



# Conscientious regulation and post-regulatory employment restrictions

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## Abstract

In this paper we address the issue of regulatory capture. Firms can seek to capture regulators by offering them 'post-regulatory' jobs at a higher wage than the regulator would otherwise receive. The firm is interested in such an arrangement if the profits from endogenous lax regulation exceed the cost incurred in higher wage payments. We show how the wage paid in the public-sector and a 'cooling-off' period for regulators can be used in tandem to preempt such 'capture' of regulators. The legislator can choose to make ongoing public-service employment more attractive than employment in the regulated industry, or can 'convince' the regulator to leave the public-sector but remain conscientious during the regulatory period. The choice depends on the legislator's preferences between levying taxes to pay civil servants, and the curtailment of the civil liberties of the regulator. We apply the model to explaining the policies that are observed in different Western countries. © 1997 Elsevier Science B.V.

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The greatest public risks arising from post-employment conduct may well occur during the period of Government employment, through the dampening

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of aggressive administration of Government policies. (New York Bar, from Adams, 1981, p. 83)

## 1. Introduction

The pioneering works of Stigler (1971) and Peltzman (1976) on regulation changed the way economists view public servants in general, and regulators in particular. While previous literature had viewed regulators as benevolent agents of the public, Stigler and Peltzman proposed that regulators are self-interested agents who do not necessarily act in the public interest. In this paper we adopt the Stigler–Peltzman point of departure, and view regulators as subject to ‘capture’ by a regulated industry, i.e., regulators can be induced to act in the industry’s interest and not in the public’s interest. We present a model which shows how a legislator, who appoints a regulator, can ‘persuade’ the regulator to act in the public interest.

In regulated industries, the regulator arbitrates between the firms whose owners would prefer that regulation be lax, and consumers who desire conscientious protection from monopolistic and opportunistic practices. There are also two additional interest groups present. The first consists of the regulators themselves, and the second consists of legislators who, aside from appointing the regulators, also determine the regulators’ obligations and responsibilities, and are answerable to their own constituents.

Spiller (1990) and others suggest that legislators are unable to monitor regulators’ actions, since the ‘regulator’s actions are intrinsically unobservable’<sup>1</sup>. If this is the case, then once the regulator is employed, the legislator has limited influence on him. Our goal in this paper is to show how, despite this limitation, the legislator can nonetheless affect the regulator’s behavior, thus solving, or at least mitigating, the problem of capture. The two instruments the legislator has at his or her disposal to achieve this goal are (i) the wages paid in the public-sector, and (ii) legislative steps which can be taken to indirectly affect the regulator during or after his or her appointment<sup>2</sup>. The manner in which these instruments operate depends on the means by which the regulator can be captured. We investigate when and how these instruments directed at ensuring conscientious behavior of regulators can be effective.

The firm seeks to capture the regulator if the profits from lax regulation exceed the cost incurred in capturing the regulator. In a society where explicit open bribes cannot safely be paid<sup>3</sup>, a mechanism whereby firms can capture regulators is by offering ‘post-commission’ jobs (i.e., jobs after they leave their jobs as regulators)

<sup>1</sup> See Laffont and Tirole (1996) for a summary of the research in this area.

<sup>2</sup> The regulator’s salary during the regulatory period cannot affect his behavior since he will receive this salary independent of his actions as a regulator.

which pay a higher wage than the regulator could receive otherwise<sup>4</sup>. This is then an implicit bribe.

It would seem, then, that the optimal response should be to simply ban regulators from ever working in the regulated industry, thereby circumventing the problem. Or, put differently, the discussion above may lead one to conclude that any regulator employed in the sector which he once regulated must have been corrupt. This, however, is not the case because the regulator acquires industry-specific human capital while regulating, making him more productive in the regulated industry than elsewhere. Thus, there would be a deadweight loss from a ban.

To prevent 'capture', the legislator can alter the choice set facing the regulator. The decision variables available to the legislator are the public-sector wage which the regulator will be paid after his appointment as regulator has been completed (if he continues in employment in the public-sector), and the length of the 'cooling-off' period for regulators (a minimal period immediately following the regulator's commission during which the regulator is prohibited from working in the regulated industry)<sup>5</sup>. We model a legislator who chooses between two alternatives. He can make the civil service job more attractive than the job in the regulated industry so that the regulator will have no incentive to help regulated firms. Or, after leaving the civil-service, the regulator can be made to 'sit on the side' for a specified minimum period of time before being allowed to accept a job in the industry which was subject to his regulation. Optimally, the incentive for firms to 'bribe' regulators is eliminated, so restoring the original intent of consumer protection<sup>6</sup>.

<sup>3</sup> As Laffont and Tirole (1996) state: "Monetary bribes are feasible, although not common due to their illegality. More pervasive are the hoped-for future employment for commissioners and agency staff with the regulated firms..."

