abstains from hiring any auditor, as long as the required investment is high enough. When allowing for both equity and debt finance, the entrepreneur selects debt finance when the required investment is small enough and the gain from liquidation exceeds the private benefit lost in the event of liquidation.

In contrast, when the market for audit services is not perfectly competitive, the entrepreneur does not internalize the economic rent derived by the auditor. The economic rent derived by the auditor under the strong governance regime exceeds that derived under the weak governance regime. Governance failures, in which the entrepreneur selects the strong governance regime when the weak governance regime maximizes economic welfare, can

thus not obtain. The opposite type of governance failure may however obtain. When the private benefit is small enough, there exists required investments leading the entrepreneur to select the weak governance regime, in which he hires an auditor, when the strong governance regime maximizes economic welfare. Furthermore, when the required investment is large enough, there exists private benefits leading the entrepreneur to select the weak governance regime, in which he abstains from hiring an auditor, when the strong governance regime maximizes economic welfare.

Related literature includes Jensen and Meckling (1976), Melumad and Thoman (1990), and Ronnen (1996). Jensen and Meckling (1976) provide a rationale for entrepreneurs to voluntarily hire auditors. Melumad and Thoman (1990) and Ronnen (1996) provide arguments against mandating audits.

The model introduced in this paper suggests that firms endowed with strong governance, that is, firms with an independent board of directors and an independent audit committee, purchase audits of a higher quality than firms endowed with low governance. The following empirical studies suggest that the existence and independence of an audit committee and the independence of the full board of directors are indeed associated with the quality of a firm's audit. Abbott and Parker (2000) find that companies with independent and active audit committee members are more likely to retain industry specialist auditors. Beasley (1996) reports a negative relation between the proportion of outside directors on the full board of directors and the incidence of fraudulent financial reporting. Carcello and Neal (2000) find a negative relation between the proportion of outside directors on the audit committees of distressed companies and the incidence of fraudulent financial reporting. Carcello and Neal (2003) report a positive relation between the proportion of affiliated directors on the audit committee and the likelihood that the auditor is dismissed after issuing a new going-concern report. Wild (1996) reports that firms that establish an audit committee experience an increase in their earnings response coefficients, suggesting that the financial market expects improved financial reporting as a consequence of the formation of an audit committee.



The next section introduces the model. The following section derives the ex-post choice of audit quality supplied by auditors and the resulting ex-ante intrinsic value of equity and economic welfare obtaining under each governance regime as a function of the entrepreneur's retained equity. The following section derives the equity stake retained under each governance regime and the governance regime selected by the entrepreneur. The following section considers debt financing. The following section introduces a market for audit services that is not perfectly competitive. The last section concludes.

## 2 The Model

The paper introduces a model consisting of three risk-neutral actors: an entrepreneur maximizing his welfare, an auditor maximizing the expected profit from his audit, and a group of unanimous potential investors referred to as the financial market. The entrepreneur is setting up a firm to exploit an investment opportunity (also referred to as a project). This investment opportunity requires an initial capital outlay and generates a cash-flow which is a random variable. The investment opportunity incorporates an option to abandon the project (and liquidate the firm) prior to the realisation of the cash-flow. Auditors have a technology which aids in distinguishing between projects which are successful and projects which are unsuccessful, and from a financial perspective, should be abandoned. In the event the project is not abandoned, the entrepreneur however derives some private benefits. The entrepreneur, who has a shortfall of funds to invest, needs outside financing via an issue of equity. The cost of outside equity thus depends on the firm's corporate governance. The entrepreneur can set up the firm under either a weak or a strong corporate governance regime. Under a strong governance regime, the firm has an independent audit committee, deciding whether or not to appoint an auditor and selecting the quality of any audit, and an independent board of directors implementing the auditor's recommendations. Under this regime, both the audit committee and the board of directors are assumed to take the decisions maximizing the value of the firm. In contrast, under a weak governance regime, the entrepreneur takes the decisions

maximizing his own welfare.

## 2.1 The Investment Opportunity

The investment opportunity requires a capital outlay  $K$  and generates a high cash-flow,  $X_H$ , if the project turns out to be successful, and a low cash-flow,  $X_L$ , if the project turns out to be a failure. The investment opportunity includes an option to abandon the project and liquidate the firm for  $L$ , with  $X_L < L < X_H$ . In the event the project is not abandoned, the entrepreneur however derives some private benefit  $B$ . Neither the entrepreneur nor the potential investors can distinguish between successful and failing projects. Both the entrepreneur and the set of potential investors however know that the project is successful with probability  $p$ . It will furthermore be assumed that  $pX_H + (1 - p)X_L > L$ .

## 2.2 Demand for Audit Services

Demand for audit services is generated by the option to abandon the project. Auditors own a technology that aids in distinguishing between successful and failing projects. When the auditor produces an audit of quality  $q$ , he issues either the report ‘S’ indicating his opinion that the project will be successful or the report ‘F’ indicating his opinion that the project will fail<sup>6</sup>. The relation between the audit report and the project’s actual condition is summarised by the following conditional probabilities:

$$\begin{cases} \Pr(\text{‘F’} \mid F, q) &= q \\ \Pr(\text{‘S’} \mid S, q) &= 1 \end{cases} \quad (1)$$

That is, if the auditor adopts an audit of quality  $q$ , the likelihood that he correctly issues the report indicating that the project will fail, given that the project ultimately fails, is  $q$ . Conversely, if the audited project is ultimately successful, the auditor is assumed not to obtain any information indicating that the project might fail and so he always issues the correct report for such

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<sup>6</sup>The auditor thus attests whether or not the firm is a going concern.

projects<sup>7</sup> <sup>8</sup>.

The market for audit services is assumed to be perfectly competitive. Any auditor can produce an audit of any quality. The cost of performing an audit of quality  $q$ ,  $C(q)$ , is assumed to be non-negative, strictly increasing,  $C_q > 0$ , and twice differentiable. For tractability purposes, it is furthermore assumed to be quadratic and equal to  $\frac{1}{2}\lambda q^2$ , with  $\lambda > (1 - p)(L - X_L)$ <sup>9</sup>.

## 2.3 Equity Financing

The entrepreneur has a shortfall of funds to invest and needs to raise  $K$  in outside capital to finance the investment opportunity. The entrepreneur is assumed to finance the required investment through an issue of voting common equity. The entrepreneur can however choose the magnitude of the equity stake he wishes to sell and raise proceeds in excess of  $K$ . It is furthermore assumed that the entrepreneur can contractually agree to subsequently hold his remaining equity stake  $\delta$  through a lock-up clause<sup>10</sup>.

## 2.4 Corporate Governance

The value of the equity stake sold by the entrepreneur to the market depends on the choice of corporate governance. This choice is taken to be binary in this model and essentially a “weak/strong” choice.

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<sup>7</sup>This assumption can be replaced by the weaker assumption that  $\Pr('S' | S, q) < 1$  as long as this probability remains sufficiently high so that investors do not liquidate prematurely firms that receive unqualified reports.

<sup>8</sup>This assumes that the auditor does not face any moral hazard in reporting on his findings. Truthfulness in reporting is however not an issue as long as the client knows what his auditor knows. The client then detects any malfeasance with certainty and the threat of litigation arising from this form of moral hazard induces truthfulness in reporting. This additional layer of moral hazard and offsetting liability is not introduced formally in the model to simplify the analysis.

<sup>9</sup>The last condition is sufficient for the equilibrium quality of audit to be an interior solution of the maximization program.

<sup>10</sup>This assumption will be relaxed later.

## 2.5 Sequence of Events

The sequence of events, as illustrated in Figure 1, is as follows:

At date  $t = 0$ , the entrepreneur selects the governance regime;

At date  $t = 1$ , the entrepreneur sells a stake in his firm through an IPO;

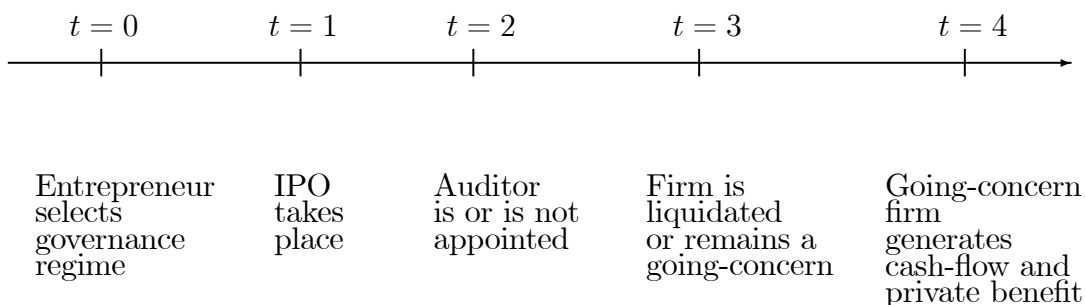
At date  $t = 2$ , an auditor is appointed to provide an audit of some prespecified quality;

At date  $t = 3$ , the firm is either allowed to remain as a going-concern or liquidated;

At date  $t = 4$ , the firm generates a cash-flow and a private benefit to the entrepreneur if the firm has not yet been liquidated.

In order to keep the exposition as simple as possible, the time value of money is furthermore assumed to be nil.

**Figure 1**  
**Timeline of Events**



## 3 Welfare, Equity Value, and Governance

Recognizing the shareholder conflict inherent in the model, this section first derives the equilibrium choices of audit quality and liquidation strategies obtaining under the strong and the weak governance regimes. This section then derives the intrinsic value of equity and economic welfare obtaining under each governance regime. The analysis presumes a welfare function which aggregates the intrinsic value of equity, the expected private benefits,

and economic rent accruing to the auditor. If the market for audit services is perfectly competitive, the welfare function is thus given by:

$$F = V + E(B) - K \quad (2)$$

where  $V$  and  $E(B)$  respectively denote the present value of cash-flow generated by the project and the expected control benefits.

