Optimal Auditing Standards

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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 riskiness of firms and in the amount of funding they seek. 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, banning the provision of consulting services by auditors eliminates collusion but may not be optimal in the presence of economies of scope.

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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. The United Kingdom moved away from self-regulation by widening the scope and powers of the Financial Reporting Council, and specifically by creating a new subsidiary board (the Professional Oversight Board for Accountancy), entrusted with oversight of the auditing and accountancy profession, and monitoring of the quality of the auditing function. Also in Italy new legislation has been passed that extends the powers of the national securities commission (CONSOB) to regulate and oversee auditors’ activity.

Now that the role of the public regulation of auditing is widely recognized, the natural question arises of what is the optimal design of such regulation. The job of auditors is to certify the reliability of accounting information, but in turn the reliability of this certification can vary depending on the quality standards set by regulators. These standards may concern the auditing procedure, the organization of the auditing firm, or both.

For example, regulation can affect the auditing procedure by mandating external confirmation of the audited company’s credits, and by calibrating the evidence required for such confirmation according to the credit’s magnitude. While relatively small credits may be checked by a telephone call to the debtor or a fax, original documents may be required for credits whose existence and terms can affect the solvency of the audited firm. The importance of rules on external confirmation

\[^1\] 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.
was highlighted by the recent Parmalat scandal, where massive fraud went undetected because of insufficient evidence on a major credit of the company.\textsuperscript{2} The Parmalat scandal underscored also the importance of another procedural rule, which applies to the auditing of conglomerates by multiple auditors: when an auditor certifies the accounts of the group’s holding company and other auditors verify those of its subsidiaries, a problem of “moral hazard in teams” arises unless the responsibility for the certification of the consolidated balance sheet lies with a single auditor.\textsuperscript{3} But regulation can also affect the organization of auditing firms, for instance by providing guidelines regarding the system of quality control for audits and by setting standards of competence, independence and honesty of their employees.\textsuperscript{4}

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 information certified by auditors is 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 this choice must take enforcement costs into account. As a result, the optimal standard will fall short of the first-best audit quality level, and must be lower the less efficient the

\textsuperscript{2} On 6 March 2003, the auditing firm Grant Thornton accepted a copy of a fax sent by Bank of America as valid evidence of a € 3,6bn credit and € 336m cash held by Bonlat (a subsidiary of Parmalat), altogether worth 36 percent of Parmalat’s debt and accounting for almost all the liquidity of the conglomerate. On 18 December 2003, the fax was revealed to be false. If the auditor had checked directly the existence of the credit with Bank of America, this fraud would have been revealed.

\textsuperscript{3} Deloitte Touche was group auditor and Grant Thornton dealt with subsidiaries, including the Bonlat offshore unit in the Cayman Islands that is at the centre of the scandal. Deloitte failed to detect the frauds because it took at face value the reports produced by Grant Thornton about Bonlat. If regulation had made Deloitte Touche the only auditor responsible for the entire group, it would have raised its incentive to check the subsidiaries’ accounts directly. Italy, the US and South Africa are among the few countries where this rule is absent, although legislation currently being passed in Italy will eliminate this deficiency. (We thank Roberto Tizzano for bringing this point to our attention.)

\textsuperscript{4} Such rules on how to structure and operate auditing firms are not only present in the legislation of several countries, but also detailed in the standards issued by the International Auditing and Assurance Standards Board: see IAASB (2004).
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 managers may want to avoid liquidation at all costs, irrespective of the firm’s profitability, and therefore may want to bribe auditors into producing positive reports under all circumstances. To bribe auditors, managers can award them profitable consulting contracts, on condition that they file favorable reports. The potential for collusion increases the auditors’ incentives to misreport, so that more resources are required to enforce any given audit standard. Thus, 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 more effective 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 the possible conflicts of interest of auditing firms, as well as 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 clear-cut. 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 in a setting where auditing has informational value in raising new finance, as in Dye (1993). As a benchmark case, we first analyze a setting where the auditors’ activity is observable and contractible, and 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 investors will allocate their funds 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.