<sup>4</sup> See Spiller (1990) and Eckert (1981).

<sup>5</sup> Whereas we are concerned with the length of time *after* an incumbent regulator has left office, other issues arise concerning the length of time *of* the incumbency. See, for example, Konrad and Torsvik (1997) for discussion of this issue. See also Spiller and Urbiztondo (1994) on interactions between short-lived political appointees who control a legislature and long-lived career civil-servants.

<sup>6</sup> The natural question which arises is how deterring the payment the regulator receives can affect the firm's decision. After all, what is important is the present value of the payments and not their nominal values. Thus, deterring the payments just means that the nominal payment will need to be higher, but the present value of those payments will be constant. In this case, only a complete prohibition from ever working in the private sector can be effective. For this to not be the case, it is necessary that the present value of the payment by the firm increase with the length of the cooling-off period. The assumption we make which gives rise to this result is that there is a probability that the regulator will not actually work in the firm despite being promised the job. This can occur either because of some occurrence at the firm level — for example, the firm may go bankrupt or undergo a change of management — or because of something which affects the regulator — he may become ill or even die, or he may receive a better offer elsewhere. The effects of this assumption are explained more at length in the text. Alternatively, if the regulator's discount rate is higher than the firm's discount rate, the present value of the payments to the firm will increase with the length of the cooling-off period. We do not assume that the legislator is interested only in consumer protection. Rather, we assume that the degree of 'producer protection' desired by the legislator is limited, and address only the residual 'consumer protection' which *is* desired by the legislator. This is discussed at greater length below.

The legislator's choice between these paths depends on his political support function. Political support is negatively affected by the wage level in the public-sector (since these wages are financed by taxes)<sup>7</sup>, and by the degree of curtailment of the civil liberties of the regulator, which is politically costly because of social aversion to limitations on individual freedoms.

A cooling-off period is not the only type of post-employment restriction, and the desire for conscientious regulation is not the only justification for legislating post-regulatory restrictions. Another, equally important, justification for legislating post-employment restrictions, is that the ex-regulator may be able to use his influence with government officials in order to advance the interests of the firm in which he is employed. This issue is usually dealt with by imposing post-employment restrictions on former regulators' appearances before government agencies for periods ranging from a year to a perpetual ban<sup>8</sup>. This consideration, while clearly important, is not the focus of our paper.

In Section 2 we present our model of regulation. The model is set up as a three stage principal-agent problem. The legislator chooses a 'cooling-off' period and wage rate, which will lead the firm to choose an optimal wage structure, which will cause the regulator to act conscientiously. In Section 3 we review the state of legislation on this matter in various countries. Conclusions are presented in Section 4.

## 2. The model

We analyze a market with three players — a regulator, a regulated firm, and a legislator. The regulator's job is to monitor the firm's actions and to assure that laws and guidelines are followed. The firm is subject to the regulator's demands, but may be able to convince the regulator to be lenient by 'capturing' the regulator. This is done by offering the regulator a job in the firm after the former has completed his or her term<sup>9</sup>. This offer will be of interest to the regulator if the wage he receives in the regulated firm is higher than his alternative wage both outside of the regulated industry and in continued service in the public-sector.

The legislator is interested in maximizing political support. In general, this maximization will have the legislator consider both the interests of the consumers and the interests of the regulated firms and the firms' stockholders. In what follows, we dichotomize the regulator's choices to being 'lenient' and 'conscientious', with the interpretation being 'overly lenient from the legislator's perspec-

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<sup>7</sup> In many countries the wages of civil servants are linked so that it is not possible to increase the wage of one worker without increasing the wages of others.

<sup>8</sup> Comptroller General (1978) and various laws.

<sup>9</sup> As stated in Section 1, monetary bribes are ignored since "a monetary bribe exposes the parties to the possibility of legal sanctions" (Laffont and Tirole, 1996, p. 477).

tive' and 'just conscientious enough'. Thus, maximization of the legislator's political support function requires that he denies the firm the opportunity to capture the regulator, resulting in the regulator being 'conscientious'. The legislator has two instruments to attain this goal — (i) he or she can pay the regulator a high wage in the public-sector, thereby making the outside offer unattractive, or (ii) a 'cooling-off' period can be legislated during which the regulator is prohibited from taking a job in any firm in the regulated industry (this period begins on the day the regulator leaves the public-sector). The legislator faces a tradeoff between raising the regulator's salary, and lengthening the cooling-off period. The former necessitates increasing taxes<sup>10</sup>, while the latter is undesirable as being in contradiction to the regulator's basic right of freedom of employment. The legislator chooses the combination of wage and cooling-off period which maximizes the political support function, subject to keeping the regulator conscientious.