### 3.1 Efficient Ex-Post Strategies

This subsection derives for reference the efficient ex-post choices of audit quality and liquidation strategies. The following results can be shown to obtain:

**Lemma 1** *If  $L - X_L \geq B$ , ex-post efficiency calls for the entrepreneur to hire an auditor and select an audit of quality  $q_P^*$ , with:*

$$q_P^* = \frac{(1-p)(L - X_L - B)}{\lambda} \quad (3)$$

*The firm should be liquidated if and only if the auditor issues the report ‘F’ indicating that in his opinion the firm will fail.*

*In contrast, if  $L - X_L \leq B$ , ex-post efficiency calls for the entrepreneur to abstain from hiring any auditor.*

The intuition is as follows. Any audit is only valuable as far as economic welfare is concerned in the event the project turns out to be unsuccessful (which obtains with probability  $p$ ) and the financial gain from liquidation,  $L - X_L$ , exceeds the private benefit  $B$  lost in the event of liquidation. The quality of audit  $q_P^*$  maximizing economic welfare is thus  $\arg \max_q (1-p)q(L - X_L) - C(q)$ , with  $C(q) = \frac{1}{2}\lambda q^2$ . The quality of audit  $q_P^*$  is thus equal to  $\min(0, \frac{(1-p)(L - X_L - B)}{\lambda})$ .

### 3.2 Ex-Post Strategies under Strong Governance

This subsection derives the equilibrium ex-post choice of audit quality and liquidation strategies obtaining under the strong governance regime. Under this regime, both the equilibrium choice of audit and the equilibrium liquidation strategies are the ones maximizing the intrinsic value of equity.

Conditional on the project turning out to be a failure, the auditor performing an audit of quality  $q$  issues the report ‘F’ (indicating that in his opinion the firm will fail) with probability  $q$  and the report ‘S’ (indicating that in his opinion the project will be successful) with the complementary probability. Conditional on the project turning out to be a success, the auditor performing an audit of quality  $q$  always issues the report ‘S’. Conditional on the auditor identifying the project as unsuccessful, the expected cash-flow (gross of the audit fee) is hence  $L$  if the firm is liquidated and  $X_L$  if the firm remains a going-concern. Conditional on the auditor identifying the project as successful, the expected cash-flow (gross of the audit fee) is hence  $\frac{p}{p+(1-p)(1-q)}X_H + \frac{(1-p)(1-q)}{p+(1-p)(1-q)}X_L$  if the firm remains a going-concern and  $L$  if the firm is liquidated. As  $X_L < L < pX_H + (1-p)X_L$ , the liquidation rules maximizing the intrinsic value of the firm thus call for keeping the firm as a going concern in the event the auditor issues the report ‘S’ and liquidating the firm in the event the auditor issues the report ‘F’.

The value of an audit of quality  $q$  to the small shareholders comes from the firm being liquidated in the event the project is identified as unsuccessful by the auditor. Given the equilibrium liquidation rules, the intrinsic value of the firm subject to an audit of quality  $q$ , is  $pX_H + (1-p)[qL + (1-q)X_L] - \Phi(q)$ , where  $\Phi(q)$  denotes the audit fee. The intrinsic value of the firm, if unaudited, is  $V_U \equiv pX_H + (1-p)X_L$ . The net value of an audit of quality  $q$  is hence  $(1-p)q(L - X_L) - \Phi(q)$ . Given a perfectly competitive market for audit services,  $\Phi(q) = C(q) = \frac{1}{2}\lambda q^2$ . The quality  $q_S^*$  maximizing the net value of the audit to the small shareholders is hence  $\arg \max_q (1-p)q(L - X_L) - \frac{1}{2}\lambda q^2$ .

The following result thus obtains:

**Proposition 1** *Under the strong governance regime, an audit of quality  $q_S^*$  is purchased and the firm is liquidated if and only if the auditor issues the report ‘F’ indicating that in his opinion the firm will fail, with:*

$$q_S^* = \frac{(1-p)(L - X_L)}{\lambda} \quad (4)$$

*Under the strong governance regime, given a realization of private benefit  $B$ , the intrinsic value of equity  $V_S$ , expected control benefits  $E_S(B)$ , and welfare*

function  $F_S$  obtaining at the date of purchase of the audit are given by:

$$\begin{cases} V_S & = V_U + \frac{(1-p)^2(L-X_L)^2}{2\lambda} \\ E_S(B) & = [1 - \frac{(1-p)^2(L-X_L)}{\lambda}]B \\ F_S & = V_U + B + \frac{(1-p)^2(L-X_L)(L-X_L-2B)}{2\lambda} - K \end{cases} \quad (5)$$

**Corollary 1** *Under the strong governance regime:*

*the quality of audit and hence the intrinsic value of equity are independent of both the retained equity stake  $\delta_S$  and the private benefit  $B$ ;*

*economic welfare is increasing in the private benefit  $B$  but is independent of the equity stake  $\delta_S$  retained by the entrepreneur.*

A proof of Proposition 1 can be found in the Appendix. The intuition is as follows. The benefit accruing to small shareholders coming from an audit of a given quality is the expected financial gain from liquidation. The quality of audit and the intrinsic value of equity are thus independent of both the retained equity stake and the private benefit. Only the excess of the financial gain from liquidation over the private benefit lost however contributes to economic welfare. The quality of audit  $q_S^*$  maximizing the value of the firm hence exceeds the ex-post efficient quality of audit  $q_P^*$  and the regime of strong governance is thus ex-post inefficient.

### 3.3 Ex-Post Strategies under Weak Governance

This subsection derives the equilibrium ex-post choices of audit quality and liquidation strategies obtaining under the weak governance regime given the entrepreneur's retained equity stake  $\delta_W$  and private benefit  $B$ . Under this regime, both the ex-post equilibrium liquidation rules and equilibrium choice of audit quality are the ones maximizing the entrepreneur's ex-post welfare  $\delta_W E(V) + E(B)$ .

Conditional on the auditor identifying the project as unsuccessful, the entrepreneur's expected welfare is  $\delta_W(L - \Phi(q))$  if the firm is liquidated and  $\delta_W(X_L - \Phi(q)) + B$  if the firm remains a going-concern. Conditional on the auditor identifying the project as successful, the entrepreneur's expected welfare is  $\delta_W[\frac{p}{p+(1-p)(1-q)}X_H + \frac{(1-p)(1-q)}{p+(1-p)(1-q)}X_L - \Phi(q)] + B$  if the firm remains a going-concern and  $\delta_W(L - \Phi(q))$  if the firm is liquidated. The optimal

liquidation rules under the weak governance regime thus call for keeping the firm as a going concern in the event the auditor issues the report ‘S’ and liquidating the firm if and only if  $\delta_W(L - X_L) \geq B$  in the event the auditor issues the report ‘F’. The equilibrium liquidation strategies under the weak governance regime thus differ from those obtaining under the strong governance regime when the auditor issues the report ‘F’ and  $\delta_W(L - X_L) < B$ .

The value to the entrepreneur of an audit of quality  $q$  comes from the firm being liquidated in the event the project is identified as unsuccessful by the auditor and  $\delta_W(L - X_L) > B$ . If the latter inequality is satisfied, the net value to the entrepreneur of an audit of quality  $q$  is hence  $(1 - p)q[\delta_W(L - X_L) - B] - \delta_W\Phi(q)$ . Given a perfectly competitive market for audit services,  $\Phi(q) = C(q) = \frac{1}{2}\lambda q^2$ . When  $\delta_W(L - X_L) > B$ , the quality  $q_W^*$  of the audit maximizing the entrepreneur’s welfare is thus  $\arg \max_q (1 - p)q[\delta_W(L - X_L) - B] - \frac{1}{2}\lambda\delta_W q^2$ .

The following result thus obtains:

**Proposition 2** *Under the weak governance regime:*

*When  $\delta_W(L - X_L) \geq B$ , the entrepreneur purchases an audit of quality  $q_W^*$ , with:*

$$q_W^* = \frac{(1 - p)[\delta_W(L - X_L) - B]}{\lambda\delta_W} \quad (6)$$

*The firm is liquidated if and only if the auditor issues the report ‘F’ indicating that in his opinion the firm will fail. The intrinsic value of equity  $V_W$ , expected control benefits  $E_W(B)$ , and welfare function  $F_W$  obtaining at the date of purchase of the audit are furthermore given by:*

$$\begin{cases} V_W & = V_U + \frac{(1-p)^2[\delta_W(L-X_L)-B][\delta_W(L-X_L)+B]}{2\lambda\delta_W^2} \\ E_W(B) & = [1 - \frac{(1-p)^2[\delta_W(L-X_L)-B]}{\lambda\delta_W}]B \\ F_W & = V_U + B + \frac{(1-p)^2[\delta_W(L-X_L)-B][\delta_W(L-X_L-2B)+B]}{2\lambda\delta_W^2} - K \end{cases} \quad (7)$$

*In contrast, when  $\delta_W(L - X_L) \leq B$ , the entrepreneur abstains from purchasing any audit and keeps the firm as a going concern. The intrinsic value of equity  $V_W$ , expected control benefits  $E_W(B)$ , and welfare function  $F_W$  are*



furthermore given by:

$$\begin{cases} V_W & = & V_U \\ E_W(B) & = & B \\ F_W & = & V_U + B - K \end{cases} \quad (8)$$

**Corollary 2** *Under the weak governance regime:*

*for a given retained equity stake  $\delta_W$ , the quality of audit and the intrinsic value of equity are weakly decreasing in the private benefit  $B$ ;*

*for a given private benefit  $B$ , the quality of audit, intrinsic value of equity, and economic welfare are weakly increasing in the entrepreneur's retained equity stake  $\delta_W$ .*

A proof of Proposition 2 can be found in the Appendix. The intuition is as follows. Under the weak governance regime, the firm is liquidated whenever the entrepreneur's share of the financial gain from liquidation exceeds the private benefit lost in the event of liquidation. When the entrepreneur's share of the financial gain from liquidation is lower than the private benefits lost in the event of liquidation, the entrepreneur abstains from hiring any auditor. In contrast, when the entrepreneur's share of the financial gain from liquidation exceeds the private benefit lost in the event of liquidation, the entrepreneur hires an auditor, the quality of the audit increasing in the retained equity stake and decreasing in the private benefit.