To continue operating, the company needs a cash injection (investment) of size \( I \). Absent such refinancing, the company is liquidated at a value that for simplicity is normalized to zero. The firm also needs to raise cash to pay for any fees \( F \) required by its auditors. Assuming that the required of return on the new capital is standardized to zero, shareholders provide the needed cash infusion in exchange for shares that are worth \( I + F \), out of their endowment \( Y \).

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 company 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 company is successful, its final value \( \tilde{V} \) is \( V_H \); if not, it is \( V_L < I < V_H \). This implies that in the bad state it is not worth refinancing the company. Since there is a continuum of firms, \( p \) is also the fraction of successful firms. The initial shareholders are supposed to have no private information about its future value. So, absent any additional information, the company’s initial value \( V \) is the

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\[5\text{ A larger stake would leave them with a surplus; a smaller one would violate their participation constraint. In most of the paper, it is indifferent whether this cash infusion is contributed by the initial shareholders or by new shareholders. It will become relevant only in Section 5.}\]
unconditional expectation of its final value, \( E(V) = pV_H + (1 - p)V_L \). We assume that \( E(V) > I \), so that it is worth refinancing the company even if no information is gathered via an audit report.

However, an audit may still be worthwhile as it allows investors to condition the refinancing decision on more reliable information. If the company is audited before it raises additional equity, its market price will reflect also the information certified by the audit. Auditors have a costly technology that aids in distinguishing high-value from low-value firms, and use this technology to produce a report \( r \) on the value of the firm. In practice, auditors assess only the reliability of the historical and prospective information provided by the company’s accountants, and deliver this “filtered” information to investors who use it to evaluate the company.\(^6\) As in Dye (1993), we collapse these two phases (the validation of accounting information and the evaluation made by the market) in a reduced-form process, by viewing the auditor’s report as an assessment of the value of the company.

An auditing firm can perform its job at different “quality” levels, depending on the procedures adopted in the audit (e.g., external confirmation of accounting data) and on its internal organization (e.g., selection of their personnel). But better audit quality comes at a cost. Formally, the auditor chooses the audit quality \( q \in (0,1) \) at a cost \( C(q) \), which is increasing and convex in \( q \), with
\[
C(0) = 0, \quad \lim_{q \to 0} C'(q) = 0 \quad \text{and} \quad \lim_{q \to 1} C'(q) = \infty.
\]

If the auditor believes that the firm will fail, he reports \( r = L \). Otherwise, he reports \( r = H \). The auditor’s report \( r \) is perfectly accurate when positive, while it may err if negative. Formally the conditional probabilities of the auditor’s report being correct are:
\[
\begin{align*}
\Pr(r = L \mid s = L, q) &= q, \\
\Pr(r = H \mid s = H, q) &= 1.
\end{align*}
\]

Using Bayes’ rule, the probability that the company will succeed conditional on a good report is:
\[
\Pr(s = H \mid r = H) = \frac{\Pr(s = H \cap r = H)}{\Pr(r = H)} = \frac{p}{p + (1 - p)(1 - q)},
\]
while the probability that it will succeed conditional on a bad report is zero:
\[
\Pr(s = H \mid r = L) = \frac{\Pr(s = H \cap r = L)}{\Pr(r = L)} = 0.
\]

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\(^6\) Auditors also solicit the production of additional information from the company’s managers and accountants, when they are dissatisfied with its reliability. If met with refusal, they can threaten a “disclaimer of opinion”.
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 continuation, before netting out the audit fee \( F \) (if an audit is performed), \( S = E(\hat{V} \mid r) - I \), will take different values in each of these contingencies:

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

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

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

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 firm is refinanced when no audit report is filed or when the report is favorable. It will be liquidated 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:

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

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 \( \Delta \) 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 firms’ quality \( p \) (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):

$$W(q) = q(1-p)(I-V_L) - C(q),$$

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 $q^{FB} \in (0,1)$:

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

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 equilibrium audit quality is zero, the market price will equal the unconditional
expectation $E(V)$, and an unprofitable firm will be more likely to continue operating.\(^7\) 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,\(^8\) denoted by $l^*$. This bound can be thought as the entire wealth of the auditing company, which is taken as exogenous in the context of the relationship with a specific client.\(^9\)

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 $f(e)$.\(^{10}\) Next, the stock market sets the price of the company at a level reflecting the perceived quality of auditing, and shareholders contribute equity to finance the company. Finally, the company’s actual value is determined.

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\(^7\) Here we are assuming that the auditor’s fee is not set conditionally on the \textit{ex-post} accuracy of the report. Admittedly, such a contract could elicit a positive level of effort from the auditor, but it would not generally elicit the first-best auditing quality if auditors have limited liability. Moreover, in the auditing profession “contingent contracts cannot be used as an incentive device because auditors’ code of professional ethics (rule 302) prohibits them from accepting incentive contracts for audit-related work” (Dye, 1993, p. 888, footnote 5).

\(^8\) Auditors’ limited liability implies that the first-best cannot be achieved even via a more sophisticated design of the penalty or of enforcement, for instance by making them contingent on the accuracy of the auditor’s report. (The point is analogous to that made in footnote 3.)

\(^9\) Auditors’ wealth can derive from interaction with previous customers and from the sale of non-audit services. In reality it may be impossible to confiscate the entire wealth of the auditor, due to the danger of “subversion of justice” (Glaeser and Shleifer, 2003).

\(^{10}\) 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.
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:

$$\Pi = F(q) - C(q) - L, \quad (7)$$

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 penalties (although, as we shall see below, no revenue from penalties is collected in equilibrium).\(^{11}\)

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 $X$: $X = X_T + X_A \geq X$. Formally, the problem is:

$$\max_{l, q^*, e} q^* \left(1-p\right)(1-V_L) - C(q^*) - e$$

subject to the incentive compatibility constraint:

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

\(^{11}\) Since utility is linear, taxation causes no distortions.
and to the feasibility constraint, which can be re-expressed as:

\[ X = Y - I - C(q) - e \geq X. \] (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.\(^1\) \( l = l^* \). 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:

\[ e(q^*) = f^{-1}(C(q^*)/l^*). \] (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 \( l^* \).\(^1\) 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:

\[
\begin{align*}
\max_{q} & \quad Y + q^* (1 - p)(I - V_L) - C(p^*) - e(q^*) + \lambda \left[ Y - I - C(q^*) - e(q^*) - X \right],
\end{align*}
\] (12)

where \( \lambda \) is the Lagrange multiplier. The first-order conditions of this problem are:

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\(^{12}\) 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 \( T = e - L \).

\(^{13}\) 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.

\(^{14}\) 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 \( e'' = f^{-1}(C(q^*)/l^* \cdot C''(q^*)/l^* + f^{-1}(C(q^*)/l^* \cdot (C'(q^*)/l^*)^2 > 0 \).
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 companies \( p \) and increasing in the required investment \( I \). If aggregate consumption is at the subsistence level, then the optimal 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.\(^{15}\) The only comparative statics that are common to these two situations are

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

\(^{15}\) 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 \( Y \leq X + I \). 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.
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 only the capability of providing such services. 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.\(^{16}\) 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. Although formally legal, this transaction obviously plays the same role of a bribe.\(^{17}\) If it accepts this “bribe”,

\(^{16}\) 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.