We proceed now to describe the regulator's optimization problem. Then we use the solution to describe the firm's problem, and then consider the legislator's optimization problem under different scenarios.

### 2.1. *The regulator's optimization problem*

Consider a regulator who can choose how conscientiously to do his job. His level of conscientiousness directly affects his utility; the regulator cares about the public's utility, which will be higher the more conscientious the regulator is, i.e., his conscientiousness is a virtue in his own self-esteem. However, the regulator's utility also depends on his income, and if the firm is willing to pay the regulator to be lenient, then his income may be affected by his level of conscientiousness. We denote the regulator's utility by  $V(I, U)$ , where  $I$  is his income, and  $U$  is the public's utility. For simplicity, we assume that his choice is dichotomous — he can choose to be lenient or conscientious. The public's utility will be denoted  $U_s$  when the regulator is conscientious, and  $U_l$  when he is lenient, with  $U_s > U_l$ . His choice of conscientiousness affects the firm's profits during the regulator's term in office. In particular, if the regulator is lenient, the firm earns  $\pi_l$ , and if he is conscientious the firm earns  $\pi_s$ , with  $\pi_l > \pi_s$ . It is this gap in profitability which motivates the firm to 'capture' the regulator. As explained above, the firm can only pay the regulator by offering the regulator a higher wage after he retires from regulating than he would receive elsewhere. However, the regulator cannot immediately take this higher paying job; if the regulator wishes to take a job in the regulated industry, he must first spend a certain time period — a cooling-off period — employed outside of both the regulated industry and the public-sector.

The regulator's choices are described in Fig. 1. After his appointment has concluded, the regulator can choose to stay employed in the public-sector and

<sup>10</sup> Since, because of linkage, increasing the wages of regulators may require increases in the wages of other civil servants, the tax consequences can be significant.

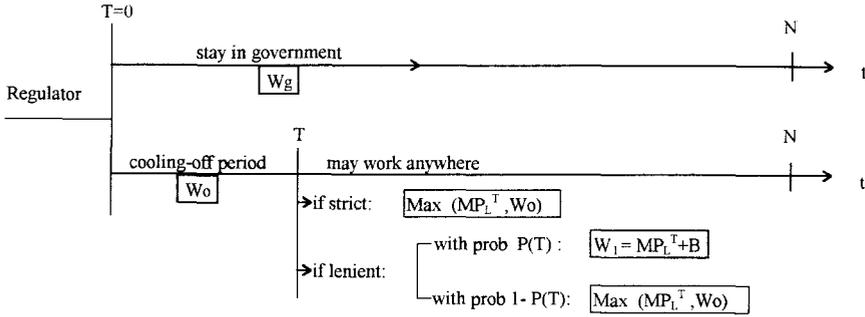


Fig. 1.

receive a wage of  $W_g$ . Alternatively, he may choose to leave the public-sector and work either outside of the regulated industry or in the regulated industry. However, if he chooses to work in the regulated industry, he must first spend a ‘cooling-off’ period of  $T$  years earning a wage of  $W_0$  outside of the regulated industry. After these  $T$  years the regulator will obtain a wage  $W_1$  if he was lenient, and if he is conscientious he will choose the better of the two options facing him — a wage of  $W_0$  outside of the regulated industry, and the value of his marginal product in the regulated industry at that time. Note that  $W_1$  will equal the value of the regulator’s marginal product in the regulated industry, plus a bribe premium, hereinafter denoted  $B$ .

Setting the price of the good equal to 1, define  $MP_L^0$  as the regulator’s (value of) marginal product in the regulated firm the day he ends his regulatory commission. We assume that this is greater than  $W_0$  because of the industry-specific human capital acquired during his term as regulator. However, his productivity in the regulated industry depreciates during the period in which he is not employed in the industry. We assume that his human capital depreciates at a rate of  $\rho$  per period, so that after  $T$  periods outside the industry, it is equal to  $MP_L^T = MP_L^0 e^{-\rho T}$ <sup>11</sup>. The depreciated marginal product can even fall below  $W_0$ . Note that the alternative sector wage does not depreciate because the regulator is actively working there, so his human capital in that sector retains its value.

Finally, we assume that, despite the fact that the firm does not intend to break its promise to the regulator<sup>12</sup>, there is some probability that the regulator will not, in the end, be given the job promised to him even if he is lenient. This can occur

<sup>11</sup> As a matter of convenience we assume that this depreciation is due to obsolescence effects and not aging effects (see Neuman and Weiss, 1995, for an explanation of this distinction), so that  $W_0$  does not also fall.