### 3.4 Weak versus Strong Governance

**Corollary 3** *For any retained equity stake  $\delta_W$  and private benefit  $B$ :*

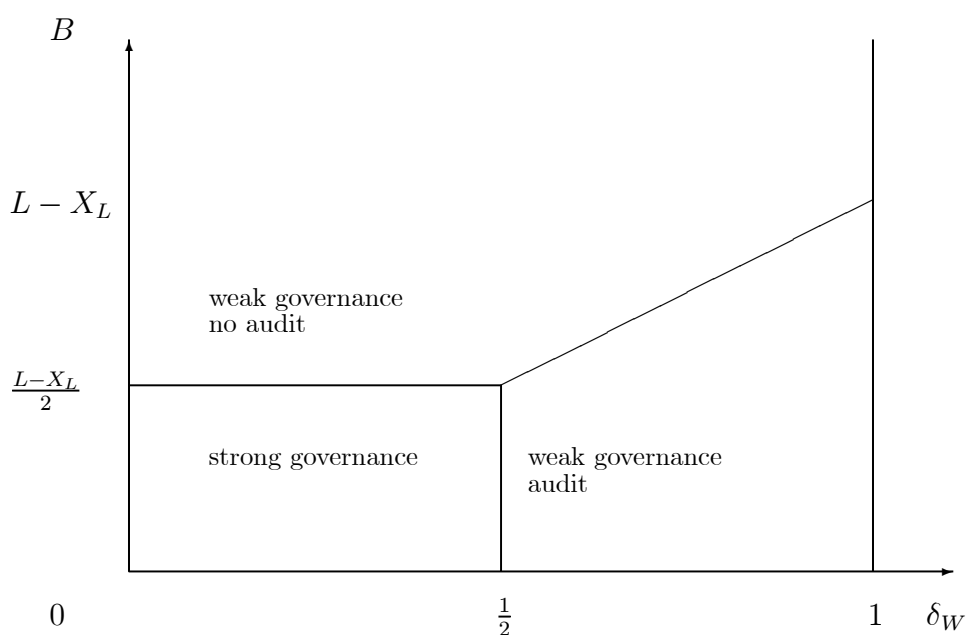
*the quality of audit purchased under the strong governance regime exceeds the quality of audit purchased under the weak governance regime;*

*the value of equity under the strong governance regime exceeds the value of equity under the weak governance regime.*

In the event in which the firm is liquidated, the entrepreneur only gets a share  $\delta_W$  of the financial gains from liquidation but loses the private benefit  $B$ . Other shareholders however do not suffer from the loss of private benefit. The quality of audit selected under the strong governance regime thus exceeds the quality of audit selected under the weak governance regime. As the

quality of audit and liquidation strategies selected under the strong governance regime are those maximizing the intrinsic value of equity, the value of equity under the strong governance regime exceeds the value of equity under the weak governance regime.

**Figure 2**  
**Optimal Governance Regimes**



**Corollary 4** *Economic welfare obtaining under the weak governance regime exceeds economic welfare obtaining under the strong governance regime as long as either  $\delta_W(L - X_L) \geq B$  and  $\delta_W \geq \frac{1}{2}$  or  $\delta_W(L - X_L) \leq B$  and  $L - X_L \leq 2B$ .*

The liquidation rule maximizing economic welfare calls for liquidating firms only when the financial gain from liquidation exceeds the private benefit lost. The liquidation strategies selected under both the strong and weak governance regimes are thus inefficient. Under the strong governance regime, the firm is liquidated whenever the financial gain from liquidation is positive. Under this regime, inefficiency is thus caused by liquidation when the

financial gain from liquidation is positive and the private benefit lost exceeds the financial gain. Under the weak governance regime, the firm is liquidated whenever the entrepreneur's share of the financial gain from liquidation exceeds the private benefit lost in the event of liquidation. Under this regime, inefficiency is thus caused by the absence of liquidation when the financial gain to all shareholders exceeds the private benefit lost while the entrepreneur's share of the financial gain is lower than the private benefit lost. As shown in Figure 2, economic welfare is thus higher under the weak governance regime when either the private benefit or the entrepreneur's retained equity stake (under this regime) is high enough. The entrepreneur's retained equity stake is however endogenous and is derived in the next section.

## 4 Governance Regime and IPO Activity

This section analyses the IPO process in more details and derives both the equity stake retained by the entrepreneur under each governance regime and the governance regime selected by the entrepreneur.

Let us assume that the entrepreneur can contractually agree to subsequently hold his position through a lock-up clause. Let us furthermore denote the equilibrium equity stake retained by the entrepreneur at date  $t = 1$  under governance regime  $i$ , where  $i = W$  denotes the weak governance regime and  $i = G$  denotes the strong governance regime, by  $\delta_i^*$ . Under any governance regime  $i$ , the entrepreneur selects the stake  $\delta_i^*$  maximising his welfare subject to investors being willing to buy the issue of equity and the proceeds from the IPO weakly exceeding the required investment  $K$ . If the entrepreneur sells a proportion  $1 - \delta_i$  of his equity, the entrepreneur's welfare at date  $t = 1$  consists of the sum of the expected control benefits  $E_i(B)$ , value of his remaining stake,  $\delta_i V_i$ , and proceeds  $P(\delta_i)$  net of the required investment  $K$ . Given rational expectations, the proceeds  $P(\delta_i)$  are furthermore equal to the value of the equity purchased by the outside investors,  $(1 - \delta_i)V_i$ . The entrepreneur's welfare is hence equal to the welfare function  $F_i$ . Under either governance regime, the entrepreneur is hence fully internalizing economic welfare through the public offering.

Let us relax the assumption that the entrepreneur can contractually agree

to subsequently hold his position through a lock-up clause. The following result then obtains:

**Lemma 2** *Under a strong governance regime, the entrepreneur has no incentive to buy or sell additional stock after the IPO. Under a weak governance regime, the entrepreneur has an incentive to maximize his equity stake.*

A proof of Lemma 2 can be found in the Appendix. The restriction that the entrepreneur is bound by a lock-up clause during the IPO is therefore never binding.

In order to derive the equity stake and the governance regime selected by the entrepreneur, let us first consider the case in which there is no required investment ( $K = 0$ ).

**Proposition 3** *In the absence of any required investment, the entrepreneur selects the weak governance regime and abstains from issuing any equity.*

**Proof.** Under the weak governance regime, economic welfare, and hence, the entrepreneur's welfare, are weakly increasing in the entrepreneur's retained equity stake  $\delta_W$ . The entrepreneur's welfare obtaining under the weak governance regime in the absence of any issue of equity strictly exceeds the entrepreneur's welfare obtaining under the strong governance regime regardless of the retained equity under the latter regime. In the absence of any required investment, the entrepreneur selects the weak governance regime and abstains from issuing any equity.

Let us then consider the case in which the entrepreneur needs to issue equity to finance the required investment ( $K > 0$ ). Equity transfers are shown to depend on the governance regime.

Let us first consider the strong governance regime. Under this regime, the proceeds  $P(\delta_S)$  from selling a proportion  $1 - \delta_S$  of equity are equal to  $(1 - \delta_S)V_S$ . The following result then obtains:

**Lemma 3** *Under the strong governance regime: the entrepreneur raises funds weakly exceeding  $K$  and is indifferent between retaining any equity stake  $\delta_S^*$  in the interval  $[0, 1 - \frac{K}{V_S}]$  as long as  $K \leq V_S$ ; the entrepreneur is unable to raise any funds, and hence the firm can not be established, as long as  $K > V_S$ .*

**Proof.** Under the strong governance regime, the present value of the cash-flow generated by the project is equal to  $V_S$ . Under this regime, when the required investment  $K$  strictly exceeds  $V_S$ , the entrepreneur is unable to raise any funds and the firm can hence not be established. In contrast, when the required investment  $K$  is lower than  $V_S$ , the firm can be established. The entrepreneur's welfare is furthermore independent of the retained equity stake. When the required investment  $K$  is lower than  $V_S$ , the entrepreneur is hence indifferent between retaining any stake in the interval  $[0, 1 - \frac{K}{V_S}]$ .

Let us then consider the weak governance regime. Under this regime, the proceeds  $P(\delta_W)$  from selling a proportion  $1 - \delta_W$  of equity are equal to  $(1 - \delta_W)V_W$ , with  $V_W = V_U + \frac{(1-p)^2[\delta_W(L-X_L)-B][\delta_W(L-X_L)+B]}{2\lambda\delta_W^2}$  if  $\delta_W \geq \frac{B}{L-X_L}$ , and  $V_W = V_U$  if  $\delta_W \leq \frac{B}{L-X_L}$ .

