Optimal Auditing Standards

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Comments welcome

Abstract

We study regulation of the auditing profession in a model where audit quality is unobservable and enforcing regulation is costly. The optimal audit standard falls short of the first-best audit quality, and is increasing in the economy's wealth, in the likelihood of a mistaken investment and in the size of typical investment. The model can encompass collusion between clients and auditors, arising from the joint provision of auditing and consulting services: deflecting collusion requires less ambitious standards. The optimal audit standard depends also on the corporate governance of client firms: audit standards and corporate governance are complements. Finally, the decision to ban the bundling of consulting and audit services should depend on the auditors' economies of scope, the intensity of their conflict of interest, and their clients' corporate governance.

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1. Introduction

The recent corporate scandals involving major companies (Enron, Worldcom, Qwest, Sunbeam, Parmalat, etc.) have highlighted that the regulation of auditing companies and its enforcement are key determinants of the reliability of corporate information. For many of the companies involved in corporate scandals, auditors failed to report any misbehavior or substantive inaccuracy. These audit failures have damaged auditors' reputation as independent experts and monitors of accounting information.

As a result of this loss of confidence, there has been a shift from self-regulation and litigation-based enforcement of audit rules towards government regulation and public-driven enforcement.[1] In the United States, the Sarbanes-Oxley Act of 2002 established the Public Company Accounting Oversight Board (PCAOB), which, under the oversight of the Security Exchange Commission (SEC), will register public accounting firms, and establish rules for auditing, quality control, ethics, independence and other standards. Moreover, it will inspect accounting firms, carry out disciplinary proceedings and impose penalties. A similar shift is under way in the other countries: for instance, also the United Kingdom moved away from self-regulation by establishing a UK Accounting Standards Boards, and in Italy new legislation is being drafted that will extend the power of the national securities commission (CONSOB) to regulate and oversee auditors' activity.

Now that the role of the public regulation of auditors is widely recognized, the natural question arises of what is the optimal design of such regulation. In this paper, we show that the answer to this question depends on three main ingredients. First, the cost of enforcing regulation, which includes both the necessary public funding (salaries of bureaucrats and judges, paperwork, investigations, etc.) and the compliance costs borne by audit firms and their customers. Second, the accountants' incentives to collude with their clients, which in turn depend both on the auditors' conflict of interest and on their client companies' governance. Third, the possible economies of scope that may be reaped through the joint provision of auditing and consulting services to the same firm.

We characterize the auditing standards that a benevolent regulator should impose if the quality of the accounting information provided by auditors is privately unobservable, so that in the absence of regulation the equilibrium level of audit quality would be zero. To avoid the implied loss of informational efficiency (and misallocation of investment), the regulator can impose a minimum quality standard on auditors, but in choosing it must take its enforcement cost into account. As a

[1] Auditing rules apply to the conduct of auditors: they prescribe how audits must be conducted. In contrast, accounting standards apply to firms: they concern the reporting principles and procedures that firms can use.

result, the optimal standard will fall short of the first-best audit quality level, and must be lower the less efficient is the enforcement technology. Moreover, the optimal standard depends on the economy's wealth: it rises with income in countries where consumption is at the subsistence level. If consumption exceeds subsistence, the optimal standard must be chosen on the basis of the informational value of audits for investment decisions: it must be higher the greater is the danger of making a mistaken investment, and the larger is the typical investment at stake.

This baseline model assumes that the moral hazard problem lies only in the activity of auditors, while firms always seek a truthful report. But the recent corporate scandals suggest that also the behavior of companies may be plagued by moral hazard, because "empire-building" managers may want to carry out investment at all costs, irrespective of its profitability, and therefore may want to bribe auditors into producing positive reports under all circumstances. To bribe auditors, managers can award a profitable consulting contract for to the auditor, on condition that he files a positive report. In order to deflect the danger of collusion between firm and auditor, the regulator will have to spend more resources to police any given audit standard. As a result, when the managers of client firms seek to corrupt their auditors, the regulator must optimally choose a less ambitious standard.

Whether managers will want to corrupt their auditors or not, however, depends on the quality of the corporate governance of their companies. We show that as managers' incentives become more aligned to shareholders' interests, the optimal audit standard increases, except for a discontinuous downward jump. Depending on the quality of corporate governance, the regulator should either try to discourage auditors from *taking* bribes or it can attempt to discourage managers from *offering* them. When corporate governance is very bad, it is less distortionary to discourage auditors from accepting bribes. Above a critical quality of corporate governance (where the discontinuity occurs), it is more efficient to discourage managers from offering bribes. In the latter region, the optimal audit standard increases monotonically in the quality of corporate governance, until it reaches the second-best level. In this region, audit standards and corporate governance are complements.

An additional regulatory tool is to sever the link between consulting and auditing activity, by forbidding auditors to provide consulting services, as indeed prescribed by the Sarbanes-Oxley Act. If this is the only way in which client firms may "bribe" their auditors, this policy would appear as a superior option to tampering with auditing standards. Indeed, in our model it would allow the regulator to leave the standard at the second-best level. However, this conclusion may no longer hold if the joint provision of auditing and consulting services generates economies of scope. We show that banning such joint provision is socially inefficient if the implied cost savings are sufficiently large and the conflict of interest is not too acute, and in any event if the corporate governance of client companies is sufficiently good. So the quality of corporate governance allows not only to go for a more ambitious auditing standard, but also to reap more easily the cost saving from economies of scope in auditing.

Our model is closely related to the microeconomic analysis of the auditor-firm relationship proposed by Dye (1993) and to the normative analysis of regulation and enforcement developed by Immordino and Pagano (2003). As in Dye (1993), auditors can contribute to the efficient allocation of investment but the quality of their audits is unobservable, leading to a moral hazard problem. But in our setting this problem is not left to litigation between investors and accountants, but entrusted to regulation and its enforcement by public officials. The choice of the optimal regulatory response takes into account its enforcement cost, along the lines of Immordino and Pagano (2003).

The result is a systematic normative analysis of the regulation of the auditing profession, which takes into account also the possible conflicts of interest within auditing firms, and the agency problems between managers and shareholders within client firms. These aspects are particularly topical in view of the ongoing debate about the appropriate regulatory response to the recent corporate scandals, and of the slate of recent empirical work produced in the accounting profession on the relationship between auditor independence, audit fees and clients' corporate governance. The studies on the correlation between auditors' fees for MAS and abnormal accruals, used as a measure for biased reporting, report contradictory results (Frankel, Johnson and Nelson, 2002; Kinney and Libbey, 2002; Antle, Gordon, Narayanmoorthy and Zhou, 2002, among others). The evidence on the relationship between corporate governance and measures of auditors' misreporting is more clearcut. The incidence of accounting fraud and earnings management is lower in firms with more independent boards (Beasley, 1996; Dechow, Sloan and Sweeney, 1996; Klein, 2002), and the frequency of earning restatements is lower in firms whose board or audit committees include an independent director with financial expertise (Agrawal and Chada, 2005).

The structure of the paper is as follows. In section 2 we present the model, derive the first-best audit quality, and characterize the second-best audit standard to be chosen if audit quality is privately unobservable. In Section 3, we analyze the optimal policy when firms collude with the auditors, by exploiting the latter's conflict of interest. Section 4 studies the relationship between the optimal audit standard and the firms' corporate governance. Section 5 considers how the design of regulation is affected once one allows for potential economies of scope arising from bundling auditing and consulting services. Section 6 places the paper in perspective, by comparing the analysis of regulation with alternative mechanisms so far tried or proposed in order to improve the informativeness of audits. Section 7 concludes.

2. The model

This section explains the rationale for regulation of auditing. It starts by introducing a setting similar to Dye (1993) to highlight the informational value of auditing to raise new finance, in a setting where the value of companies is uncertain. We start from a situation where auditors' activity is observable and contractible, so that the economy achieves the first-best outcome. We then examine what happens if investors cannot observe the level of effort that auditors invest in their task. This moral hazard problem in auditing implies that auditors will choose the minimal level of quality. Under our assumptions, the social cost of this moral hazard is that companies will allocate the investment less efficiently.

2.1. Informational value of auditing

Consider an economy with risk neutrality and no discounting by all agents, and a continuum of firms. The representative company is managed in the interest of the shareholders, so that the manager's objective is to maximize its current value.

The company can effect an investment of size I. To catch this opportunity, it must get a cash infusion that equals the investment I plus any fees F to be paid to an auditor. Assuming that the required of return on the new capital is standardized to zero, shareholders provide the needed cash infusion in exchange for shares in the company that are worth $I + F$, out of their endowment Y.[2] Their budget constraint is:

$$Y = I + F + T + X_I , \tag{1}$$

which states that investors spend their endowment Y to buy shares in the company (paying $I + F$), pay taxes T, and purchase consumption X_I .

Eventually, the project may turn out to be a success (state $s = H$) or a failure (state $s = L$). State H occurs with unconditional probability p, and state L with probability $1-p$. If the project is a success, the company's final value $\tilde{V}$ is V_H ; if not, it is $V_L < I < V_H$. This implies that in the bad state the new investment is unprofitable. Since there is a continuum of firms, p is also the fraction of successful firms. The firm's initial shareholders are supposed to have no private information about

[2] A larger stake would leave them with a surplus; a smaller one would violate their participation constraint. In most of the paper, it is indifferent whether this cash infusion is contributed by the initial shareholders or by new shareholders. It will become relevant only in Section 5.

its future value. So, absent any additional information, the company's initial value V is the unconditional expectation of its final value, $E(V) = pV_H + (1-p)V_L$. We assume that $E(V) > I$, so that the investment is worthwhile even if no information is gathered via an audit report.