<sup>12</sup> The reason that the firm can be expected to keep its promise is because this is an infinitely repeated game — after this regulator completes his term there will be another regulator, and if the promise to the first one is broken, the second one will no longer cooperate. Thus, there is no renegotiation problem.

for several reasons, stemming either from issues involving the firm — e.g., the firm with which the regulator struck the deal may go bankrupt or undergo a change of management — or from issues involving the regulator — for instance, the regulator may be unable to take the job due to sickness or death, or he may prefer not to take the job if he receives a better offer elsewhere. The probability of not taking the job increases with the length of the cooling-off period, so that, denoting by  $P(T)$  the probability of receiving the promised job,  $P(0) = 1$ ,  $P' < 0$ , and  $P'' > 0$ . This assumption has the effect of making the expected income of the regulator less than the conditional cost (conditional on survival) to the firm, with the difference being a function of the length of the cooling-off period. This is a crucial assumption for what follows, since, in the absence of this assumption, the only cooling-off period which will be effective is of infinite duration because the present value of the necessary payment is independent of the length of the cooling-off period <sup>13</sup>.

Define  $I_l$  as the present value of the regulator's income if he is lenient (and thus works in the regulated industry after the cooling-off period has ended),  $I_s^f$  if he is conscientious (strict) but leaves the public-sector, and  $I_s^g$  as the present value of his income if he remains employed in the public-sector. The regulator's income depends on whether he has been lenient or conscientious and on where he is employed. If lenient the regulator receives a wage of  $W_0$  for  $T$  periods, and, assuming a post-regulation worklife of  $N$  years, for  $N - T$  periods he receives  $MP_L^T + B$  (his wage when lenient,  $W_1$ ) with probability  $P(T)$  and the larger of  $W_0$  and  $MP_L^T$  with probability  $1 - P(T)$ . Thus, the present value of the regulator's wage is

$$EI_l = \int_0^T W_0 e^{-rt} dt + \int_T^N [P(T)(MP_L^0 e^{-\rho T} + B) + (1 - P(T))\max(W_0, MP_L^0 e^{-\rho T})] e^{-rt} dt. \tag{1}$$

If conscientious, the regulator will still be able to work in the regulated firm if he chooses to leave the regulatory industry, but will receive only his marginal product if he does so. Thus,

$$I_s^f = \int_0^T W_0 e^{-rt} dt + \int_T^N (\max[W_0, MP_L^0 e^{-\rho T}]) e^{-rt} dt. \tag{2}$$

Finally, if the regulator continues to work in the public-sector, he earns

$$I_s^g = \int_0^N W_g e^{-rt} dt. \tag{3}$$

The regulator will shirk on his responsibility if

$$EV(I_l, U_l) \geq \max[V(I_s^f, U_s), V(I_s^g, U_s)]. \tag{4}$$

<sup>13</sup> But see <sup>6</sup> for an alternative assumption which will yield similar results.

For simplicity, assume that  $V$  is separable in its arguments and that the regulator is risk-neutral, so that

$$V(I, U) = I + \beta U, \tag{5}$$

where  $\beta$  is a measure of the importance of conscientiousness to the regulator. Eq. (4), the regulator’s problem (RP), can be rewritten as

$$\text{RP: } E\Delta I \equiv EI_1 - I_s^i \geq \beta(U_s - U_1) \equiv \beta\psi, \quad i = f, g. \tag{6}$$

That is, the regulator will shirk on his responsibility if the monetary compensation for doing so (the left-hand-side of Eq. (6)) is greater than his non-monetary cost — his loss of utility from not being conscientious.

2.2. The firm’s optimization problem

The firm wishes to maximize its stream of profits. In so doing it weighs the present benefit derived from ‘capturing’ the regulator against the future cost of paying the regulator more than his marginal product. If the firm is to ‘capture’ the regulator, it wishes to choose the smallest bribe,  $B$ , which satisfies the regulator’s problem RP as stated in Eq. (6). Defining  $\Delta\pi$  as the net increased profit from ‘capturing’ the regulator, the firm’s problem (FP) is

$$\text{FP: } \max \left[ 0, \max_B \Delta\pi | \text{RP} \right]. \tag{7}$$

If  $\Delta\pi$  is not positive when RP is satisfied, the firm will not try to influence the regulator and the regulator will be conscientious. Defining  $R_1$  as the difference between ‘lenient’ and ‘conscientious’ profits during the regulator’s term in office, i.e.,  $R_1 = \pi_1 - \pi_s$ <sup>14</sup>,

$$\Delta\pi = R_1 - \int_T^N B e^{-rt} dt. \tag{8}$$

Note that for the firm to capture the regulator, it is necessary (but not sufficient) for  $R_1$  to be greater than the lost utility to the regulator, so that the firm can compensate the regulator and not lose. In other words, if capture is to be feasible, it must necessarily be the case that

$$R_1 \geq \beta\psi. \tag{9}$$

2.3. The legislator’s optimization problem

The legislator wants to be reelected, or to maximize political support. Voters are affected by (i) utility from the regulated industry, (ii) the wage level in the