\(^{17}\) Admittedly, the potential for collusion may arise even within the market for auditing services, if this market is not perfectly competitive or if the incumbent consultancy has a cost advantage relative to the competition. Also in this case, auditors could be “bribed” by the threat of losing their rents. Alternatively, a firm could bribe its auditor even more directly via an illegal side-payment. But these bribes do not generate a conflict of interest for auditors, which is regarded by practitioners as the main source of auditors’ involvement in corporate scandals (see Crockett, Harris, Mishkin and White, 2003). In addition, considering the joint provision of auditing and consulting services allows us to consider also the implied efficiency gains.
the auditing-consulting firm optimally will invest no resources in auditing: \( q = 0.18 \). The decision to bribe the auditor is taken by a manager, who draws a private benefit from continuation irrespective of the state of nature. In this section, we assume that the manager gives no weight 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 incentive compatibility constraint. He will maximize expression (8), subject to the feasibility constraint (10) and to the new incentive constraint:

\[
F(q^c) - C(q^c) \geq F(q^c) + M - f(e)^{\text{I}^*},
\]

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:

\[
e^c_c(q^c) = f^{-1}((C(q^c) + M) / l^*).
\]

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 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 auditing 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 \( M \).

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18 Equivalently, the firm can be thought as bribing the auditor into exerting zero effort, since this will give a positive report with certainty: \( \Pr(r = H \mid q = 0) = 1 \).
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 auditing 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 continuation 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 firm is not liquidated) and the expected final value of the company. This second term is weighted by the parameter $\gamma$, 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.\(^{19}\) For brevity, from here onwards we shall refer to $\gamma$ simply as the “quality of corporate governance”. As a result, the manager’s decision to bribe the company’s auditor changes his payoff by:

\[^{19}\text{If this parameter is intended literally as the fraction of shares held by the manager, it must be that case that the manager is not allowed to sell them before the final date in the time line of the model, when the company’s true value is determined. If the manager could sell the shares before that date, he would be able to trade on his private information about whether he has bribed the auditor – at the expense of other shareholders. Rather than realigning his incentives to those of other shareholders, this scheme would go in the opposite direction!}\]
\[ \Psi(q, \gamma) = \Pr(\text{r} = L)B - \gamma \Omega(q) = q(1-p)B - \gamma \left[ q(1-p)(1-V_L) - C(q) \right]. \] (16)

The first term of \( \Psi(q, \gamma) \) is the increase in the manager’s expected private benefit. With the bribe, the firm continues to operate with probability 1. Without the bribe, it continues only if the auditor’s report is positive, that is, with probability \( \Pr(\text{r} = H) \). So the bribe raises the probability of obtaining the private benefit by \( \Pr(\text{r} = L) = 1 - \Pr(\text{r} = H) \). 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.\(^{20}\)

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 \( \gamma \) 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 (\( \gamma \) 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 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 \( \gamma \) (say, from \( \gamma_1 \) to \( \gamma_2 \)) for given \( q \), as \( \partial \Psi / \partial \gamma = -\Omega(q) < 0 \).

[Insert Figure 2]

These remarks provide the basis to understand how the optimal audit standard must vary as the quality of corporate governance \( \gamma \) changes. This is illustrated in Figure 3. For low values of \( \gamma \), the manager’s incentive to bribe auditors is so strong that deterring them would require an excessive

\(^{20}\) 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 \( \gamma \). 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 \( B \).
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 $\gamma$ the audit standard is set at the level $q^c$ identified in Section 4.

For higher values of $\gamma$, 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 him from offering a bribe, by making $\Psi(q^{nc}, \gamma) \leq 0$, where the superscript $nc$ stands for “no collusion”. As $\gamma$ 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 $\gamma_1$ 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 auditing 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 $\gamma_1$ an increase of the consulting profits $M$ imply a reduction of the audit standard $q^c(M)$, in accordance with Proposition 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 $\gamma$, drops discretely for a critical value $\gamma_1$ and then increases monotonically in $\gamma$ up to the second-best level $q^*$. The critical value $\gamma_1$ 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.\(^{21}\) Indeed, this is one of the provisions contained in the Sarbanes-Oxley Act, as well as in Italy’s 2005 “Law for the Protection of Saving and Financial Market Regulation”. 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, Narayamoorthy 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 \( \theta \), with \( 0 < \theta \leq 1 \): the costs to produce audit services of a given quality \( q \) become \( (1 - \theta)C(q) \).\(^{22}\)

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 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

\(^{21}\) In reality, however, firms may attempt to bribe auditors also in other ways, for instance by direct side payments. If they do so, merely forbidding the joint provision of auditing and consulting services would not curb unfaithful reporting by auditors.