However, an audit may still be worthwhile as it allows the firm to condition its investment decision on more accurate information. If the company is audited before it raises additional equity, its market price will reflect also the information conveyed by the audit. As in Dye (1993), auditors have a costly technology that aids in distinguishing high-value from low-value firms. If an auditor performs an audit of quality $q \in (0,1)$, he produces a report r about the firm's final value at a cost $C(q)$, which is increasing and convex in q, with $C(0) = 0$, $\lim_{q \to 0} C'(q) = 0$ and $\lim_{q \to 1} C'(q) = \infty$.

If the auditor believes that the project will fail, he reports $r = L$. Otherwise, he reports $r = H$. The auditor's report is perfectly accurate when positive, while it may err if negative. Formally the conditional probabilities of the auditor's report being correct are:

$$\Pr(r = L \mid s = L,\ q) = q,$$
$$\Pr(r = H \mid s = H,\ q) = 1.$$

Using Bayes' rule, the probability that the company will succeed conditional on a good report is:

$$\Pr(s = H \mid r = H) = \frac{\Pr(s = H \cap r = H)}{\Pr(r = H)} = \frac{p}{p + (1-p)(1-q)}. \tag{2a}$$

while the probability that it will succeed conditional on a bad report is zero:

$$\Pr(s = H \mid r = L) = \frac{\Pr(s = H \cap r = L)}{\Pr(r = L)} = 0. \tag{2b}$$

For convenience, we denote by $r = N$ the case in which no audit is carried out. In this case, the probabilities of the states H and L will be the unconditional ones, p and $1-p$.

The initial value of the company V takes three different values depending on whether: (i) a positive report is filed; (ii) a negative one is filed; (iii) no audit is carried out. Correspondingly, the shareholders' surplus from the investment I, before netting out the audit fee F (if an audit is performed), $S = E(\tilde{V} \mid r) - I$, will take different values in each of these contingencies:

$$S_H(q) = \left[V_H \Pr(s = H \mid r = H, q) + V_L \Pr(s = L \mid r = H, q)\right] - I = \frac{V_H p + V_L (1-p)(1-q)}{p + (1-p)(1-q)} - I, \tag{3a}$$

$$S_L(q) = \left[V_H \Pr(s = H \mid r = L, q) + V_L \Pr(s = L \mid r = L, q)\right] - I = V_L - I, \tag{3b}$$

$$S_N = E(V) - I, \tag{3c}$$

where we have used the conditional probabilities in (2a) and (2b). By assumption, $S_L(q) < 0$ and $S_N > 0$. From the latter inequality, it follows that $S_H(q) > 0$. Therefore, the investment is carried out when no audit report is filed or when it is favorable. It will not be carried out if the report is unfavorable, so that in this case the surplus, conditional on the optimal investment decision, is zero.

However, whenever an audit is commissioned, it must be paid for. So we define the net surplus:

$$\Delta_r = \begin{cases} S_H(q) - F & \text{if} \quad r = H, \\ -F & \text{if} \quad r = L, \\ S_N & \text{if} \quad r = N, \end{cases} \tag{4}$$

which takes into account both the cost of the audit *F* and the optimal investment decision.

The informational value of an audit is the difference between the expected value of *Δ* with an audit and its value without an audit:

$$\Omega(q) = \Pr(r = H)\Delta_H + \Pr(r = L)\Delta_L - \Delta_N = q(1-p)(I - V_L) - F, \tag{5}$$

which is easily obtained from (4). This expression is increasing in the quality of auditing *q*, decreasing in the quality of available projects *p* (the worse the pool, the more valuable is information), and increasing in the losses that would arise from investing in bad ones. The term $I - V_L$ is a measure of the potential misallocation of investment that can be prevented by auditors' information.

2.2. The unregulated outcome

If the audit fee *F* just equals the auditors' cost *C*(*q*), i.e. if auditors make zero profits, then expression (5) becomes the net *social* surplus (on a per-firm basis):

$$W(q) = q(1-p)(I - V_L) - C(q), \tag{6}$$

Indeed, since auditors earn zero profits, the entire net social surplus accrues to the shareholders.

The first-best outcome is obtained by maximizing the net social surplus *W*(*q*). Given our assumptions about the auditor's cost function, *W*(*q*) is concave and has an internal maximum where the marginal value of audit quality equals its marginal cost. This identifies the first-best quality value $q^{FB} \in (0,1)$:

$$(1-p)(I-V_L) = C'(q^{FB}). \tag{6}$$

Since the cost function $C(q)$ is convex, q^{FB} is decreasing in the quality of the pool and increasing in the potential misallocation of investment, just as the informational value of auditing.

If the audit quality is observable, the first-best outcome emerges as the competitive market equilibrium. Firms' managers choose their "demand for audit quality" by maximizing the informational value of auditing, $\Omega(q)$. Auditors choose their "supply of audit quality" by maximizing their profit per audit, $F(q)-C(q)$, and make zero profits. The market-clearing price of an audit will then be the fee corresponding to the first-best level of audit quality, $F(q^{FB})$.

It is easy to show that if quality is observable, the first-best allocation coincides with the Bertrand equilibrium of the model, that is, the Nash equilibrium of an extensive-form game where auditors choose the quality q of the audit and a fee function $F(q)$. The strategy of auditor j is a choice of quality and fee, which is the best response to the qualities and fees chosen by competing auditors. The situation in which all firms choose the first-best quality and price is a Nash equilibrium, since no firm can profitably deviate.

If instead the audit quality is privately unobservable, then for any positive audit quality expected by investors, auditors have an incentive to choose a lower level and save the corresponding cost. As a result, the only equilibrium audit quality is zero, the market price will equal the unconditional expectation $E(V)$, and the firm will be more likely to carry out *ex-post* unprofitable investments. So in this case there is a rationale for public intervention. To this we turn in the next subsection.

2.3 Regulated auditing

The government sets an auditing quality standard q^*. This implies that auditors must choose a quality level at least equal to q^* and must truthfully report the signal that they observe with this quality level. If they deviate from either one of these duties, they are liable to pay a penalty l. The quality chosen by auditors is observable and verifiable at a cost by a regulator, who chooses also the amount of resources e devoted to enforcement, i.e. to detection of violators. The penalty is monetary and cannot exceed an upper bound l^*. This bound can be thought as the entire wealth of the auditing company, which can be taken as exogenous in the context of the relationship with a specific client.[3]

Figure 1 illustrates the sequence of moves. First, nature chooses the state *s*. Second, the regulator chooses the audit standard *q**, the penalty *l* and the enforcement *e*. Third, auditors choose the quality level of their audit *q* charging the fee *F*(*q*), and produce the corresponding report *r*. Fourth, bureaucrats enforce the standard by inspection, detecting non-compliance with probability $f(e)$.[4] Next, the stock market sets the price of the company at a level reflecting the perceived quality of auditing, and shareholders contribute equity to the company to finance audit fees and possibly investment. Finally, the company's actual value is determined.

[Insert Figure 1]

For it to be respected, the audit standard must be backed up by an appropriate expected penalty *L* in case of non-compliance. The auditor's profit is:

$$\Pi = F(q) - C(q) - L\,, \tag{7}$$

where the expected penalty *L* is the product of the probability *f*(*e*) of detecting a non-complying auditor and the statutory penalty *l*. The probability of detection is increasing and concave in the regulator's effort: $f'(e) > 0$, $f''(e) < 0$, with $f(0) = 0$, $\lim_{e\to 0} f'(e) = \infty$ and $\lim_{e\to\infty} f'(e) = 0$, that is, the enforcement technology has decreasing marginal productivity. So the expected penalty is:

$$L = \begin{cases} f(e)l & \text{if } q < q^*, \\ 0 & \text{otherwise.} \end{cases}$$

If auditors earn any positive profits, these are spent on their consumption: $\Pi = X_A$.

The penalty contributes to the government's revenue from penalties, *f*(*e*) also being the fraction of auditors that are inspected. Enforcement is financed out of the sum of net taxes and revenue from

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[3] This wealth can derive from previous customers, and from the sale of non-audit services, in areas of tax consulting, accounting, management information systems, etcetera. In reality it may be impossible to confiscate the entire wealth of the auditor, due to the danger of "subversion of justice": setting too high a penalty may induce violators to subvert it, by investing in legal strategies to avoid punishment or by intimidating and bribing officials (Glaeser and Shleifer, 2003).

[4] In our setting, the regulator commits to the probability of detection $f(e)$, by allotting the level of resources *e* to enforcement activity. One can think of *e* as the salaries paid to the officials in the authority that oversees the application of audit standards: once hired, these detect violations with a probability given by their enforcement technology.

penalties (although, as we shall see below, no revenue from penalties is collected in equilibrium).[5] Assuming that the budgetary cost of a unit of enforcement is a unit of consumption and that the regulator spends all tax revenue on enforcement, the government budget constraint is $e = T + L$.

Being benevolent, the regulator chooses the auditing standard $q*$, the enforcement level e and the penalty l so as to maximize the social surplus from auditing quality minus the associated enforcement cost, $W(q) - e$, subject to the incentive-compatibility constraint of auditors and the feasibility constraint that aggregate consumption does not fall short of the subsistence level $\underline{X}$: $X \equiv X_I + X_A \geq \underline{X}$. Formally, the problem is:

$$\max_{l,q*,e} q^*(1-p)(I-V_L) - C(q^*) - e \tag{8}$$

subject to the incentive compatibility constraint:

$$F(q^*) - C(q^*) \geq F(q^*) - C(q) - f(e)l \quad \text{for any } q \neq q^*, \tag{9}$$

and to the feasibility constraint, which can be re-expressed as:[6]

$$X \equiv Y - I - C(q) - e \geq \underline{X} . \tag{10}$$

In the incentive compatibility constraint (9), the auditor's fee F on both sides of the inequality corresponds to the prescribed audit quality expected by investors, while the cost C depends on the quality level actually chosen by the auditor.