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<sup>14</sup> Note that the cost is not weighted by  $P(T)$ . This is because the firm is only interested in what happens while it is a going concern.

public-sector (which affects the amount of taxes they pay), and (iii) their reluctance, in a democratic society, to place limitations on freedom to choose employment<sup>15</sup>. The first of these is affected directly by how conscientiously the regulator does his job. Our assumption is that the difference in the public's utility between conscientious and lenient regulation is sufficiently great, that in the legislators political support function this effect outweighs either of the other considerations<sup>16</sup>. Given this, the legislator will want to maximize political support

$$\phi = \phi(W_g, T), \quad (10)$$

subject to keeping the regulator conscientious<sup>17</sup>. Since voters prefer both a lower public-sector wage level and more personal freedom, we assume that

$$\begin{aligned} \frac{\partial \phi}{\partial W_g} < 0; \quad \frac{\partial \phi}{\partial T} < 0; \quad \frac{(\partial \phi)^2}{\partial^2 W_g} < 0; \quad \frac{(\partial \phi)^2}{\partial^2 T} < 0; \quad \text{and} \\ \frac{(\partial \phi)^2}{\partial W_g \partial T} = 0. \end{aligned} \quad (11)$$

Thus, in  $\{W_g, T\}$  space, the legislator's indifference map is concave and decreasing as we move away from the origin. The legislator will wish to achieve conscientious regulation as cheaply as possible, and will do so by being on the lowest indifference curve subject to the constraints imposed by the regulator and the firm.

#### 2.4. The solution

The legislator attains his primary goal of conscientious regulation if the length of the cooling-off period ( $T$ ) and the wage in the public-sector ( $W_g$ ) are set such that the firm cannot profitably bribe the regulator (FP yields 0). Referring back to RP, there are two ways in which this can be done. First, the legislator can make the present value of working outside of the public service sector and being

<sup>15</sup> Of course, the regulator knows when he accepts the job that post-regulatory employment restrictions exist and takes them into account, so that his 'civil rights' are certainly not being violated. Still, in the deliberations in some countries (e.g., Germany), this curtailing of opportunities was viewed as being undesirable.

<sup>16</sup> As one referee stated, however, we have assumed that the government is interested in consumer protection. In reality, there are pro-consumer and pro-business governments, and in some cases, strict regulation may not be desired. Indeed, the government's choice of, and demands from these regulators may be endogenous. We thank the referee for pointing this out.

<sup>17</sup> The length of the cooling-off period may affect the legislator's utility function in ways other than that discussed in the text. For example, as stated above, the regulator has industry-specific human capital which makes him more productive in the regulated industry than outside of it. If consumers' utility is affected by the proper allocation of resources, then the legislator will also want  $T$  to be as short as possible while still attaining conscientious regulation.

conscientious greater than the present value of being lenient (and working in the regulated industry once allowed). In this case the regulator will be conscientious despite possibly ending up in the regulated industry. Second, the legislator can make the present value of continuing to work in the public service sector greater than the present value of being lenient, in which case the regulator does not leave the public sector. The choice between these alternatives depends on the legislator’s political support function. Each of these possibilities will first be presented separately, and will then be combined with the legislator’s indifference map to derive the optimal policy.

We begin by presenting the solution when the worker leaves the public-sector, and then turn to the case where he remains.

2.4.1. *Utility outside the public-sector – conscientious vs. lenient regulation*

Solving this problem requires consideration of two cases in Eqs. (1) and (2) — when the regulator’s marginal product in the regulated industry at time  $T$  is greater than his marginal product in the alternative sector ( $MP_L^T \equiv MP_L^0 e^{-\rho T} \geq W_0$ ) and when it is not ( $MP_L^T < W_0$ ). Both cases will occur at some  $T > 0$  because the regulator’s productivity in the regulated industry approaches zero as  $T$  approaches infinity. Solutions for the two cases are derived in Appendix A. In what follows we define  $\tilde{T}$  as the  $T$  at which  $MP_L^T = W_0$ .

If  $MP_L^T \geq W_0 (T < \tilde{T})$ , the shortest cooling-off period which will keep the regulator conscientious by denying the firm the opportunity to affect his decisions will make the firm’s profits equal zero, i.e.,

$$\Delta\pi = R_1 - \frac{\beta\psi}{P(T)} = 0. \tag{12}$$

Solving for  $T$ ,

$$T^* = P^{-1}\left(\frac{\beta\psi}{R_1}\right). \tag{13}$$

This solution is appropriate only if the  $T^*$  thus derived is less than or equal to  $\tilde{T}$ . If, however,  $MP_L^T < W_0 (T > \tilde{T})$  then this solution is infeasible, and the optimal cooling-off period will be the  $T^*$  which solves

$$\Delta\pi = R_1 - \frac{\beta\psi}{P(T)} - (W_0 - MP_L^0 e^{-\rho T}) \frac{e^{-rT} - e^{-rN}}{r} = 0. \tag{14}$$