Let us consider the former case in which the retained equity stake is high enough to justify a subsequent audit. It can be shown that there exists a threshold  $B^* < L - X_L$  such that  $\bar{\delta} \equiv \arg \max_{\delta_W \in [\frac{B}{L-X_L}, 1]} P(\delta_W) = \frac{B}{L-X_L}$  if  $B^* \leq B \leq L - X_L$  and  $\bar{\delta} \equiv \arg \max_{\delta \in [\frac{B}{L-X_L}, 1]} P(\delta_W) \in (\frac{B}{L-X_L}, 1)$  if  $0 < B < B^*$ . Let us denote  $\max_{\delta_W \in [\frac{B}{L-X_L}, 1]} P(\delta_W)$  by  $\bar{K}$ . If  $K \leq \bar{K}$ , there thus exists a unique equity stake  $\delta_W$  weakly exceeding  $\frac{B}{L-X_L}$  and satisfying  $P(\delta_W) = K$  as long as  $B > B^*$  and up to two such equity stakes as long as  $B \leq B^*$ . Let us denote the largest one by  $\hat{\delta}$ .

The parameters  $\bar{K}$ ,  $\bar{\delta}$ , and  $\hat{\delta}$  (when it exists<sup>11</sup>) hence respectively represent under the weak governance regime in which an auditor is hired: the capacity for raising outside equity, the entrepreneur's retained equity stake enabling him to raise  $\bar{K}$ , and the entrepreneur's highest retained equity stake enabling him to raise the required investment  $K$ . These parameters are shown to have the following behaviour:

**Lemma 4**  $\bar{\delta}$  and  $\bar{K}$  are respectively increasing and decreasing in the magnitude of the private benefit  $B$ ;

Given the required investment  $K$ ,  $\hat{\delta}$  is decreasing in the magnitude of the private benefit  $B$ , with  $\lim_{B \rightarrow 0} \hat{\delta} = 1 - \frac{K}{V_{2S}}$ ;

<sup>11</sup>The parameter  $\hat{\delta}$  does not exist if  $K > \bar{K}$ .

Given the private benefit  $B$ ,  $\hat{\delta}$  is decreasing in the magnitude of the required investment  $K$ , with  $\lim_{K \rightarrow 0} \hat{\delta} = 1$ .

A proof of Lemma 4 can be found in the Appendix.

The following result then obtains.

**Lemma 5** *Under the weak governance regime:*

1. If  $B$  is large enough so that  $\bar{K} \leq V_U$ ,

the entrepreneur raises the required investment  $K$  by selling  $1 - \delta_W^*$ , with  $\delta_W^* = \hat{\delta}$  if  $K \leq \bar{K}$ ;

the entrepreneur raises funds  $P$  weakly exceeding the required investment  $K$  and is indifferent between retaining any stake  $\delta_W^*$  in the interval  $[0, \frac{B}{L-X_L}]$ , as long as  $\bar{K} < K \leq V_U$ ;

the entrepreneur is unable to raise any funds, and hence the firm can not be established, as long as  $K > V_U$ .

2. In contrast, if  $B$  is small enough so that  $\bar{K} \geq V_U$ ,

the entrepreneur raises the required investment  $K$  by selling  $1 - \delta_W^*$ , with  $\delta_W^* = \hat{\delta}$  if  $K \leq \bar{K}$ ;

the entrepreneur is unable to raise any funds, and hence the firm can not be established, as long as  $K > \bar{K}$ .

3. The equity stake  $\hat{\delta}$  can be written as:

$$\hat{\delta} = 2(-m)^{\frac{1}{2}} \cos \frac{\theta}{3} + \frac{1}{3} \left(1 - \frac{K}{V_S}\right) \quad (9)$$

with:

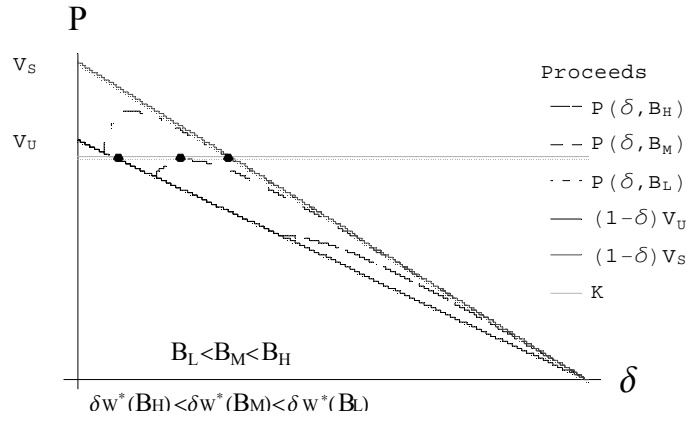
$$\begin{cases} m &= -\frac{(1-p)^2 B^2}{6\lambda V_S} - \frac{1}{9} \left(1 - \frac{K}{V_S}\right)^2 \\ n &= \frac{(1-p)^2 B^2}{12\lambda V_S} \left(2 + \frac{K}{V_S}\right) - \frac{1}{27} \left(1 - \frac{K}{V_S}\right)^3 \\ \theta &= \arctan \frac{|m^3 + n^2|^{\frac{1}{2}}}{n} \end{cases} \quad (10)$$

**Proof.** The entrepreneur's welfare is weakly increasing in his retained equity stake: it remains constant over the interval  $[0, \frac{B}{L-X_L}]$  associated with a lack of audit and is strictly increasing over the interval  $(\frac{B}{L-X_L}, 1]$  associated with an audit. Whenever feasible, the entrepreneur hence raises only the required investment  $K$  by retaining the highest equity stake  $\delta_W^* = \hat{\delta}$  leading him to hire subsequently an auditor. When either the required investment  $K$  or

the private benefit  $B$  is high enough, the entrepreneur is however unable to raise  $K$  by retaining an equity stake  $\delta_W^* = \widehat{\delta}$  exceeding  $\frac{B}{L-X_L}$ . In this event, as long as the required investment  $K$  does not exceed the highest proceeds  $V_U$  which can be raised in the absence of any audit, the entrepreneur sells a higher equity stake leading him subsequently to abstain from hiring any auditor.

Equity transfers under weak governance are illustrated in Figure 3.

**Figure 3**  
**Equity Transfers under Weak Governance**



**Proposition 4** *In the presence of a required investment  $K$ , there exists a threshold  $\widehat{K}$ , with  $\widehat{K}$  decreasing in  $B$ , such that:*

*when the private benefit  $B \leq \frac{L-X_L}{2}$ , the entrepreneur selects the weak governance regime and hires an auditor, as long as the required investment  $K \leq \widehat{K}$ , and selects the strong governance regime as long as the required investment satisfies  $\widehat{K} \leq K \leq V_S$ ;*

*when the private benefit  $B \geq \frac{L-X_L}{2}$ , the entrepreneur selects the weak governance regime and hires an auditor, as long as the required investment  $K \leq \widehat{K}$ , selects the weak governance regime and abstains from hiring an auditor, as long as the required investment satisfies  $\widehat{K} \leq K \leq V_U$ , and selects the strong governance regime, as long as the required investment satisfies  $\max(\widehat{K}, V_U) \leq K \leq V_S$ .*

Let us assume for exposition purposes that the firm can be financed under either governance regime. Whenever the private benefit is low enough, the

entrepreneur thus selects the weak governance regime, in which he hires an auditor, as long as the required investment is small enough and selects the strong governance regime as long as the required investment is high enough. In contrast, when the private benefit is high enough, the entrepreneur thus selects the weak governance regime, in which he hires an auditor, as long as the required investment is small enough and selects the weak governance regime, in which he abstains from hiring any auditor, as long as the required investment is high enough. As the entrepreneur fully internalizes economic welfare, there is however no governance failure and no case for intervention such as mandating strong governance or statutory audits.

## 5 Financing with Risk-Free Debt

In the previous sections, the entrepreneur had to finance the required investment  $K$  through equity financing. This section allows for debt financing. Let us assume that the debt has no interim coupon payments and denote the face value or principal amount to be repaid by the entrepreneur to the debtholders at date  $t = 4$  by  $D$ . Let us furthermore assume that the entrepreneur can contractually agree not to sell any financial claims after the initial financial deal is placed in the market. Let us finally assume that the required investment  $K$  is small enough so that the firm's cash-flow  $X_L$  obtaining when the firm is unsuccessful is high enough to repay both the principal to the debtholders and the audit fee to the auditor. The following result then obtains:

**Proposition 5** *When  $L - X_L \geq B$  and  $K \leq K_D \equiv X_L - \frac{(1-p)^2}{2\lambda}(L - X_L - B)^2$ , the entrepreneur issues  $D$ , with  $K \leq D \leq K_D$ , and purchases an audit of quality  $q_D^*$ , with:*

$$q_D^* = \frac{(1-p)(L - X_L - B)}{\lambda} \quad (11)$$

*The firm is liquidated if and only if the auditor issues the report 'F' indicating that in his opinion the firm will fail. The intrinsic value of equity  $V_D$ , expected control benefits  $E_D(B)$ , and welfare function  $F_D$  obtaining at the date of*



purchase of the audit are furthermore given by;

$$\begin{cases} V_D & = V_U - D + \frac{(1-p)^2}{2\lambda}[(L - X_L)^2 - B^2] \\ E_D(B) & = [1 - \frac{(1-p)^2(L - X_L - B)}{\lambda}]B \\ F_D & = V_U + B + \frac{(1-p)^2}{2\lambda}(L - X_L - B)^2 - K \end{cases} \quad (12)$$

In contrast, when  $L - X_L \leq B$  and  $K \leq X_L$ , the entrepreneur is indifferent between issuing any level of debt in the interval  $[K, X_L]$ , abstains from purchasing any audit and keeps the firm as a going concern. The intrinsic value of equity  $V_D$ , expected control benefits  $E_D(B)$ , and welfare function  $F_D$  obtaining at the date of purchase of the audit are similar to those obtaining under weak governance when  $\delta_W(L - X_L) \leq B$ .