As in Becker (1968), for any positive enforcement level it is optimal to set the penalty at the maximum feasible level: [7] $l = l^*$. To obtain the optimal enforcement level, we use the incentive compatibility constraint (9) with equality, since the optimal policy requires this constraint to be binding. If not, the regulator could increase welfare by lowering enforcement e, for any given l^*. Next, notice that, in case of non-compliance, the auditor would optimally deviate to a zero quality level, since this would minimize his cost. Finally, since the detection probability $f(e)$ is monotonically increasing, it can be inverted to yield the optimal enforcement:

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[5] Since utility is linear, taxation causes no distortions.

[6] The national accounting identity on the left-hand-side of (10) is obtained by combining the shareholders' budget constraint (1) with the auditors' budget constraint $\Pi = X_A$ and the government budget constraint $T = e - L$.

[7] To see why, notice that if the penalty were set at a lower level, increasing it would enable the regulator to decrease enforcement e while keeping L constant. The social surplus in the objective function would be unchanged but the enforcement cost would be lower, so that welfare would be higher.

$$e(q^*) = f^{-1}(C(q^*)/l^*). \tag{11}$$

From the properties of the enforcement and audit technologies, it is immediate that the optimal enforcement e^* is an increasing and convex function of the audit standard q^*, and a decreasing function of the maximum penalty l^*.[8] The positive relationship between enforcement and audit standards highlights their complementarity: a more demanding audit standard invites non-compliance by auditors, so that it must be assisted by more intensive monitoring by the regulator.

Replacing the optimal enforcement (11) into the objective function, the problem of maximizing (8) under the feasibility constraint (10) can be rewritten as the Lagrangian:

$$\max_{q^*} \; Y + q^*(1-p)(I - V_L) - C(p^*) - e(q^*) + \lambda\left[Y - I - C(q^*) - e(q^*) - \underline{X}\right], \tag{12}$$

where λ is the Lagrange multiplier. The first-order conditions of this problem are:

$$\begin{cases} (1-p)(I - V_L) = (1+\lambda)(C'(q^*) + e'(q^*)), & \text{(13a)} \\ \lambda\left[Y - I - C(q^*) - e(q^*) - \underline{X}\right] = 0. & \text{(13b)} \end{cases}$$

From these optimality conditions, one can show:

Proposition 1 (Second-best audit standard). *The optimal audit standard q^* is smaller than the first-best standard q^{FB}.*

The proof of this proposition (and subsequent ones) is in the Appendix. The intuition for why the optimal standard is lower than the first-best level is very simple: the regulator must take into account the resource cost of enforcing it. The comparative statics of the optimal standard generally depend on whether consumption is at subsistence level or not:

Proposition 2 (Comparative statics). *If aggregate consumption exceeds subsistence, then the optimal standard is decreasing in the fraction of successful projects p and increasing in the required investment I. If aggregate consumption is at the subsistence level, then the optimal*

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[8] The first derivative of enforcement with respect to the standard is $e' = f'^{-1}(C(q^*)/l^*) \cdot C'(q^*)/l^* > 0$. Its second derivative is $e'' = f'^{-1}(C(q^*)/l^*) \cdot C''(q^*)/l^* + f''^{-1}(C(q^*)/l^*) \cdot (C'(q^*)/l^*)^2 > 0$.

standard is increasing in initial income Y and decreasing in the required investment I. In both cases, it is increasing in the efficiency of the auditing and enforcement technology.

Intuitively, when a country has sufficient resources to pay for auditing, it should choose a more demanding standard if audits allow investors to pick the few winners in a bad pool, and/or if the audit cost is spread over a large investment. These are situations in which the social value of a reliable auditor is very high. If instead a country's resources are already largely absorbed by consumption and investment, as probably happens in many developing countries, the auditing standard can be raised only insofar as additional resources become free to fund the implied enforcement and auditing costs. This happens either if income *Y* increases, and/or if the required investment *I* decreases.[9] The only comparative statics that are common to these two situations are those concerning technological shifts: in both cases, a country can afford higher standards if its auditors become more efficient in their job and/or regulators become better at monitoring them.

3. Auditors' conflict of interest and collusion with audited firms

As discussed in the introduction, one of the alleged sources of the recent corporate scandals has been the ability of company managers to "buy" the acquiescence of auditors by exploiting the conflict of interest between their consulting arm and their auditing arm. Auditing firms can provide services in the area of tax, accounting or management information systems and strategic advice, which are commonly labeled "management advisory services" (MAS). The fees for the purchase of MAS can be used to reduce the independence of auditing reports.

To capture the auditor's conflict of interest, we amend the model by assuming that the firm's managers can condition the purchase of MAS to a positive audit report, irrespective of the true state of nature. We assume that the market for auditing services is competitive (as in the previous section, $F(q) = C(q)$), but only one auditor is already active also in the market for MAS: other firms have

[9] It can also be shown that the standard is zero if the economy is sufficiently poor, that is, it has at most just enough resources for subsistence consumption and investment ($Y \leq \underline{X} + I$). In this case, the economy forgoes the efficiency benefits of an audit standard, but this efficiency loss is unavoidable because the country cannot afford an audit standard. This result, as well as the positive relationship between the auditing standard and income *Y*, would be attenuated to the extent that a poor country could borrow resources from the international capital market to relax the feasibility constraint. In the limiting case of perfect capital markets, both of these results would no longer hold.

only the capability of providing them. The incumbent consulting-auditing firm can produce MAS at a lower cost than potential entrants, due to barriers to entry or to a technological advantage.[10] As a result, by limit pricing the incumbent earns the cost difference M from the sale of such services. We assume that at the resulting price the client firm wants to buy MAS, irrespective of the state of nature and of the purchase of auditing services.

The client firm can condition a MAS contract with the incumbent consulting firm upon receiving a positive report $r = H$ from its auditing arm, irrespective of the true state of nature. If it accepts this "bribe", the auditing-consulting firm optimally chooses to invest no resources in auditing: $q = 0$.[11] In this section, we assume that the decision to bribe the auditor is taken by a manager, who draws a private benefit from implementing the investment irrespective of the state of nature, and gives no weight at all to the interest of shareholders. In the next section we shall explore the implications of a less drastic agency problem within the firm.

In setting the optimal audit standard and associated enforcement spending, now the regulator must take into account the firm's incentive to bribe the auditor via the profits from consulting. Formally, the new regulator's problem is the same as before except for the auditor's the incentive compatibility constraint. He will maximize expression (8), subject to the feasibility constraint (10) and to the new incentive constraint:

$$F(q^c) - C(q^c) \geq F(q^c) + M - f(e)l^* \ , \tag{14}$$

where the superscript c stands for "collusion". Going through the same steps as in the previous section, one find that the first-order conditions are the same as before (13a and 13b), but that the corresponding optimal enforcement level is:

$$e_c(q^c) = f^{-1}((C(q^c) + M)/l^*). \tag{15}$$

This expression, which is increasing and convex in q^c, shows that the enforcement necessary to uphold a given audit standard q^c exceeds the second-best level identified in equation (11) because the possibility of obtaining profits M from consulting raises the enforcement activity needed to prevent collusion. The optimal audit standard is correspondingly lower: intuitively, the potential

[10] One need not assume that there is a single incumbent firm in the market for MAS: there can be several incumbents, which collude in pricing. Alternatively, there can be several active competitive firms, only one of which has lower costs than the others.

[11] Equivalently, the firm can be thought as bribing the auditor into exerting zero effort, since this will give a positive report with certainty: $\Pr(r = H \mid q = 0) = 1$.

bribe raises the cost of enforcement, inducing the regulator to choose a less ambitious standard. The problem gets worse the larger are the profits from consulting M that can be used to bribe the auditor. As a result, the larger these profits, the less ambitious the accounting standard must be.

Proposition 3 (Optimal policy with conflict of interest). *If $M > 0$, then the optimal standard $q^c(M)$ is lower than in the second best q^*, and is decreasing in the consulting profits M.*

4. Auditors' conflict of interest and corporate governance

It is widely agreed that the recent corporate scandals were generated not only by conflicts of interest within accounting firms, but primarily by bad corporate governance arrangements within the companies being audited. Indeed, one of the key assumptions in the previous section was that managers disregard completely the interest of shareholders, and thereby the informational value of auditing. In this section, we explore a more general case, where the severity of the agency problem within the company can be varied parametrically. Although managers draw a private benefit from "empire building" (and therefore from the investment) as in the previous section, now they also place a positive weight on the expected value of the company.

This generalization encompasses the models of the previous two sections. That of Section 2 corresponds to the polar case where the manager's incentives are well aligned with those of shareholders, so that the manager does not want to bribe auditors and impair the informational value of the audit. Conversely, Section 3 corresponds to the case in which managerial incentives are poorly aligned with those of auditors. In the present section, we show that the regulation of audit quality must take into account the quality of corporate governance. If managerial incentives are sufficiently aligned with those of shareholders, the regulator will not have to worry about deterring auditors from taking bribes, since companies will not offer them in the first place: in this case audit standards will be set at the second-best level q^*. Managers will offer bribes to auditors only if corporate governance is sufficiently bad: in this case, the regulator will have to take this into account, and choose the audit standard q^c computed in the previous section.