The legislator, in optimizing, will want to choose the smaller of the two  $T^*$ ’s, as depicted in panels A and B of Fig. 2. In each panel  $\Delta\pi$  is plotted twice — the top curve in each panel depicts Eq. (14) and the bottom one depicts Eq. (12)<sup>18</sup>. By definition, the two curves intersect at  $\tilde{T}$ . In panel A the intersection occurs before

<sup>18</sup> Note that Eq. (14) has a higher intercept than Eq. (12) because, by assumption,  $MP_L^0 > W_0$ .

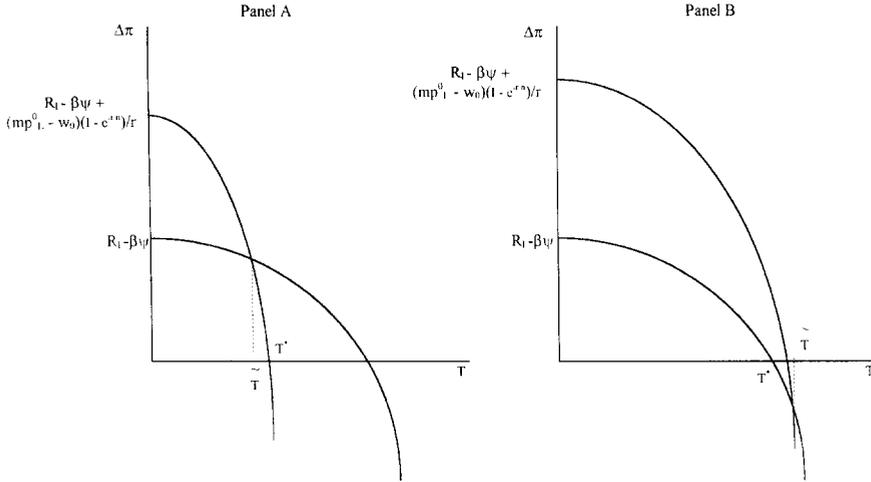


Fig. 2.

$\Delta\pi$  reaches zero. In this case  $T^*$  will be set in accordance with Eq. (14) since that is the relevant curve. In panel B, conversely,  $T^*$  will be set in accordance with Eq. (13). In either case, if the regulator enters the regulated industry (which he will do with probability  $P(T^*)$ ), he will do so with his integrity intact since the firm will not have had sufficient incentive to bribe the regulator<sup>19</sup>.

Note that a change in  $MP_L^0$  will affect the top but not the bottom curve. Beginning in panel A, the binding equation is Eq. (14). Increases in the marginal product of the regulator in the regulated industry increase the profitability (by decreasing the cost) to the firm of hiring the regulator, and thus cause the optimal cooling-off period to increase. However, once the situation in panel B is reached, where Eq. (12) is binding, increases in  $MP_L^0$  no longer affect the cooling-off period. This change occurs because once the regulator is more productive in the regulated industry *even after the cooling-off period is over*, the firm no longer saves costs as a result of an increase in the regulator's productivity, because it must pay him his marginal product.

The optimal cooling-off period established above is appropriate if the regulator leaves the public service sector. Setting a cooling-off period of this duration results in the regulator acting conscientiously during his term in office, and yet he may nevertheless enter the regulated industry once the cooling-off period has passed. We turn now to the case when the regulator is better off remaining in the public-sector.

<sup>19</sup> Note that this is true only if  $T^* < N$ . Theoretically, however, it is clearly possible that  $T^* > N$ . In this case the regulator will be prohibited from ever working in the regulated industry, since then the firm always profits from buying off the regulator.

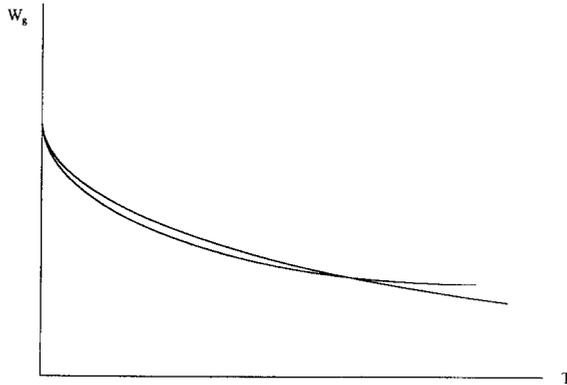


Fig. 3.