**Corollary 5** *When the required investment  $K$  is small enough:*

*the entrepreneur weakly prefers debt to equity finance;*

*the entrepreneur is strictly better off with debt finance as long as  $L - X_L > B$ ;*

*economic welfare under debt finance strictly dominates economic welfare under equity finance as long as  $L - X_L > B$  and is equal to economic welfare under equity finance (with weak governance) as long as  $L - X_L \leq B$ .*

A proof of Proposition 5 can be found in the Appendix. The intuition is as follows. When the amount  $D$  borrowed is small enough, the levels of audit quality purchased are ex-post efficient. When the required investment  $K$  is small enough, economic welfare under debt finance hence strictly dominates economic welfare under equity finance, regardless of the governance regime under equity finance, as long as  $L - X_L > B$ . Economic welfare under debt finance is furthermore equal to economic welfare under equity finance (with weak governance) when  $L - X_L \leq B$ . As the entrepreneur internalizes fully economic welfare, the entrepreneur is strictly better off under debt finance as long as  $L - X_L > B$  and is indifferent between debt and equity finance (with weak governance) as long as  $L - X_L \leq B$ .

## 6 A Differentiated Market For Audit Services

In the previous sections, the market for audit services was assumed to be perfectly competitive. This led the entrepreneur to fully internalize economic

welfare through the IPO. This section introduces a differentiated market for audit services consisting of  $m$  identical firms and  $n$  potential auditors, with auditors differing in the cost of providing an audit of a given quality. The cost of supplying an audit of quality  $q$  is  $C_L(q) = \frac{1}{2}\lambda_L q^2$  for a proportion  $\pi$  of auditors and  $C_H(q) = \frac{1}{2}\lambda_H q^2$  for the complementary proportion of auditors, with  $\lambda_L < \lambda_H$ . The type of each auditor is common knowledge, the former auditors being referred to as high productivity auditors and the latter auditors being referred to as low productivity auditors. In order to avoid trivial results, it is furthermore assumed that the number of potential auditors exceeds the number of firms, which in turn, exceeds the number of potential high productivity auditors ( $n > m > n\pi$ ). Entrepreneurs have to finance the required investment  $K$  through equity financing.

The matching process between potential auditors and firms is assumed to take place as follows. Potential auditors approach prospective clients, with prospective clients being entrepreneurs under the weak governance regime and audit committees under the strong governance regime, with audit contracts consisting of an audit quality and an audit fee. Any prospective client either accepts an offer or abstains from hiring any auditor. The audit contract accepted is the one maximizing the net value of the audit to the shareholders under the strong governance regime and the one maximizing the net value of the audit to the entrepreneur under the weak governance regime.

In any equilibrium in which auditors are hired, the net value of any audit (gross value of any audit net of the audit fee) supplied by any auditor must be the same regardless of the auditor's type. The high productivity auditors are able to provide their clients with a higher gross value of audit than the low productivity auditors. In a market in which auditors differ in their type, the entrepreneur hence does not fully internalise economic welfare. In any equilibrium in which auditors are hired, the high productivity auditors are hence hired and able to derive some strictly positive economic rent. As not all low productivity effort auditors are hired, employed low productivity auditors do not derive any economic rent.

Let us denote the economic rent derived by the high productivity auditor under respectively the weak and strong governance regime by  $\Pi_W(\lambda_L)$  and  $\Pi_S(\lambda_L)$ . The following result then obtains:

**Lemma 6** *The economic rent derived by a high productivity auditor under the strong governance regime exceeds the economic rent derived under the weak governance regime.*

**Proof.** Under either governance regime, the net value of any audit supplied by a high productivity auditor must be equal to the net value of any audit supplied by a low productivity auditor. Hence:

$$\begin{cases} \Phi[q_S^*(\lambda_L)] = (1-p)[q_S^*(\lambda_L) - q_S^*(\lambda_H)](L - X_L) + C[q_S^*(\lambda_H)] \\ \Phi[q_W^*(\lambda_L)] = (1-p)[q_W^*(\lambda_L) - q_W^*(\lambda_H)][\delta_W(L - X_L) - B] + C[q_W^*(\lambda_H)] \end{cases} \quad (13)$$

with:

$$\begin{cases} q_S^*(\lambda_L) = \frac{(1-p)(L-X_L)}{\lambda_L} > q_S^*(\lambda_H) = \frac{(1-p)(L-X_L)}{\lambda_H} \\ q_W^*(\lambda_L) = \frac{(1-p)[\delta_W(L-X_L)-B]}{\lambda_L \delta_W} > q_W^*(\lambda_H) = \frac{(1-p)[\delta_W(L-X_L)-B]}{\lambda_H \delta_W} \end{cases} \quad (14)$$

It then follows that:

$$\begin{cases} \Pi_S(\lambda_L) = \frac{(1-p)^2}{2}(L - X_L)^2 \left[ \frac{1}{\lambda_L} - \frac{1}{\lambda_H} \right] \\ > \Pi_W(\lambda_L) = \frac{(1-p)^2}{2}(L - X_L - \frac{B}{\delta_W})^2 \left[ \frac{1}{\lambda_L} - \frac{1}{\lambda_H} \right] \end{cases} \quad (15)$$

The economic rent derived by a high productivity auditor under the strong governance regime thus exceeds the economic rent derived under the weak governance regime.

The intuition is as follows. The level of audit quality supplied by any auditor under the strong governance regime exceeds that supplied by the same auditor under the weak governance regime. The economic rent derived by the high productivity auditor under the strong governance regime hence exceeds that derived by the same auditor under the weak governance regime.

**Corollary 6** *When auditors differ in the cost of providing an audit of a given quality, the only type of governance failure that can obtain is one in which the entrepreneur selects the weak governance regime when the strong governance regime maximizes economic welfare.*

**Proof.** An entrepreneur's welfare under any regime is equal to economic welfare less the auditor's expected economic rent:

$$\begin{cases} \delta_W V_W + E_W(B) = F_W - \pi \Pi_W(\lambda_L) \\ \delta_S V_S + E_S(B) = F_S - \pi \Pi_S(\lambda_L) \end{cases} \quad (16)$$

The economic rent derived by the high productivity auditor under the strong governance regime hence exceeds that derived by the same auditor under the weak governance regime. Whenever economic welfare under the weak governance regime exceeds economic welfare under the strong governance regime, the entrepreneur's welfare under the weak governance regime thus exceeds the entrepreneur's welfare under the strong governance regime. A governance failure, in which the entrepreneur selects the strong governance regime when the weak governance regime maximizes economic welfare, can hence not obtain. A governance failure, in which the entrepreneur selects the weak governance regime when the strong governance regime maximizes economic welfare, may however obtain.

Let us assume from now on that either the proportion of high productivity auditors or the difference in productivity is small enough. The governance regime selected by the entrepreneur as a function of both the magnitude of the private benefit and the retained equity stake (under the weak governance regime in which an audit takes place) are then as shown in Figure 4. The entrepreneur's choice of governance regime in a differentiated market for audit services is hence fairly similar to that obtaining in a perfectly competitive market as reflected in Figure 2. The region in which the entrepreneur selects the strong governance regime is however smaller in a differentiated market for audit services. This reflects the higher economic rents accruing to high productivity auditors under the strong governance regime. The equity stake retained by the entrepreneur under the weak governance regime, regardless of the level of competitiveness of the market for audit services, is however endogenous and depends on the magnitude of the private benefit.

\*Insert Figure 4\*

Assuming that the firm can be financed under either governance regime, the governance regime selected by the entrepreneur in a differentiated market for audit services is as follows. Whenever the private benefit is low enough, the entrepreneur thus selects the weak governance regime, in which he hires an auditor, as long as the required investment is small enough and selects the strong governance regime as long as the required investment is high enough.

In contrast, when the private benefit is high enough, the entrepreneur thus selects the weak governance regime, in which he hires an auditor, as long as the required investment is small enough and selects the weak governance regime, in which he abstains from hiring any auditor, as long as the required investment is high enough. Whilst the policy in a differentiated market for audit services is similar to that obtaining in a perfectly competitive market, the thresholds are different. As the entrepreneur does not fully internalizes economic welfare in a differentiated market for audit services, there is furthermore scope for governance failures. The following Propositions provide sufficient conditions for governance failures to obtain.

**Proposition 6** *When the private benefit  $B$  is small enough, there exists an interval such that for any required investment  $K$  belonging to that interval, the entrepreneur selects the weak governance regime, in which he hires an auditor, when the strong governance regime maximizes economic welfare.*

A proof of Proposition 6 can be found in the Appendix. The intuition is as follows. Let us consider first a setting in which the market for audit services is perfectly competitive, the private benefit  $B$  is small enough, and the required investment  $K$  is high enough, so that  $\delta_W^* = \frac{1}{2}$  and  $\delta_W^*(L - X_L) > B$  under the weak governance regime. It hence follows that the entrepreneur's welfare (and hence economic welfare) is equal under either governance regime. When the market for audit services is not perfectly competitive, the high productivity auditor however derives some strictly positive economic rent, the one under the strong governance regime exceeding the one under the weak governance regime. When the market for audit services is not perfectly competitive,  $\delta_W^* = \frac{1}{2}$ , and  $\delta_W^*(L - X_L) > B$ , the entrepreneur hence prefers the weak governance regime even if economic welfare is higher under the strong governance regime. There thus exists some interval for the required investment  $K$  over which the entrepreneur selects the weak governance regime when the strong governance regime maximizes economic welfare.