Assume that the manager's payoff is the sum of his private benefits (that accrue only if the investment I is carried out) and the expected final value of the company. This second term is weighted by the parameter γ, which can be interpreted as the fraction of shares held by the manager or, more generally, as a measure of the effectiveness of any incentive scheme intended to align his interests to those of the shareholders.[12] For brevity, from here onwards we shall refer to γ simply as the "quality of corporate governance". As a result, the manager's decision to bribe the company's auditor changes his payoff by:

$$\Psi(q,\gamma) = \Pr(r = L)B - \gamma\,\Omega(q) = q(1-p)B - \gamma\left[q(1-p)(I - V_L) - C(q)\right]. \qquad (16)$$

The first term of $\Psi(q,\gamma)$ is the increase in the manager's expected private benefit. With the bribe, the investment is carried out with probability 1. Without the bribe, it is carried out only if the auditor's report is positive, that is, with probability $\Pr(r = H)$. So the bribe raises the probability of obtaining the private benefit by $\Pr(r = L) = 1 - \Pr(r = H)$. The second term of $\Psi(q,\gamma)$ is proportional to the audit's informational value $\Omega(q)$, i.e. the loss in value borne by forgoing a truthful audit.[13]

The manager will offer a bribe to the firm's auditor only if expression (16) is strictly positive (we assume that if indifferent, the manager will not offer the bribe). This expression is zero for $q = 0$, convex in q and increasing as q approaches 1 (since $\lim_{q\to 1} C'(q) = \infty$). If the quality of corporate governance γ is sufficiently low and/or the private benefit B is sufficiently large, the function $\Psi(q,\gamma)$ is increasing for any $q \in (0,1]$, and therefore always positive. In this case, we are back to the analysis of the last section, since the manager always wants to bribe the auditor. The novel case to be considered here is that of a less severe agency problem within the client firm (γ sufficiently high and/or B sufficiently low), so that the function $\Psi(q,\gamma)$ is initially decreasing and then increasing in q. Figure 2 illustrates this case. It also shows that the manager's incentive to bribe the

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[12] If this parameter is intended literally as the fraction of shares held by the manager, it must be that case that the manager is not allowed to sell them before the final date in the time line of the model, when the company's true value is determined. If the manager could sell the shares before that date, he would be able to trade on his private information about whether he has bribed the auditor – at the expense of other shareholders. Rather than realigning his incentives to those of other shareholders, this scheme would go in the opposite direction!

[13] We assume that whenever $\Psi(q, \gamma)$ is positive, the manager makes a take-it-or-leave-it offer to the consulting firm to obtain that it issues a positive auditing report. Alternatively, one could imagine a less extreme bargaining game between the two parties: specifically, the consulting-auditing firm may offer a discount on MAS in exchange for being allowed not to cheat in its auditing report. The largest discount that it could offer is $M - f(e)l^*$, of which the manager of the client firm would earn a fraction γ. For the manager to refuse such counter-offer and insist in demanding the fake report, it is sufficient to assume that $\Psi(q, \gamma) > \gamma$ $(M - f(e)l^*)$, which can be guaranteed by assuming a sufficiently large private benefit B.

firm's auditors decreases as the firm's corporate governance improves: the function $\Psi(q,\gamma)$ shifts downward as a result of a parametric increase in γ (say, from γ_1 to γ_2) for given *q*, as $\partial\Psi / \partial\gamma = -\Omega(q) < 0$.

[Insert Figure 2]

These remarks provides the basis to understand how the optimal audit standard must vary as the quality of corporate governance γ changes. This is illustrated in Figure 3. For low values of γ, the manager's incentive to bribe auditors is so strong that deterring them would require an excessive distortion of audit standards away from the second best. In this case, the regulator prefers to turn its efforts toward auditors, by increasing enforcement in order to deter them from *accepting* a bribe. Therefore, for low γ the audit standard is set at the level q^c identified in Section 4.

For higher values of γ, the manager's incentive to bribe auditors is weak, so that it is preferable to set the audit standard at a value q^{nc} that is just sufficient to deter them from *offering* a bribe, by making $\Psi(q^{nc},\gamma) \leq 0$, where the superscript *nc* stands for "no collusion". As γ increases, the choice of $q^{nc}(\gamma)$ can become more ambitious since the manager's incentive to bribe auditors weakens. In this region, the optimal audit standard increases monotonically in the quality of corporate governance, until it reaches the second-best level q^*. In this region, therefore, audit standards and corporate governance are complements.

Interestingly, the region where this complementarity holds is increasing in the magnitude of the consulting profits *M*, which measures the intensity of the auditor's potential conflict of interest. Intuitively, as the potential "bribe" rises, it becomes increasingly difficult to control the implied conflict of interest by discouraging the auditor from *taking* the bribe, so that one must discourage the manager from *offering* the bribe in the first place. As a result, the parameter region in which regulation is designed to prevent managers from offering the bribe expands: graphically, the boundary γ_1 between the two regimes moves towards the origin. This is shown in Figure 3, where consulting profits *M* are assumed to be small in the top graph and low in the bottom graph. The region where accounting standards are increasing in the quality of corporate governance is larger in the bottom graph. The graph also shows that in the region to the left of γ_1 an increase of the consulting profits *M* require a reduction of the audit standard $q^c(M)$, in accordance with Proposition 3.

[Insert Figure 3]

These results can be summarized as follows:

Proposition 4 (Optimal audit standard and corporate governance). *The optimal audit standard equals* q^c *for low values of* γ*, drops discretely for a critical value* γ_1 *and then increases monotonically in* γ *up to the second-best level* q^**. The critical value* γ_1 *is decreasing in M.*

Clearly, an even better policy would be to eliminate the conflict of interest at its root, if this is possible. In the setting of our model, this is achieved if the government can sever the link between consulting and auditing activity, by forbidding auditors to provide MAS. In this case, the optimal accounting standard would increase to the second best level q^*, irrespective of corporate governance. This would be efficient, since welfare would also increase. Indeed, this is one of the provisions contained in the Sarbanes-Oxley Act, in response to auditors' misbehavior in recent corporate scandals. However, in the next section we will show that this conclusion has to be qualified if consulting generates economies of scope that lower the cost of auditing.

5. Conflict of interest versus efficiency gains from non-audit services

In principle, the provision of managerial advisory services (MAS) by an auditing company may improve the quality of its auditing services, owing to the presence of economies of scope between its consulting and its auditing arm. Indeed, empirical studies have uncovered limited evidence of such economies of scope (Simunic, 1984; Palmrose, 1986; Prakesh and Venables, 1993, Antle, Gordon, Narayanmoorthy and Zhou, 2002). To capture this point, we amend the model by assuming that economies of scope reduce the cost of auditing by a fraction θ, with $0 < \theta \leq 1$: the costs to produce audit services of a given quality q become $(1-\theta)C(q)$.[14]

Since each auditing company can in principle provide MAS and exploit the implied economies of scope, it will make two separate offers to the client firm, depending on whether the latter

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[14] More generally, our results hold if the auditor-consultant's cost function has weakly lower marginal and average values compared with an ordinary auditor's cost function $C(q)$.

purchases only audit services or a "bundle" that includes both audit services and MAS. In the former case, the lowest price that can be charged for the auditing component of the package is $C(q)$, while in the latter it is $(1-\theta)C(q)$. Competition among auditors ensures that these are actually the prices offered in equilibrium to the client firm. Clearly, this implies that the client firm will always purchase an audit-cum-MAS bundle from the same provider. However, the client firm may still decide to purchase the bundle from the incumbent consulting firm or from an entrant. The difference between these two options lies in the fact that the incumbent can be "bribed" by the client firm because it can earn a profit *M* from the sale of MAS, while entrants cannot, as assumed in the previous section.

Now consider that the regulatory agency has two ways of avoiding that accountants file a false report: one is by forbidding altogether the provision of MAS by auditors; the other is by setting an auditing standard and a level of enforcement that deter cheating.

If regulation allows bundling, client firms will enjoy the implied efficiency gains, but they may have the incentive to "bribe" their auditor, and the regulator must decide how to prevent it. As explained in the previous section, the regulator can do so either by discouraging the auditor from taking the "bribe" or by discouraging the manager of the client company from offering it.

Formally, the first strategy consists of maximizing the objective function (8), subject to constraints (10) and (15), replacing everywhere $C(q)$ with $(1-\theta)C(q)$. This strategy results into an audit standard $q^c(M,\theta)$, which is decreasing in *M* (as before), increasing in θ (as lower costs improve the objective function and relax both of its constraints). In Figure 4, this audit standard is a constant as before, since it does not depend on the quality of corporate governance γ.

The second strategy instead consists of maximizing the objective function (8), subject to constraints (10), (11) and $\Psi(q,\gamma)\leq 0$, again replacing everywhere $C(q)$ with $(1-\theta)C(q)$. This strategy results into an audit standard $q^{nc}(\gamma,\theta)$, that is increasing in γ and in θ: better governance allows higher audit standards (as before), and so does greater cost efficiency in auditing. As shown in Figure 4, the resulting audit standard rises with γ, until it achieves the second-best level $q^*(\theta)$.

Alternatively, the regulator can choose a third strategy: forbidding bundling altogether, and forgoing the implied efficiency gains. Then the problem reverts to that of Section 2, and the resulting accounting standard becomes simply the second-best level q^*, as stated at the end of Section 4. This is below the new second-best $q^*(\theta)$, based on a more efficient audit technology.

Which of these three strategies maximizes social welfare depends on the magnitude the consulting profits *M* and of the efficiency gain θ. Figure 4 illustrates the two possible cases.

The top graph portrays a situation in which the profits from consulting are low and economies of scope are high, so that the conflict of interest is less important than the efficiency gain from bundling. As a result, the regulator will not want to forbid bundling of auditing and consulting services, and the optimal audit standard will be that indicated by the solid line in the graph. The choice of strategies by the regulator will be similar to that seen in Figure 3: for low values of the corporate governance quality γ, the regulator will choose the first strategy $q^c(M,\theta)$, and for higher values it will switch to the second strategy $q^{nc}(\gamma,\theta)$. It can be shown that in this case the regulator can choose a more ambitious standard by discouraging auditors from accepting bribes than by forbidding bundling altogether: $q^c(M,\theta) > q^*$.