\(^{22}\) 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 \( C(q) \).
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 $\theta$ (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 $\gamma$.

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 $\gamma$ and in $\theta$: 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 $\gamma$, 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 of the consulting profits $M$ and of the efficiency gain $\theta$. 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 $\gamma$, 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 accepting 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 exploiting 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 $\theta$ 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 $\gamma$, drops discretely for a critical value $\gamma_1$ and then increases monotonically in $\gamma$ up to the second-best level $q^*(\theta)$.

(ii) For $M$ sufficiently high and $\theta$ sufficiently low, it is optimal to forbid bundling of audit and consulting if $\gamma$ is below a critical value $\gamma'$. In this region, the optimal audit standard equals $q^*$. At this critical value $\gamma'$, the standard drops discretely and then increases monotonically in $\gamma$ up to the second-best level $q^*(\theta)$. 

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6. Alternatives to public regulation

Our analysis focuses on regulation and public enforcement as the only device to temper agency problems in auditing and collusion between auditors and client companies. However, alternative mechanisms have been proposed in the literature in order to correct these problems: auditors’ self–regulation assisted by litigation-based enforcement, reputational mechanisms, certification by intermediaries, financial statements 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 by self-regulation and enforced via litigation. The recent corporate scandals have highlighted the weaknesses of this mechanism. The reliability of audit companies as self-regulating entities 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. This point is reminiscent of the result in DeMarzo, Fishman and Hagerty (2001), that a self-regulatory organization accountable to its members tends to choose laxer enforcement than customers would.

Of course, even in a system of public regulation, enforcement can be entrusted to litigation rather than to the intervention by the regulator, as postulated in our model. The limitation of litigation-based enforcement is that the costs of suing auditors may deter dispersed investors from taking action against violations, due to collective action problems. In contrast, a well-endowed and highly motivated public prosecutor can be very effective against financial fraud, as witnessed by the activity of New York State Attorney General Eliot Spitzer since 1999.

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. Therefore, in principle this mechanism could be effective. However, it appears not to have deterred negligent or fraudulent behavior so extensive as to wipe out 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.

Alternative mechanisms that could in principle be used to improve the reliability of auditors are the creation of an intermediary that “certifies” the quality of their information (Lizzeri, 1999) or a “financial statement insurance” (FSI) scheme, by which companies purchase insurance that protects investors against losses due to misrepresentation in financial reports and the insurer itself appoints
and pays auditors (Dontoh, Ronen and Sarath, 2004). The creation of a certification intermediary would tend to realign the incentive of auditors towards truth-telling by creating a second layer of monitoring, while the FSI scheme would eliminate at its root the conflict of interest arising from companies appointing and paying for their auditors. However, neither of these mechanisms is completely collusion-proof: both a certification intermediary and an insurance company providing FSI might collude with the client firm, unless they are themselves under the purview of a public enforcement mechanism. This suggests that, rather than dispensing with public intervention, these mechanisms simply shift the need for such intervention to a higher layer.

The danger of collusion between auditors and their clients suggests that “whistle-blowing” mechanisms might be particularly suited in this case, being designed to break collusion. Such mechanisms could reward individuals (e.g., employees) who report fraud by auditors and/or their clients, by entitling them to a portion of the penalty paid by the latter (see Buccirossi and Spagnolo, 2001). But in our case whistle-blowing is unlikely to be effective, since the “whistle-blower” would hardly be able to document the tacit exchange of favorable audits against consulting contracts.