**Proposition 7** *When the required investment  $K$  is high enough, there exists an interval such that for any private benefit  $B$  belonging to that interval, the entrepreneur selects the weak governance regime, in which he abstains from*

*hiring an auditor, when the strong governance regime maximizes economic welfare.*

A proof of Proposition 7 can be found in the Appendix. The intuition is as follows. Consider a setting in which the private benefit  $B$  is equal to  $\frac{L-X_L}{2}$  and the required investment  $K$  is high enough so that the entrepreneur does not hire any auditor under the weak governance regime. In this setting, economic welfare is the same under either governance regime. Under the strong governance regime, a high productivity auditor is however able to derive a strictly positive economic rent from the audit. The entrepreneur's welfare is hence strictly lower under the strong governance regime. There thus exists an interval such that for any private benefit  $B$  belonging to that interval, the entrepreneur selects the weak governance regime, in which he abstains from hiring an auditor, when the strong governance regime maximizes economic welfare.

## 7 Conclusion

This paper introduces an analytical model investigating the desirability of mandatory corporate governance requirements in the presence of shareholder conflicts. In this model, investment in governance and audit serves to protect outside shareholders' claim from decisions made by a dominant shareholder (entrepreneur) with conflicting preferences. It provides conditions under which an entrepreneur requiring equity financing selects weak as opposed to strong corporate governance. Whether the entrepreneur's choice of corporate governance regime is efficient or distorted is shown to depend on the level of competitiveness of the market for audit services.

When the market for audit services is perfectly competitive, the entrepreneur fully internalizes economic welfare. There is thus no governance failure and no need for external intervention. Under the strong governance regime, the firm is liquidated as long as the financial gain from liquidation is non negative. Only the excess of the financial gain from liquidation over the private benefit lost however contributes to economic welfare. Under the strong governance regime, the quality of audit supplied is hence ex-post inefficient

as it is too high compared with that maximizing economic welfare. Under the weak governance regime, the entrepreneur liquidates the firm if his share of the financial gain from liquidation exceeds the private benefit lost in the event of liquidation. The choice of audit quality obtaining in the presence of outside equity under the weak governance regime is hence ex-post inefficient as it is too low compared with that maximizing economic welfare, with the distortion decreasing in the entrepreneur's retained equity stake. In the absence of any required investment, the entrepreneur thus selects the weak governance regime and abstains from issuing any equity. In the presence of a required investment, when the private benefit is low enough, the entrepreneur selects the weak governance regime, in which he hires an auditor, as long as the required investment is small enough and selects the strong governance regime as long as the required investment is high enough. In contrast, when the private benefit is high enough, the entrepreneur selects the weak governance regime, in which he hires an auditor, as long as the required investment is small enough and selects the weak governance regime, in which he abstains from hiring any auditor, as long as the required investment is high enough. When allowing for both equity and debt finance, the entrepreneur selects debt finance when the required investment is small enough and the gain from liquidation exceeds the private benefit lost in the event of liquidation.

In contrast, when the market for audit services is not perfectly competitive, the entrepreneur does not internalize the economic rent derived by the auditor. The economic rent derived by the auditor under the strong governance regime exceeds that derived under the weak governance regime. Governance failures, in which the entrepreneur selects the strong governance regime when the weak governance regime maximizes economic welfare, can thus not obtain. The opposite type of governance failure may however obtain. When the private benefit is small enough, there exists required investments leading the entrepreneur to select the weak governance regime, in which he hires an auditor, when the strong governance regime maximizes economic welfare. Furthermore, when the required investment is large enough, there exists private benefits leading the entrepreneur to select the weak governance regime, in which he abstains from hiring an auditor, when the strong gover-

nance regime maximizes economic welfare.



## A Appendix

### A.1 Proof of Proposition 1

The quality  $q_S^*$  of the audit maximizing the intrinsic value of the firm under the strong governance regime is  $\arg \max_{q \in [q, 1]} (1-p)q(L - X_L) - \frac{1}{2}\lambda q^2$ . As  $\lambda > (1-p)(L - X_L)$ ,  $q_S^*$  is an interior solution and hence:

$$q_S^* = \frac{(1-p)(L - X_L)}{\lambda} \quad (\text{A1})$$

Given  $q_S^*$ , the expected value of the control benefits is:

$$\begin{cases} E_S(B) &= [p + (1-p)(1 - q_S^*)]B \\ &= [1 - \frac{(1-p)^2(L - X_L)}{\lambda}]B \end{cases} \quad (\text{A2})$$

If  $V_U \equiv pX_H + (1-p)X_L$ , the net shareholder value is:

$$\begin{cases} V_S &= pX_H + (1-p)[q_S^*L + (1 - q_S^*)X_L] - \frac{1}{2}\lambda q_S^{*2} \\ &= V_U + \frac{(1-p)^2(L - X_L)^2}{2\lambda} \end{cases} \quad (\text{A3})$$

Under the strong governance regime, the welfare function is hence:

$$F_S = V_U + B + \frac{(1-p)^2(L - X_L)(L - X_L - 2B)}{2\lambda} - K \quad (\text{A4})$$

### A.2 Proof of Corollary 1

As  $\lambda > (1-p)(L - X_L)$ ,

$$\frac{dF_{2S}}{dB} = 1 - \frac{(1-p)^2(L - X_L)}{\lambda} > 0 \quad (\text{A5})$$

### A.3 Proof of Proposition 2

Let us first consider a low realization of  $B$  satisfying  $\delta_W(L - X_L) > B$ . The quality  $q_W^*$  of the audit maximizing the entrepreneur's welfare under the weak governance regime is then  $\arg \max_{q \in [q, 1]} (1-p)q[\delta_W(L - X_L) - B] - \frac{1}{2}\delta_W\lambda q^2$ . As  $\lambda > (1-p)(L - X_L) > (1-p)[\delta_W(L - X_L) - B]$ ,  $q_W^*$  is an interior solution and hence:

$$q_W^* = \frac{(1-p)[\delta_W(L - X_L) - B]}{\delta_W\lambda} \quad (\text{A6})$$

Given  $q_W^*$ , the expected value of the control benefits is:

$$\begin{cases} E_W(B) &= [p + (1-p)(1-q_W^*)]B \\ &= \left[1 - \frac{(1-p)^2[\delta_W(L-X_L)-B]}{\delta_W\lambda}\right]B \end{cases} \quad (\text{A7})$$

The net shareholder value is:

$$\begin{cases} V_W &= pX_H + (1-p)[q_W^*L + (1-q_W^*)X_L] - \frac{1}{2}\lambda q_W^{*2} \\ &= V_U + \frac{(1-p)^2[\delta_W(L-X_L)-B][\delta_W(L-X_L)+B]}{2\lambda\delta_W^2} \end{cases} \quad (\text{A8})$$

Under the weak governance regime, for a low realization of  $B$ , the welfare function is hence:

$$F_W = V_U + B + \frac{(1-p)^2[\delta_W(L-X_L)-B][\delta_W(L-X_L-2B)+B]}{2\lambda\delta_W^2} - K \quad (\text{A9})$$

Let us finally consider a high realization of  $B$  satisfying  $\delta_W(L-X_L) \leq B$ . Given this realization of  $B$ , the entrepreneur would never want to liquidate the firm and hence does not appoint any auditor. The expected control benefits  $E_W(B)$ , intrinsic value of equity  $V_W$ , and welfare function  $F_W$ , under the weak governance regime, for a high realization of  $B$  hence are:

$$\begin{cases} E_W(B) &= B \\ V_W &= V_U \\ F_W &= V_U + B - K \end{cases} \quad (\text{A10})$$

## A.4 Proof of Corollary 2

The intrinsic value of equity  $V_W$  obtaining under the weak governance regime is continuous in  $B$ . By differentiating  $V_W$  with respect to  $B$ , one obtains:

$$\begin{cases} \frac{dV_W}{dB} &= \frac{(1-p)^2B}{\lambda\delta_W^2} < 0 & \text{if } \delta_W(L-X_L) > B \\ &= 0 & \text{if } \delta_W(L-X_L) \leq B \end{cases} \quad (\text{A11})$$

For a given retained equity stake  $\delta_W$ , the intrinsic value of equity  $V_{2W}$  obtaining under the weak governance regime is hence weakly decreasing in  $B$ .

The intrinsic value of equity  $V_W$  obtaining under the weak governance regime is continuous in  $\delta_W$ . By differentiating  $V_W$  with respect to  $\delta_W$ , one obtains:

$$\begin{cases} \frac{dV_W}{d\delta_W} &= 0 & \text{if } \delta_W(L-X_L) \leq B \\ &= \frac{(1-p)^2B^2}{\lambda\delta_W^3} > 0 & \text{if } \delta_W(L-X_L) > B \end{cases} \quad (\text{A12})$$

For a given private benefit realisation  $B$ , the intrinsic value of equity  $V_W$  obtaining under the weak governance regime is hence weakly increasing in  $\delta_W$ .

The economic welfare  $F_W$  obtaining under the weak governance regime is continuous in  $\delta_W$ . By differentiating  $F_W$  with respect to  $\delta_W$ , one obtains:

$$\begin{cases} \frac{dF_W}{d\delta_W} = 0 & \text{if } \delta_W(L - X_L) \leq B \\ \frac{dF_W}{d\delta_W} = \frac{(1-p)^2 B^2 (1-\delta_W)}{\lambda \delta_W^3} > 0 & \text{if } \delta_W(L - X_L) > B \end{cases} \quad (\text{A13})$$

For a given private benefit realisation  $B$ , the economic welfare  $F_W$  obtaining under the weak governance regime is hence weakly increasing in  $\delta_W$ .