The lower graph in Figure 4 portrays the opposite situation: high profits from consulting and low economies of scope, so that the conflict of interest is more important than the efficiency gain from bundling. In this case, the third strategy – forbidding bundling – turns out to be optimal at least for sufficiently bad corporate governance: this happens when $\gamma < \gamma'$ in the figure. In this region, managers will tempt their auditors with a very large "bribe" *M*, so that the standard that would deter auditors from accept the bribe would be very low and very expensive to enforce. As a result, it is more efficient to sever the link between consulting and auditing activity, and forgo the associated efficiency gains. Only for better corporate governance, it becomes possible to allow bundling, as in the previous case. So another payoff of a better corporate governance – beside that of higher audit standards – is that it allows to exploit the potential economies of scope in auditing and consulting.

These points are summarized in the following proposition:

Proposition 5 (Optimal policy with conflict of interest and economies of scope).
(i) *For M sufficiently low and θ sufficiently high, it is optimal to allow bundling of audit and consulting, and choose an audit standard that equals $q^c(M,\theta)$ for low values of γ, drops discretely for a critical value γ_1 and then increases monotonically in γ up to the second-best level $q^*(\theta)$.*
(ii) *For M sufficiently high and θ sufficiently low, it is optimal to forbid bundling of audit and consulting if γ is below a critical value γ'. In this region, the optimal audit standard equals q^*. At*

this critical value γ', *the standard drops discretely and then increases monotonically in* γ *up to the second-best level* $q^*(\theta)$.

6. Related literature

Our analysis focuses on regulation and public enforcement as the only device to temper agency problems in auditing as well as the possible collusion between auditors and client companies. However, alternative mechanisms have been used or proposed in the literature in order to correct these problems: self–regulation assisted by litigation-based enforcement, reputational mechanisms, certification by intermediaries, financial statements insurance insurance, whistleblowing, etc. In this section we do not analyze all these alternative mechanisms in detail: we simply attempt to compare them to the analysis of regulation and public enforcement performed in this paper.

As mentioned in the introduction, until recently the standards of the U.S. auditing profession have been set through self-regulation and have been enforced via litigation. The recent corporate scandals have highlighted the weaknesses of this specific mechanism. At least two reasons for this failure can be identified. First, the mounting litigation costs of the 1980s led the self-regulating US auditing profession to seek on "safe harbor rules" to defend themselves more easily against litigation. As a result, attention shifted towards formal compliance with accounting rules, and away from the economic condition of companies, thus reducing the intrinsic quality of accounting information.[15] Second, the reliability of audit companies has been tarnished by the increasing conflict of interest between their audit role and their consulting role, as the share of consulting fees kept increasing in their revenues.

Of course, even in a system of public regulation, enforcement can be entrusted to litigation rather than to the intervention of the regulator, as postulated in our model. The limitation of this form of enforcement is that the costs of suing auditors may deter dispersed investors from taking action against violations of such rules, due to collective action problems.

Reputation is another decentralized mechanism that might enhance the reliability of auditors, especially considering the limited number of active auditing firms, the repeated nature of their interactions with client firms and investors, and especially the large stakes represented by the auditors' equity base. In principle, this mechanism could be effective, but in practice it appears not

[15] This is reminiscent of the point by DeMarzo, Fishman and Hagerty (2001), that a self-regulatory organization accountable to its members tends to choose laxer enforcement than customers would.

to have deterred negligent or fraudulent behavior so extensive as to bring to their heels established companies such as Arthur Andersen. Even though the reasons why reputation has been ineffective are still unclear, its limitations suggest that it needs to be complemented by regulatory intervention.

Other mechanisms that have been recently analyzed in the literature are: (i) the creation of an intermediary that "certifies" the quality of privately produced information (Lizzeri, 1999); (ii) a "financial statement insurance" (FSI) scheme, by which companies would purchase insurance that provides coverage to investors against losses due to misrepresentation in financial reports (Dontoh, Ronen and Sarath, 2004); and (iii) whistleblowing mechanisms, by which a party is given a financial incentive to report opportunistic behavior by another party, by entitling the former to a portion of the penalty paid by the latter (Buccirossi and Spagnolo, 2001). Each of these mechanisms may have some merit – taken alone or in conjunction – to realign the incentive of auditors to truth-telling. However, they all have some weakness in the presence of extensive collusion: both a certification intermediary and an insurance company providing FSI might collude with the client firm, just as well as the auditors could; and whistleblowing would hardly be applicable to the tacit exchange of favorable audits against consulting contracts, which are formally legal. This underscores the importance of public regulation and enforcement as "residual" mechanisms to discipline the auditing profession.

7. Conclusion

The recent corporate scandals have highlighted the need for tighter regulation of the audit profession. However, once it is recognized that the enforcement of such regulation is costly, three important lessons can be drawn concerning the optimal standards to be imposed on auditors.

First, audit quality standards must be based on a cost-benefit analysis of audit activity. On the cost side, they must be less ambitious in economies that are poorer and have less efficient enforcement. On the benefit side, they must be tighter in economies where investments are riskier and where the typical size of projects is larger.

Second, regulatory standards must be less ambitious when auditors can collude with the managers of client companies at the expense of shareholders, because deflecting the potential for collusion requires more intensive – and therefore costlier – enforcement.

Third, the optimal audit standard depends on the alignment of managers with shareholders' interests, since this alignment reduces the managers' incentives to corrupt auditors. In particular, to the extent that regulation deters managers from offering bribes (rather auditors from accepting them), audit standards and corporate governance turn out to be complements, in the sense that countries with better corporate governance can afford tougher auditing standards.

Finally, if client firms may "bribe" their auditors by offering them generous consulting contracts, regulators can eliminate the source of collusion by forbidding auditors to provide consulting services. This policy prescription may however not be warranted if the joint provision of auditing and consulting services generates economies of scope. Banning such joint provision is socially inefficient if the implied cost savings are sufficiently large and the conflict of interest is not too acute, and in any event if the corporate governance of client companies is sufficiently good. So the quality of corporate governance allows not only to go for a more ambitious auditing standard, but also to reap more easily the cost saving from economies of scope in auditing.

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Appendix

Proof of Proposition 1. To show that $q^* < q^{FB}$, compare condition (13a) to the first-best condition (6), and note that the right-hand side of (13a) is larger, implying the result by the convexity of $C(q)$ and $e(q)$. ■

Proof of Proposition 2. To help the reader's intuition, this proof is provided graphically rather than algebraically. Figure 1A illustrates the optimal audit standard chosen by a regulator. The convex function $e(q^*)$ shows the minimum enforcement required for each audit standard, from equation (11). The function is bounded above by the feasibility constraint, which is decreasing and concave, as can be seen by differentiating it. The government's preferences are described by a field of concave, upward-sloping social indifference curves, from the properties of the welfare function W: their slope $(1-p)(I-V_L)-C'(q)$ is positive for quality levels lower than the first best, and is decreasing by the convexity of $C(q)$.

[Insert Figure 1A]

In the upper graph in Figure 1A, the feasibility constraint is not binding ($X > \underline{X}$, so that $\lambda = 0$) and the optimal values of e and q^* are at the tangency between the lowest indifference curve and the $e(q^*)$ function. Consider an increase in the required investment I or a reduction in the fraction of good firms p: both of these increase the marginal value of the audit quality. This results in an increase in the optimal standard, because the social indifference curves become steeper. Similarly, higher efficiency of enforcement decreases the slope of the $e(q^*)$ function and thus raises the optimal standard. By the same token, a greater cost efficiency of auditors increases the optimal standard, since the social indifference curves become steeper and the $e(q^*)$ function flatter. Finally, a larger income Y shifts the feasibility constraint upward, which leaves the equilibrium unaffected.

The lower graph in Figure 1A portrays a situation where the feasibility constraint is binding ($X = \underline{X}$, so that $\lambda > 0$). The second-best that corresponds to the tangency point cannot be achieved, because the resources left (after paying for investment and for subsistence consumption) are insufficient to enforce the second-best quality level. The resulting audit standard corresponds to the intersection between $e(q^*)$ and the feasibility constraint. In this case, a larger income Y or a lower investment I move the feasibility constraint upward, so that the intersection moves to the right and the audit standard rises. The other comparative statics results are similar to the previous case. Since an increase in the efficiency of enforcement flattens the $e(q^*)$ function (while leaving the feasibility constraint unchanged), it shifts the intersection with the feasibility constraint to the right, raising the optimal quality standard. A greater audit efficiency has the same effect: it flattens both the $e(q^*)$ function and the feasibility constraint. ■

Proof of Proposition 3. To show that $q^c < q^*$, consider separately the case $\lambda = 0$ and the case $\lambda > 0$. If $\lambda = 0$, then the right-hand side exceeds that of (13a), while the left-hand side is identical. By the convexity of $C(q)$ and $e(q)$, this implies $q^c < q^*$. If $\lambda > 0$, then q^c is determined by (13b), that is, by $Y - I - \underline{X} = C(q^c) + e_c(q^c)$. Since by (15) $e_c(q) > e(q)$, and both $C(q)$ and $e(q)$ are increasing, it must be $q^c < q^*$. To show that q^c is decreasing in M, again consider separately these two cases. If $\lambda = 0$, by differentiating the first-order condition (13a) and equation (15), we obtain $dq^c / dM = -\left[e''(\cdot)/l^*\right] / \left[C''(q^c) + e''(\cdot)C'(q^c)/l^*\right] < 0$. If $\lambda > 0$, differentiating the first-order condition (13b) and equation (15) yields $dq^c / dM = -\left[e'(\cdot)/l^*\right] / \left[C'(q^c) + e'(\cdot)C'(q^c)/l^*\right] < 0$. ■

Proof of Proposition 4. To maximize social welfare, the regulator has two alternative strategies:

(i) The <u>first strategy</u> is to deter auditors from accepting bribes, assuming that managers will offer them. This is the audit standard q^c that solves the problem defined by (8), (10) and (15), already studied in Section 4. Denote the corresponding welfare level by $W^c(q^c)$. Both q^c and $W^c(q^c)$ are independent of γ.