#### 2.4.2. *Utility in the agency vs. utility in the regulated industry (when lenient)*

If the legislator seeks to keep the regulator in the public-sector, he can do so by raising the public-sector wage. High wages can also be used in conjunction with legislation of a cooling-off period. Combinations of the two instruments will yield the desired result. In general, the longer the cooling-off period legislated, the lower the wage the legislator must pay to keep the regulator honest. In any case, the regulator cannot offer a wage lower than  $W_0$ , since, if he does, no one will accept a job as a regulator. Thus,  $W_g > W_0$ .

To achieve a result of conscientious regulation, the legislator can choose any combination of  $W_g$  and  $T$  for which it is unprofitable for the firm to capture the regulator (i.e., for which  $\Delta\pi$  is less than or equal to zero). The solution frontier is derived in Appendix B, and shown in Fig. 3 as the outer envelope of the two curves. We denote this frontier the 'honesty-contour'. The negative slope indicates that an increase in the cooling-off period lowers the value of the outside option, and thus enables the legislator to pay a lower public-sector wage. While all points on this frontier lead to both conscientious regulation and to the regulator remaining in the public-sector, the legislator chooses the point which maximizes political support.

#### 2.4.3. *Equilibrium and comparative statics*

The legislator maximizes political support by choosing the better of the two solutions of the two previous sections (as depicted in Figs. 2 and 3). Two possible solutions are depicted in Fig. 4, which replicates the 'honesty-contour' of Fig. 3 with two additions. First, we introduce indifference contours for the legislator. Recall that the legislator's utility increases as he moves to a lower contour. Second, we add  $T^*$  as established in Fig. 2. We depict two possible values for  $T^*$  in Fig. 4. Conscientious regulation can be attained in two ways: either by being on (or above) the 'honesty-contour', in which case the regulator remains in the

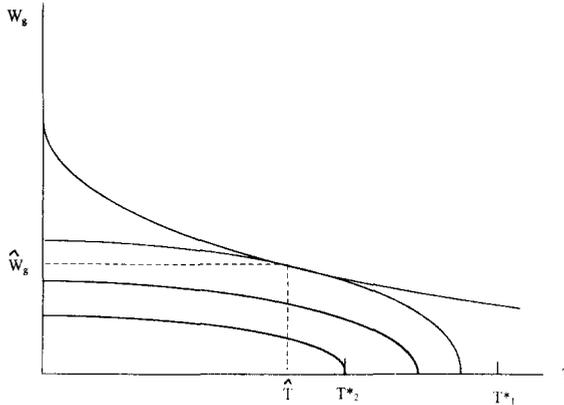


Fig. 4.

public-sector, or by being at the point where  $T = T^*$  and  $W_g = W_0$ , in which case the regulator may eventually enter the regulated industry. In the case drawn, if  $T^*$ , as found in Fig. 2, is  $T_1^*$ , then the legislator will choose to keep the regulator in the public-sector, and will do so by setting  $W_g$  equal to  $\hat{W}_g$  and  $T$  equal to  $\hat{T}$ . If, however,  $T^*$  is equal to  $T_2^*$ , the legislator will set  $T$  equal to  $T^*$  and  $W_g$  equal to  $W_0$ , and the regulator will leave the public-sector when his term ends<sup>20</sup>.

The parameters identified here can in principle, and do in practice (see the following section), vary extensively between sectors and countries. Changes in the shape or level of the ‘honesty-contour’, changes in the shape of the indifference contours reflecting legislators’ preferences, and changes in the value of  $T^*$  change not only the length of the optimal cooling-off period; they can also change the nature of the solution, since they can change the place of employment of the regulator. It is this change which is of particular interest.

In general, changes in the model’s parameters affect both the ‘honesty-contour’ and  $T^*$ . For instance, increases in the firm’s profit from capturing the regulator move the ‘honesty-contour’ out and also increase  $T^*$ . This results in a longer cooling-off period, but may or may not entail a change in the place of employment of the regulator. This particular outcome depends, among other things, on the legislator’s preferences. Similarly,  $T^*$  is increased by (i) a decrease in the importance to the public of conscientious regulation ( $\psi$ ), (ii) a decrease in the importance to the legislator of being honest ( $\beta$ ), and (iii) an increase in the probability that the job will still be available and desirable ( $P(T)$ ). It cannot be determined a priori how these changes affect the choice between keeping the regulator in the civil service and having him join the private sector.

<sup>20</sup> Note that these alternative equilibria could have been presented by altering the indifference map instead of the value of  $T^*$ . This will be discussed further below.

There are, however, two other influences on the choice between these possibilities. The first is an increase in  $MP_L^0$ , the regulator's marginal product in the regulated industry on the day he completes his term. This moves the 'honesty-contour' out, and, as discussed above, also increases  $T^*$ , but only until the point at which  $MP_L^T = W_0$ . Beyond this point, further increases in  $MP_L^0$  move the 'honesty-contour' out, but leave  $T^*$  unchanged. This tends to move the equilibrium point to the corner, with  $T = T^*$  and  $W_g = W_0$ ; that is, the regulator will leave the public-sector. The reason is that when the productivity of the regulator in the regulated industry is high, the salary which needs to be paid to keep him in the public-sector may well be prohibitive.