### A.5 Proof of Corollary 3

The value of equity  $V_S$  obtaining under the strong governance regime exceeds the value of equity  $V_W$  under the weak governance regime as:

$$\begin{cases} V_S - V_W = \frac{(1-p)^2 B^2}{2\lambda \delta_W^2} > 0 & \text{if } \delta_W(L - X_L) > B \\ V_S - V_W = \frac{(1-p)^2 (L - X_L)^2}{2\lambda} > 0 & \text{if } \delta_W(L - X_L) \leq B \end{cases} \quad (\text{A14})$$

### A.6 Proof of Corollary 4

For a given private benefit realisation  $B$ , the difference between economic welfare  $F_W$  obtaining under the weak governance regime and economic welfare  $F_S$  obtaining under the strong governance regime is as follows:

$$\begin{cases} F_W - F_S = \frac{(1-p)^2 B^2}{2\lambda \delta_W^2} (2\delta_W - 1) & \text{if } \delta_W(L - X_L) > B \\ F_W - F_S = -\frac{(1-p)^2 (L - X_L)(L - X_L - 2B)}{2\lambda} & \text{if } \delta_W(L - X_L) \leq B \end{cases} \quad (\text{A15})$$

Economic welfare obtaining under the weak governance regime thus exceeds economic welfare obtaining under the strong governance regime as long as either  $\delta_W(L - X_L) > B$  and  $\delta_W > \frac{1}{2}$  or  $\delta_W(L - X_L) \leq B$  and  $L - X_L < 2B$ .

### A.7 Proof of Lemma 2

Assume that the entrepreneur retains a stake  $\delta$  at the IPO stage and assume furthermore that the capital market believes the entrepreneur will subsequently retain his stake. By changing his equity stake by an amount  $\varepsilon$

unobserved by the financial market, the entrepreneur's welfare changes by:

$$(\delta + \varepsilon)[V(\delta + \varepsilon) - V(\delta)] + E_B(B, \delta + \varepsilon) - E_B(B, \delta) \quad (\text{A16})$$

Under the weak governance regime, in which the entrepreneur hires an auditor, the change in the entrepreneur's welfare can be shown to be equal to:

$$\frac{(1-p)^2 B^2}{2\lambda} \left[ \frac{\varepsilon}{\delta^2} + \frac{1}{\delta + \varepsilon} - \frac{1}{\delta} \right] \quad (\text{A17})$$

By differentiating (A17) with respect to  $\varepsilon$ , one hence obtains:

$$\frac{(1-p)^2 B^2}{2\lambda} \left[ \frac{1}{\delta^2} - \frac{1}{(\delta + \varepsilon)^2} \right] \quad (\text{A18})$$

which is strictly positive if and only if  $\varepsilon$  is strictly positive. The entrepreneur has therefore an incentive to increase his shareholding after the IPO but has no funds to do so.

Under the weak governance regime, a change from  $\delta = \frac{B}{L-X_L}$  to  $\frac{B}{L-X_L} + \varepsilon$ , with  $\varepsilon > 0$ , the change in the entrepreneur's welfare can be shown to be equal to:

$$\frac{(1-p)^2 B^2}{2\lambda(\delta + \varepsilon)} [(\delta + \varepsilon)(L - X_L) - B]^2 \quad (\text{A19})$$

which is strictly positive. Again, the entrepreneur has therefore an incentive to increase his shareholding after the IPO but has no funds to do so.

Under both the weak governance regime, in which the entrepreneur abstains from hiring any auditor, and the strong governance regime, the change in the entrepreneur's welfare is nil. There is thus no incentive for the entrepreneur to change his equity stake post IPO.

## A.8 Proof of Lemma 4

Let us assume that  $\delta(L - X_L) \geq B$ . Let us then consider  $f(\delta, B) \equiv (1 - \delta) \left[ V_U + \frac{(1-p)^2 [\delta(L-X_L)-B][\delta(L-X_L)+B]}{2\lambda\delta^2} \right] = (1-\delta) \left[ V_U + \frac{(1-p)^2}{2\lambda} [(L - X_L)^2 - \left(\frac{B}{\delta}\right)^2] \right]$  with  $\delta \in \left[ \frac{B}{L-X_L}, 1 \right]$ . By differentiating  $f(\delta, B)$  with respect to  $\delta$ , one obtains:

$$\begin{cases} \frac{\partial f(\delta, B)}{\partial \delta} &= - \left[ V_U + \frac{(1-p)^2}{2\lambda} [(L - X_L)^2 - \left(\frac{B}{\delta}\right)^2] \right] + (1 - \delta) \frac{(1-p)^2 B^2}{\lambda \delta^3} \\ &= -V_U + \frac{(1-p)^2}{2\lambda} \left[ \left(\frac{B}{\delta}\right)^2 \frac{2-\delta}{\delta} - (L - X_L)^2 \right] \end{cases} \quad (\text{A20})$$

Furthermore, as  $\delta(L - X_L) \geq B$ :

$$\begin{cases} \left. \frac{\partial f(\delta, B)}{\partial \delta} \right|_{\delta=1} = -V_U + \frac{(1-p)^2}{2\lambda} [B^2 - (L - X_L)^2] \\ < 0 \end{cases} \quad (\text{A21})$$

By differentiating  $f(\delta, B)$  twice with respect to  $\delta$ , one obtains:

$$\begin{cases} \frac{\partial^2 f(\delta, B)}{\partial^2 \delta} = \frac{(1-p)^2 B^2}{\lambda} \frac{\delta-3}{\delta^4} \\ < 0 \end{cases} \quad (\text{A22})$$

$\frac{\partial f(\delta, B)}{\partial \delta}$  is thus at its maximum at  $\delta = \frac{B}{L - X_L}$ , with:

$$\left. \frac{\partial f(\delta, B)}{\partial \delta} \right|_{\delta = \frac{B}{L - X_L}} = -V_U + \frac{(1-p)^2 (L - X_L)^2 (L - X_L - B)}{\lambda B} \quad (\text{A23})$$

As  $\lim_{B \rightarrow 0} \left. \frac{\partial f(\delta, B)}{\partial \delta} \right|_{\delta = \frac{B}{L - X_L}} > 0$  and  $\lim_{B \rightarrow L - X_L} \left. \frac{\partial f(\delta, B)}{\partial \delta} \right|_{\delta = \frac{B}{L - X_L}} < 0$ , the sign of  $\left. \frac{\partial f(\delta, B)}{\partial \delta} \right|_{\delta = \frac{B}{L - X_L}}$  hence depends on the magnitude of  $B$ .

There thus exists a threshold  $B^*$  such that  $\bar{\delta} \equiv \arg \max_{\delta \in \left[ \frac{B}{L - X_L}, 1 \right]} f(\delta, B) = \frac{B}{L - X_L}$  if  $B^* \leq B \leq L - X_L$  and  $\bar{\delta} \equiv \arg \max_{\delta \in \left[ \frac{B}{L - X_L}, 1 \right]} f(\delta, B) \in \left( \frac{B}{L - X_L}, 1 \right)$  if  $0 < B < B^*$ . The threshold  $B^*$  is furthermore defined by the following identity:

$$B^* \equiv \frac{(1-p)^2 (L - X_L)^3}{\lambda V_U + (1-p)^2 (L - X_L)^2} \quad (\text{A24})$$

From the definition of  $\bar{\delta}$ , if  $B < B^*$ ,  $\left. \frac{\partial f(\delta, B)}{\partial \delta} \right|_{\bar{\delta}} = 0$ , which implies that:

$$\frac{(1-p)^2}{2\lambda} \left( \frac{B}{\bar{\delta}} \right)^2 \left( \frac{2}{\bar{\delta}} - 1 \right) = V_S \quad (\text{A25})$$

By differentiating this expression totally with respect to  $B$  over  $[0, B^*]$ , one obtains:

$$\frac{d\bar{\delta}}{dB} = \frac{\bar{\delta}(2 - \bar{\delta})}{B(3 - \bar{\delta})} > 0 \quad (\text{A26})$$

The equity stake  $\bar{\delta}$  is hence weakly increasing in  $B$  (strictly increasing over  $[0, B^*]$  and equal to  $\frac{B}{L - X_L}$  when  $B$  strictly exceeds  $B^*$ ).

Furthermore, by differentiating  $f(\bar{\delta}, B) \equiv \bar{K}$  totally with respect to  $B$  over  $[0, B^*]$ , one obtains  $\frac{d\bar{K}}{dB} = \frac{\partial \bar{K}}{\partial B} + \frac{\partial \bar{K}}{\partial \bar{\delta}} \frac{d\bar{\delta}}{dB}$ . From the definition of  $\bar{\delta}$ ,  $\frac{\partial f(\bar{\delta}, B)}{\partial \bar{\delta}} =$

0, which implies that:

$$\frac{d\bar{K}}{dB} = \frac{\partial\bar{K}}{\partial B} = -\frac{(1-\bar{\delta})(1-p)^2B}{\lambda\bar{\delta}^2} < 0 \quad (\text{A27})$$

The threshold  $\bar{K}$  is hence strictly decreasing in  $B$  (as  $\frac{df(\frac{B}{L-X_L}, B)}{dB}$  is strictly negative too when  $B$  strictly exceeds  $B^*$ ).