(ii) The <u>second strategy</u> is to deter the offer of bribes by managers by appending the further constraint $\Psi(q,\gamma) \le 0$ to the problem defined by (8), (10) and (11): denote the audit standard that solves this problem by $q^{nc}(\gamma)$ and the corresponding welfare level by $W^{nc}(q^{nc},\gamma)$. The welfare level $W^{nc}(q^{nc},\gamma)$ is increasing in γ, since a higher value of γ relaxes the additional constraint $\Psi(q,\gamma) \le 0$, recalling that $\partial\Psi / \partial\gamma = -\Omega(q) < 0$. For values of γ larger than a critical value γ_2 (that solves $\Psi(q^*,\gamma_2) = 0$), this constraint becomes slack, so that the problem becomes identical to that of Section 3. It follows that, for $\gamma \ge \gamma_2$, $q^{nc}(\gamma) = q^*$. For $\gamma < \gamma_2$, instead, the standard cannot be kept at the level q^* because $\Psi(q^*,\gamma) > 0$. The solution then requires to choose $q^{nc}(\gamma)$ such that $\Psi(q^{nc},\gamma) = 0$. Total differentiation in this equality shows that $dq^{nc} / d\gamma > 0$. Summarizing, if the regulator chooses this second strategy, both the audit standard and the welfare level are increasing in γ, up to their second-best levels, where they stabilize for $\gamma \ge \gamma_2$.

(iii) The optimal regulation is found by comparing the welfare level associated with the two strategies just described. Let us start by effecting this comparison for $\gamma = 0$. It is easy to show that $q^{nc}(0) = 0$ and $W^{nc}(q^{nc}, 0) = 0$. Instead, as shown in Section 4, $q^c \geq 0$ and $W^c(q^c) \geq 0$. Next, consider this comparison for $\gamma \geq \gamma_2$. In this range, as already shown, $q^{nc}(\gamma) = q^* > q^c$, so that $W^{nc}(q^{nc}, \gamma) = W(q^*) > W(q^c)$. Therefore, the function $W^{nc}(q^{nc}, \gamma)$, being increasing in γ, intersects from below the welfare associated with the first strategy, $W^c(q^c)$. Let us denote by γ_1 the value of γ for which the two welfare functions are equal, that is, $W^c(q^c) = W^{nc}(q^{nc}, \gamma_1)$. It follows that the regulator will choose the first strategy ($q = q^c$) for $0 \leq \gamma < \gamma_1$ and switch to the second strategy ($q = q^{nc}$) for $\gamma \geq \gamma_1$.

(iv) Finally, we show that the critical value γ_1 is decreasing in *M*. Recall that γ_1 is defined implicitly by the condition $W^c(q^c) = W^{nc}(q^{nc}, \gamma_1)$. The left-hand side expression of this equation, $W^c(q^c)$, is decreasing in *M*: as *M* increases, the incentive constraint (15) becomes tighter, so that the associated welfare level decreases. Recalling that the left-hand side expression $W^{nc}(q^{nc}, \gamma)$ is independent of *M* and increasing in γ, the result follows immediately. ■

Proof of Proposition 5. To maximize social welfare, the regulator has <u>three</u> alternative strategies. The <u>first</u> and <u>second</u> strategies allow bundling of auditing and consulting, and are otherwise defined as in points (i) and (ii) of the Proof of Proposition 4. The <u>third</u> strategy is to forbid bundling and choose the second-best level q^*.

To effect this comparison, let us start from two polar cases: (i) $M > 0$, $\theta = 0$ (only conflict of interest); (ii) $M = 0$, $\theta > 0$ (only economies of scope). In the first case, trivially the third strategy dominates: $W(q^*) > W^c(q^c)$ and $W(q^*) > W^{nc}(q^{nc})$, since there are no economies of scope, the optimal strategy is to ban bundling and to set the standard at q^*. In the second case, as there is no conflict of interest, there is no reason to ban bundling, so that the first strategy is dominated, and the optimal standard will be $q^*(\theta)$, that is, the second-best level associated with the more efficient auditing technology.

Now consider a neighborhood of the first polar case: $M > 0$, $\theta = \varepsilon$, for ε small enough that the third strategy still dominates the first strategy: $W(q^*) > W^c(q^c)$. The rationale for choosing this neighborhood is that an increase in θ changes the objective functions and constraints in the same direction in the problems solved by the first and third strategy, irrespective of the value of γ, whereas the comparison between the third and the second strategy depends on the value of γ. For $\gamma = 0$, it is easy to show that $q^{nc}(0) = 0$ and $W^{nc}(q^{nc}, 0) = 0$. Instead, as shown in Section 2, $q^* \geq 0$ and $W(q^*) \geq 0$. Next, consider this comparison for values of γ larger than the critical value γ_2, that solves $\Psi(q^*, \gamma_2) = 0$. In this range, the constraint $\Psi(q^*, \gamma) \leq 0$ becomes slack, so that the problem becomes identical to that of Section 2, and $q^{nc}(\gamma_2) = q^*(\theta)$. Therefore, $W^{nc}(q^*(\theta), \gamma) \geq W(q^*)$ for any $\gamma \geq \gamma_2$. So the function $W^{nc}(q^{nc}, \gamma)$, being increasing in γ, intersects from below the welfare associated with the third strategy, $W(q^*)$. Therefore, the third strategy dominates for low values of γ, and the second strategy dominates for higher values. More precisely, the optimal standard is q^* for $\gamma < \gamma'$, where γ' is such that $W(q^*) = W^{nc}(q^{nc}(\gamma', \theta), \gamma')$, and it is q^{nc} for $\gamma \geq \gamma'$. This situation is portrayed in the lower graph of Figure 4.

Now consider a neighborhood of the second polar case: $M = \varepsilon$, $\theta > 0$, for ε small enough that the first strategy still dominates the third strategy: $W(q^*) < W^c(q^c)$. Therefore, we must compare the first and the second strategy for different values of γ. This comparison is analogous to that performed under point (iii) of the Proof of Proposition 4, simply replacing everywhere $C(q)$ with $(1-\theta)C(q)$. It follows that the regulator will choose the first strategy ($q = q^c(\theta)$) for $0 \leq \gamma < \gamma_1$ and switch to the second strategy ($q = q^{nc}(\gamma, \theta)$) for $\gamma \geq \gamma_1$. This situation is portrayed in the upper graph of Figure 4.

For intermediate values of M and θ such that we cannot rank the first strategy relative to the third strategy (that is, $W(q^*)$ relative to $W^c(q^c)$), we cannot state whether the regulator should ban the bundling of audit and consulting services. ■