This discussion 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 the fraction of bad investments is larger or companies seek more external funding.

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23 Collusion can hinder the effectiveness of a FSI scheme in two ways. First, the fact that the auditors is chosen and paid by the insurance company does not rule out that client firms might try to bribe them. Second, the client company might bribe the insurance company to underreport FSI premiums in exchange for higher premiums on other insurance contracts, and thereby mischievously appear in the eyes of investors as companies with high-quality financial statements.

24 We thank Giancarlo Spagnolo for pointing this out to us.
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.
References


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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 ($X > X$, 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 ($X = X$, 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 $Y - I - \bar{X} = C(q^c) + e_c(q^c)$. 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 $dq^c / dM = -\left[\frac{\partial\Psi}{\partial q}\right] < 0$. If $\lambda > 0$, differentiating the first-order condition (13b) and equation (15) yields $dq^c / dM = -\left[\frac{\partial\Psi}{\partial q}\right] < 0$.

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

(i) The first strategy 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 $\gamma$.

(ii) The second strategy is to deter the offer of bribes by managers by appending the further constraint $\Psi(q, \gamma) \leq 0$ 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 $\gamma$, since a higher value of $\gamma$ relaxes the additional constraint $\Psi(q, \gamma) \leq 0$, recalling that $\partial\Psi / \partial \gamma = -\Omega(q) < 0$. For values of $\gamma$ larger than a critical value $\gamma_2$ (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 $\gamma \geq \gamma_2$, $q^{nc}(\gamma) = q^*$. 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 $\gamma$, up to their second-best levels, where they stabilize for $\gamma \geq \gamma_2$.  

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(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 $\gamma$, intersects from below the welfare associated with the first strategy, $W^c(q^c)$. Let us denote by $\gamma_1$ the value of $\gamma$ 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 $\gamma_1$ is decreasing in $M$. Recall that $\gamma_1$ 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 $\gamma$, the result follows immediately. 

Proof of Proposition 5. To maximize social welfare, the regulator has three alternative strategies. The first and second strategies allow bundling of auditing and consulting, and are otherwise defined as in points (i) and (ii) of the Proof of Proposition 4. The third 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: $M > 0$, $\theta = \epsilon$, for $\epsilon$ 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 $\theta$ 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 $\gamma$.
whereas the comparison between the third and the second strategy depends on the value of \( \gamma \). 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 \( \gamma \) larger than the critical value \( \gamma_2 \) 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 \( \gamma \), intersects from below the welfare associated with the third strategy, \( W(q^*) \). Therefore, the third strategy dominates for low values of \( \gamma \), and the second strategy dominates for higher values. More precisely, the optimal standard is \( q^* \) for \( \gamma < \gamma' \), where \( \gamma' \) 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 \( \varepsilon \) 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 \( \gamma \). 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 \( \theta \) 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.
Nature chooses the state of the world $s$.

Firm buys audit service at fee $F$; auditor chooses audit quality $q$, and files report $r$.


Regulator chooses legal standard $q^*$, penalty $l$ and enforcement $e$.

Bureaucrats detect compliance with standard $q^*$ with probability $f(e)$.

The company’s actual value $V$ is determined.

Figure 1. Time line
Figure 2. Manager’s gain from bribing auditor $\Psi$ as function of auditing standards $q$ and quality of corporate governance $\gamma$
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 $\gamma$ and of profits from consulting $M$
Case a. Low profits from consulting $M$ and high efficiency gains $\theta$

Case b. High profits from consulting $M$ and low efficiency gains $\theta$

Figure 4. Optimal auditing standards $q$ as function of the quality of corporate governance $\gamma$, efficiency gains from consulting $\theta$ and profits from consulting $M$
non-binding feasibility constraint
\[ e = Y - I - X - C(Q) \]

incentive constraint
\[ e(q^*) \]

indifference curves

Figure 1A. Equilibrium auditing standards \( q \) and enforcement level \( e \)