If  $K \leq \bar{K}$ , there thus exists a unique equity stake  $\delta$  weakly exceeding  $\frac{B}{L-X_L}$  and satisfying  $f(\delta, B) = K$  as long as  $B > B^*$  and up to two such equity stakes as long as  $B \leq B^*$ . Let us denote the largest one by  $\hat{\delta}$ . By differentiating  $f(\hat{\delta}, B) = K$  totally with respect to  $B$  and recognizing that both  $\frac{\partial f(\delta, B)}{\partial B}\Big|_{\hat{\delta}} \leq 0$  and  $\frac{\partial f(\delta, B)}{\partial \delta}\Big|_{\hat{\delta}} \leq 0$ , one obtains:

$$\frac{d\hat{\delta}}{dB} = -\frac{\frac{\partial f(\delta, B)}{\partial B}\Big|_{\hat{\delta}}}{\frac{\partial f(\delta, B)}{\partial \delta}\Big|_{\hat{\delta}}} \leq 0 \quad (\text{A28})$$

The equity stake  $\hat{\delta}$  is hence decreasing in the magnitude of the private benefits  $B$ . Furthermore, by differentiating  $f(\hat{\delta}, B) = K$  totally with respect to  $K$ , one obtains:

$$\frac{d\hat{\delta}}{dK} = \frac{1}{\frac{\partial f(\delta, B)}{\partial \delta}\Big|_{\hat{\delta}}} < 0 \quad (\text{A29})$$

The retained equity stake  $\hat{\delta}$  thus decreases in the magnitude of the required investment  $K$  and the value of the private benefit  $B$ . The retained equity stake  $\hat{\delta}$  furthermore converges towards 1 when  $K$  tends towards 0 and converges towards  $\delta_S^*$  when  $B$  tends towards 0.

## A.9 Proof of Proposition 5

Let us assume that the firm's cash-flow  $X_L$  obtaining when the firm is unsuccessful is high enough to repay both the principal to the debtholders and the audit fee to the auditor.

Let us first assume that  $L - X_L \geq B$ . The quality  $q_D^*$  of the audit maximizing the entrepreneur's welfare is then  $\arg \max_q (1-p)q(L - X_L - B) - \frac{1}{2}\lambda q^2$ . As  $\lambda > (1-p)(L - X_L) > (1-p)(L - X_L - B)$ ,  $q_D^*$  is an interior solution and hence:

$$q_D^* = \frac{(1-p)(L - X_L - B)}{\lambda} \quad (\text{A30})$$

In this case, the intrinsic value of equity  $V_D$ , expected control benefits  $E_D(B)$ , and welfare function  $F_D$  obtaining at the date of purchase of the audit are hence:

$$\begin{cases} V_D & = V_U - D + \frac{(1-p)^2}{2\lambda}[(L - X_L)^2 - B^2] \\ E_D(B) & = [1 - \frac{(1-p)^2(L - X_L - B)}{\lambda}]B \\ F_D & = V_U + B + \frac{(1-p)^2}{2\lambda}(L - X_L - B)^2 - K \end{cases} \quad (\text{A31})$$

The maximum amount of debt,  $K_D$ , satisfying  $X_L - K_D - \Phi(q_D^*) \geq 0$ , is hence:

$$K_D = X_L - \frac{(1-p)^2}{2\lambda}(L - X_L - B)^2 \quad (\text{A32})$$

Let us then assume that  $L - X_L < B$ . In this case, the entrepreneur abstains from purchasing any audit and keeps the firm as a going concern. The intrinsic value of equity  $V_D$ , expected control benefits  $E_D(B)$ , and welfare function  $F_D$  obtaining at the date of purchase of the audit are similar to those obtaining under weak governance when  $\delta_W(L - X_L) \leq B$ .

## A.10 Proof of Lemma 6

Under the regime of strong governance, the audit fee  $\Phi[q_S^*(\lambda_L)]$  charged by the high productivity auditor is given by the following relation:

$$\begin{cases} \Phi[q_S^*(\lambda_L)] & = (1-p)(L - X_L)[q_S^*(\lambda_L) - q_S^*(\lambda_H)] + \Phi[q_S^*(\lambda_H)] \\ & = (1-p)^2(L - X_L)^2[\frac{1}{\lambda_L} - \frac{1}{2\lambda_H}] \end{cases} \quad (\text{A33})$$

This implies that the intrinsic value of equity,  $V_S^D$ , expected private benefit,  $E_S^D(B)$ , and entrepreneur welfare,  $\Omega_S^D$ , obtaining under the strong governance regime are given by:

$$\begin{cases} V_S^D & = V_S(\lambda_H) \\ E_S^D(B) & = E_S(B, \lambda_H) - \pi(1-p)^2(L - X_L)\frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} B \\ \Omega_S^D & = F_S(\lambda_H) - \pi(1-p)^2(L - X_L)\frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} B \end{cases} \quad (\text{A34})$$

Under the strong governance regime, the economic rent  $\Pi_S^D(\lambda_L)$  derived by the high productivity auditor is hence:

$$\Phi[q_S^*(\lambda_L)] - \frac{1}{2}\lambda_L q_S^{*2}(\lambda_L) = \frac{(1-p)^2(L - X_L)^2}{2} \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} \quad (\text{A35})$$

Under the regime of weak governance, assuming that  $\delta_W^D(L - X_L) - B \geq 0$ , the audit fee  $\Phi[q_W^*(\lambda_L)]$  charged by the high productivity auditor is given by the following relation:

$$\begin{cases} \delta\Phi[q_W^*(\lambda_L)] &= (1-p)[\delta_W^D(L - X_L) - B][q_W^*(\lambda_L) - q_W^*(\lambda_H)] + \delta\Phi[q_W^*(\lambda_H)] \\ &= \frac{(1-p)^2[\delta_W^D(L - X_L) - B]^2}{\delta_W^D} \left[ \frac{1}{\lambda_L} - \frac{1}{2\lambda_H} \right] \end{cases} \quad (\text{A36})$$

This implies that the intrinsic value of equity,  $V_W^D$ , expected private benefit,  $E_W^D(B)$ , and entrepreneur welfare,  $\Omega_W^D$ , obtaining under the weak governance regime are given by:

$$\begin{cases} V_W^D &= V_W(\lambda_H) + \pi \frac{(1-p)^2}{(\delta_W^D)^2} [\delta_W^D(L - X_L) - B] B \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} \\ E_W^D(B) &= E_W(B, \lambda_H) - \pi \frac{(1-p)^2 [\delta_W^D(L - X_L) - B]}{\delta_W^D} \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} B \\ \Omega_W^D &= F_W(\lambda_H) + \pi \frac{(1-p)^2 [\delta_W^D(L - X_L) - B]}{\delta_W^D} B \left[ \frac{1}{\delta_W^D} - 1 \right] \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} \end{cases} \quad (\text{A37})$$

Under the weak governance regime, the economic rent  $\Pi_W^D(\lambda_L)$  derived by the high productivity auditor is hence:

$$\Phi[q_W^*(\lambda_L)] - \frac{1}{2} \lambda_L q_W^{*2}(\lambda_L) = \frac{(1-p)^2}{2} \left[ L - X_L - \frac{B}{\delta_W^D} \right]^2 \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} \quad (\text{A38})$$

## A.11 Proof of Proposition 6

When either the proportion of high productivity auditors or the difference in productivity is small enough, it can be shown that the intrinsic value of equity and entrepreneur welfare are increasing in the entrepreneur's retained equity stake. Under the same conditions, the results of Lemma 4 also obtain when the market for audit services is differentiated.

Let us then assume that  $\delta_W^{D*}(L - X_L) - B \geq 0$ . It can then be shown that:

$$\begin{cases} \Omega_W^D - \Omega_S^D &= F_W(\lambda_H) - F_S(\lambda_H) \\ &+ \pi(1-p)^2 \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} \frac{B}{(\delta_W^{D*})^2} [\delta_W^{D*}(L - X_L) - B + \delta_W^{D*} B] \\ F_W^D - F_S^D &= \Omega_W^D - \Omega_S^D + \pi[\Pi_W^D(\lambda_L) - \Pi_S^D(\lambda_L)] \\ &= \frac{(1-p)^2 B^2}{2\lambda_H (\delta_W^{D*})^2} (2\delta_W^{D*} - 1) + \frac{\pi(1-p)^2}{2} \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} \left( \frac{B}{\delta_W^{D*}} \right)^2 (\delta_W^{D*} - 1) \end{cases} \quad (\text{A39})$$

Consider  $B$  small enough and  $K$  high enough so that  $\delta_W^{D*} = \frac{1}{2}$ . It hence follows that  $F_W(\lambda_H) - F_S(\lambda_H) = 0$  and  $\Omega_W^D - \Omega_S^D$  is strictly positive.  $F_W^D - F_S^D$



is however strictly negative. There thus exists some interval for  $K$  over which the entrepreneur selects the weak governance regime when the strong governance regime maximizes economic welfare.

## A.12 Proof of Proposition 7

Consider now some required investment  $K$  high enough and some private benefit  $B$ , with  $B$  arbitrarily close to but lower than  $\frac{L-X_L}{2}$ , such that the entrepreneur does not hire any auditor under the weak governance regime. It can then be shown that:

$$\left\{ \begin{array}{l} \Omega_W^D - \Omega_S^D = (1-p)^2(L-X_L) \left[ \pi \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} B + \frac{2B-L+X_L}{2\lambda_H} \right] \\ F_W^D - F_S^D = \Omega_W^D - \Omega_S^D - \pi \Pi_S^D(\lambda_L) \\ \phantom{F_W^D - F_S^D} = (1-p)^2(L-X_L) \frac{2B-L+X_L}{2} \left[ \pi \frac{\lambda_H - \lambda_L}{\lambda_L \lambda_H} + \frac{1}{\lambda_H} \right] \end{array} \right. \quad (\text{A40})$$

If  $B$  becomes close enough to  $\frac{L-X_L}{2}$ ,  $\Omega_W^D > \Omega_S^D$ , and the entrepreneur hence selects the weak governance. However,  $F_W^D < F_S^D$ , and hence, the strong governance regime however maximizes economic welfare.

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