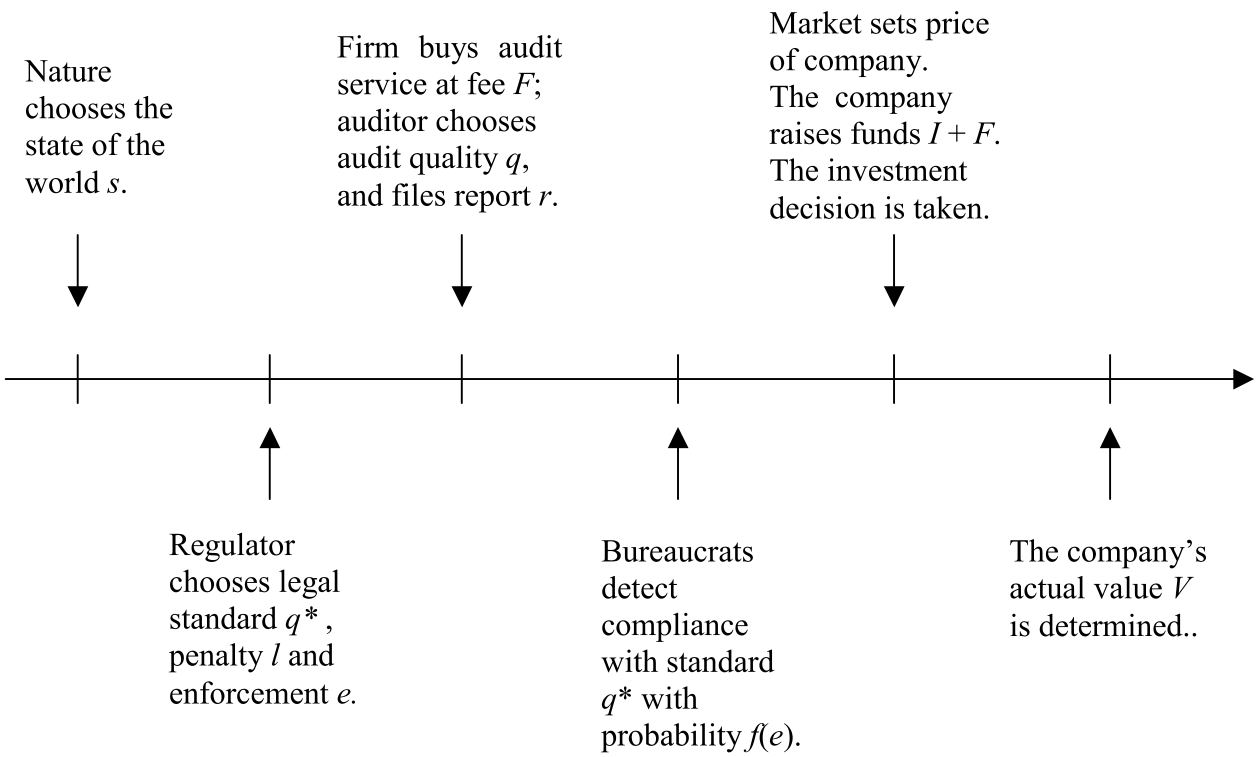


Figure 1. Time line

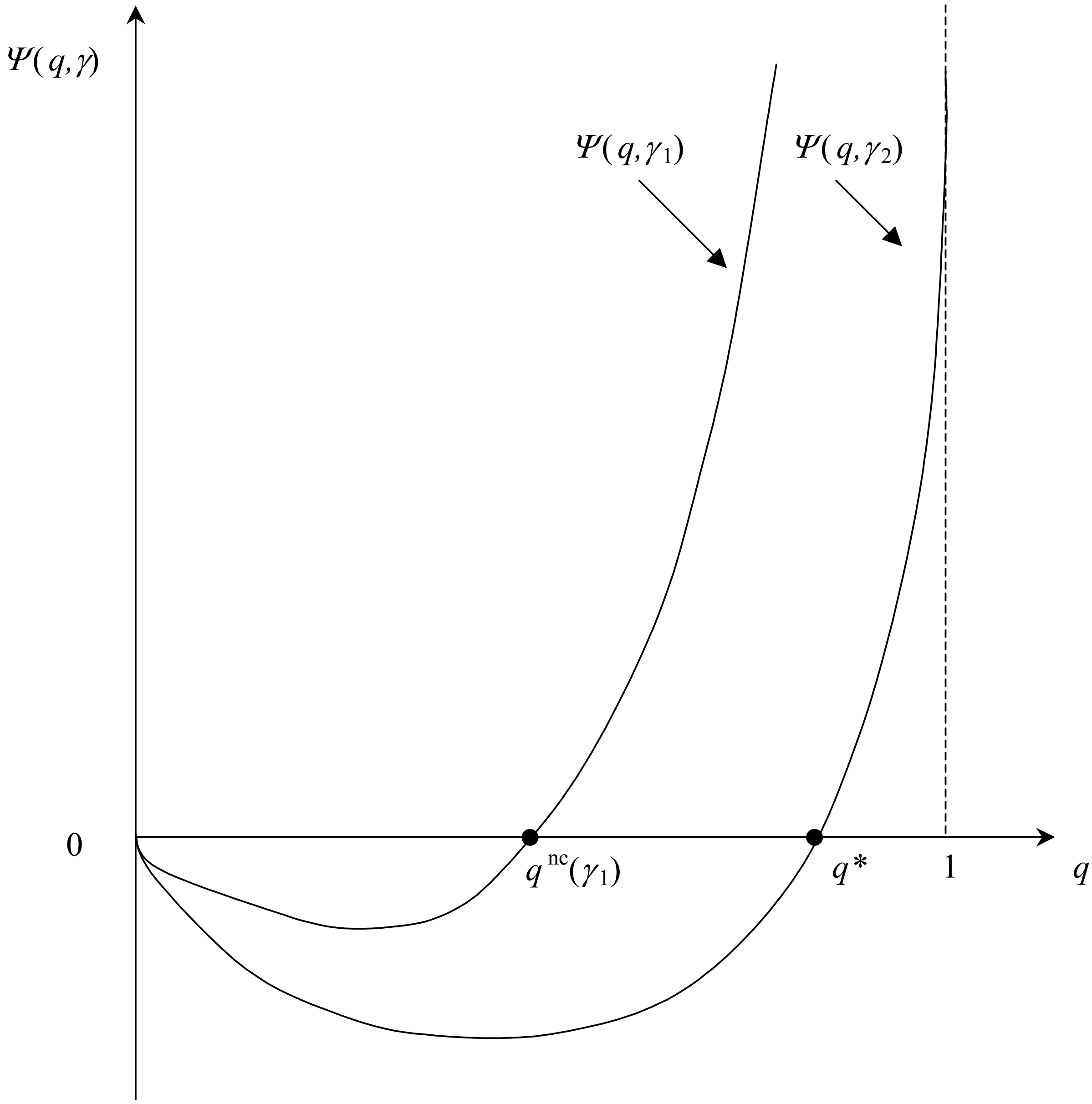
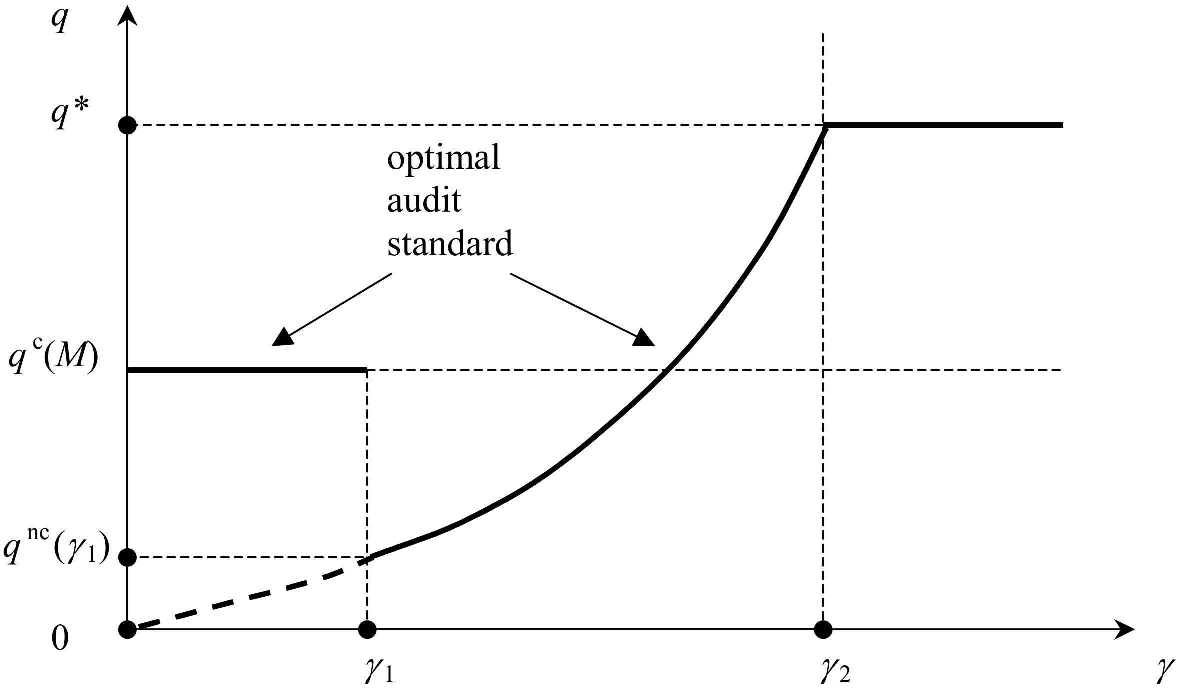


Figure 2. Manager's gain from bribing auditor Ψ as function of auditing standards q and quality of corporate governance γ

Case a. Low profits from consulting *M*



Case b. High profits from consulting *M*

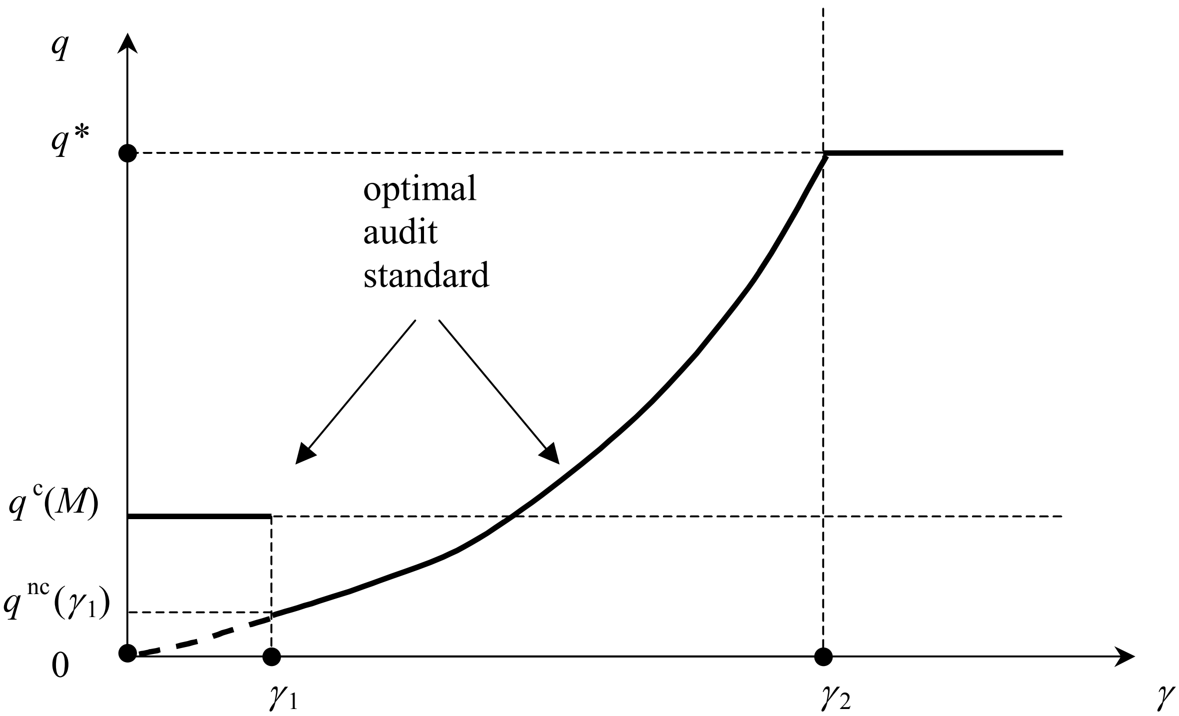
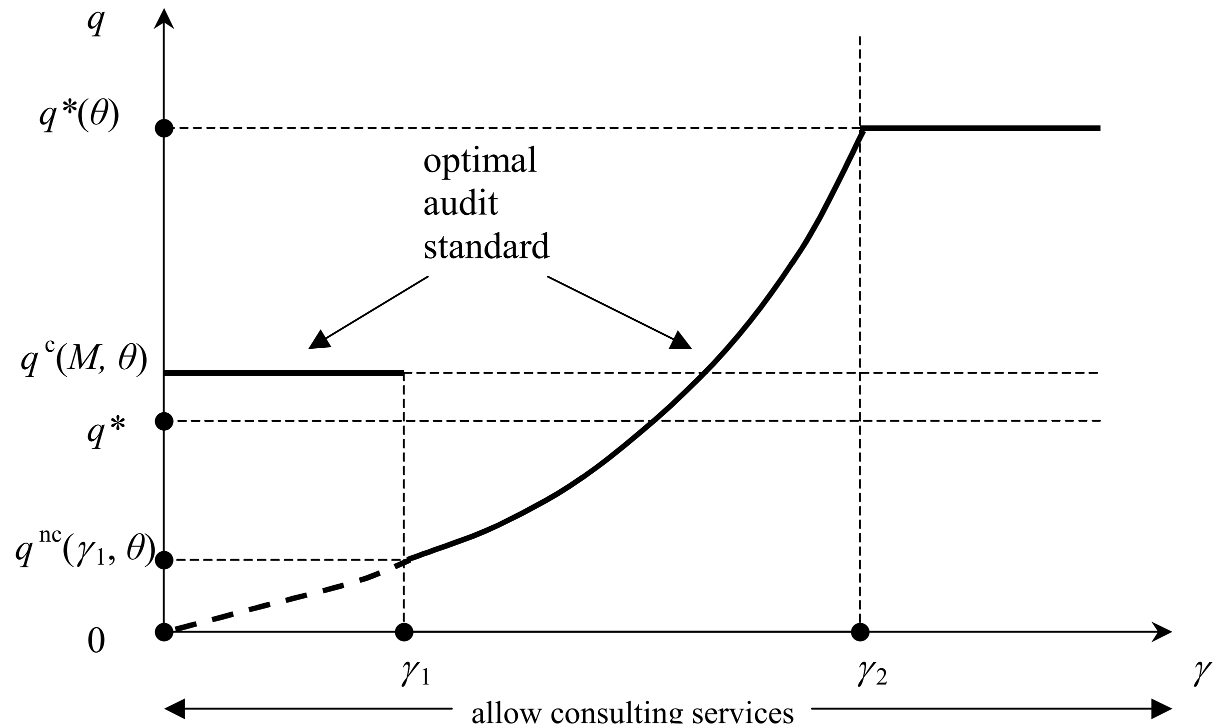


Figure 3. Optimal auditing standards *q* as function of the quality of corporate governance γ and of profits from consulting *M*

Case a. Low profits from consulting *M* and high efficiency gains *θ*



Case b. High profits from consulting *M* and low efficiency gains *θ*

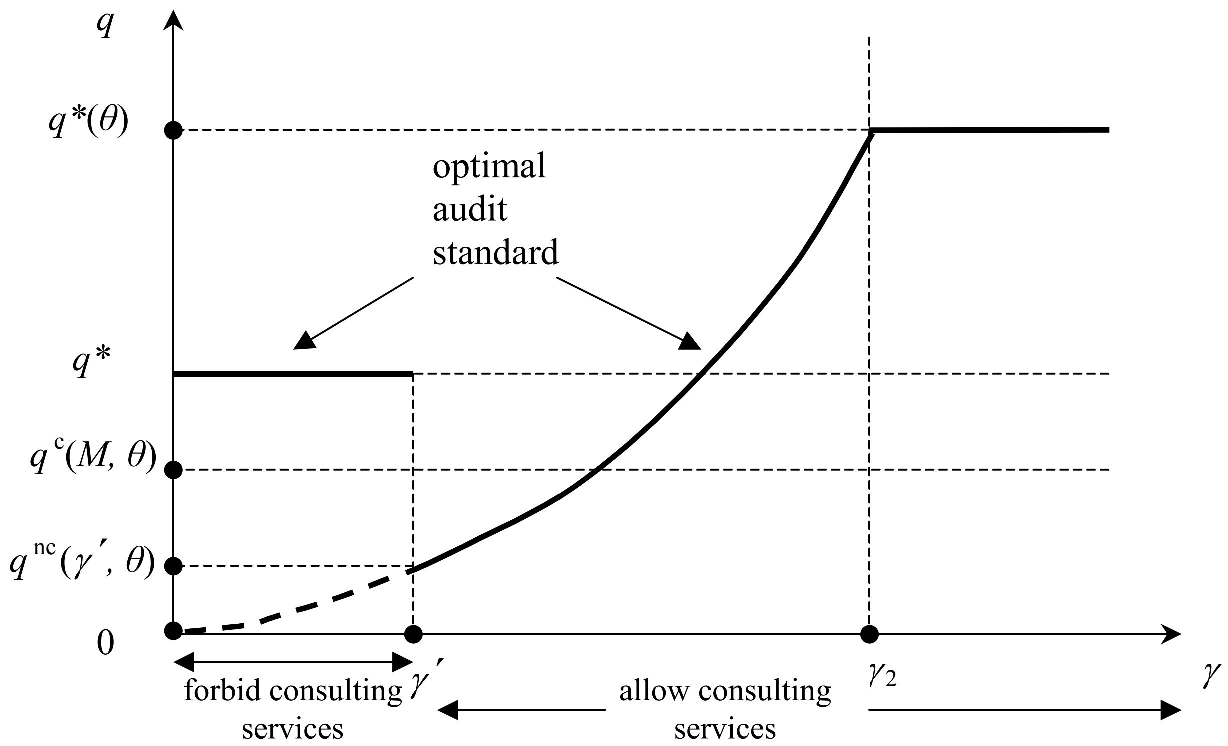


Figure 4. Optimal auditing standards *q* as function of the quality of corporate governance γ, efficiency gains from consulting θ and profits from consulting *M*

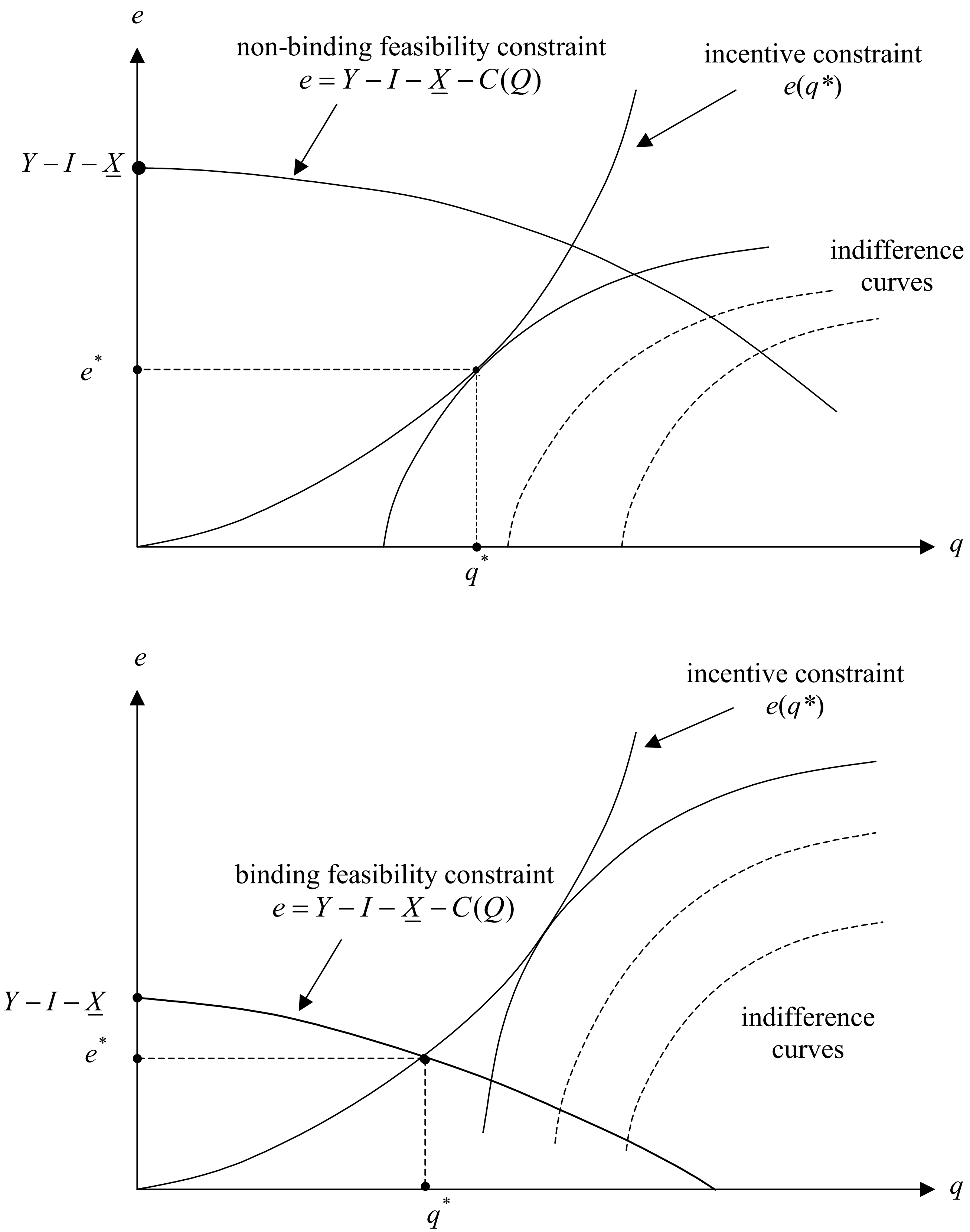


Figure 1A. Equilibrium auditing standards *q* and enforcement level *e*