The legislator's choice is also influenced by his preferences over the levying of taxes and the curtailment of civil rights. As the importance of the wage falls and/or the importance of the freedom to choose rises, continued employment in the public-sector tends to become the more likely choice. For instance, if wages of public servants are linked, then an increase in the wage of regulators increases the wages elsewhere. In this case, a greater tax burden flattens the indifference curves, leading regulators to leave the public service. If, on the other hand, the political cost of curtailment of civil rights is high, we would expect the opposite.

### 3. Existing legislation <sup>21</sup>

We wish to consider how the determinants of the optimal post-employment restrictions can be used to understand differences across countries. To this end, we turn first to a description of laws in different countries.

In the U.S., the Ethics Reform Act of 1989 contains general restrictions on the post-employment activities of former officers, employees and elected officials of the executive and legislative branches. The Act also applies to former members of independent agencies. Most restrictions are with regard to representation before government agencies. These restrictions range from one year for certain types of consulting positions to permanent restrictions for projects in which the officer was personally involved. However, employment per se is restricted only in the banking industry for former employees of the Federal Reserve. These restrictions are for two years. Transgression is a criminal offense punishable by up to five years in prison and/or a fine of up to \$50,000.

The experience in the U.S. is summed up in Eckert (1981) as follows:

A different pattern emerges for post-commission behavior. Service on a commission is clearly a stepping-stone to private-sector jobs related to the

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<sup>21</sup> Much of this section is based on Comptroller General (1978).

regulated industry. Of the 142 ex-commissioners, 72... took privately related jobs.... They (commissioners) appear to have been captured... by private organizations in or related to the regulated industry.... Why do ex-commissioners take such jobs?... First, the jobs could be rewards for votes on the bench that were favorable to the industry or a particular firm. Second, the job could be the return on the investment in human capital... during his tenure in office, a period of relatively low wages...

Spiller (1990) found that of 129 commissioners for which there were data, 58 took post-agency jobs in the regulated industry, and 22 remained in the public-sector. Thus, in the U.S. the cooling-off period has not been sufficiently long to keep regulators out of the regulated industry. However, there is no way to know, *a priori*, whether it is not long enough to keep regulators honest.

Canada adopted post-employment guidelines in December 1976 as a result of activities by two former high-level government officials. The guidelines prohibit, for a period of two years, accepting an appointment to the board of directors of a commercial corporation with which regulators were involved during the course of government service. In addition, regulators are prohibited for 1.5 years from accepting employment with a private company with which they had significant direct dealings during the last year of public service. There is no penalty specified in the law for transgressions.

In Europe the situation varies across countries. In Germany, post-employment restrictions appear to be considered unnecessary since individuals rarely leave the civil service, but also post-employment restrictions may be in violation of the German Constitution, which guarantees freedom of occupation. In the United Kingdom there is a two year restriction on employment, but there are no sanctions for violators. In France the law is stricter, and former government employees are restricted from any type of contact with firms for five years, punishable by imprisonment and a fine.

In Japan, the 1947 Japanese National Public Service Law prohibits for two years all National Public Service employees from accepting a position from any profit-making firm closely connected with any agency at which the employee was formerly employed within 5 years prior to separation. The penalty for violation is imprisonment for up to one year and a fine.

In Israel, The Public Service (Restrictions after Retirement) Law of 1969 restricts employment for one year. Central bank employees were previously restricted for two years, but in March 1995 the law was changed to one year. Transgression is a criminal offense, bearing the penalty of either a fine or six months imprisonment. As of December 1995 no criminal proceeding had been filed by the authorities in violation of this Law (source: Civil Service Commissioner). In February 1997 the law was applied for the first time to prevent the former head of the antitrust authority from accepting a job as the CEO of Bezeq, the major Israeli telecommunications company.

The observed differences across countries are explainable by appealing to our model on the assumption that legislation was chosen optimally by legislators.

In the United States, a small percentage of regulators remain employed in the public-sector, which, according to our model, occurs when the legislator prefers the corner solution of a relatively long cooling-off period and a relatively low public-sector wage. In terms of Fig. 3, the chosen solution is to set  $W_g = W_0$  and  $T = T^*$ . This is consistent with high productivity in the private-sector. At the same time, the cooling-off period is relatively short, which indicates that a very large bribe is necessary to capture the regulator — perhaps because regulators in the U.S. are conscientious, or are carefully supervised (a possibility not analyzed in our model).

In Germany, the importance placed on the individual's freedom to choose his own desired place of employment is translated in our model into legislators' preferences which result in a short (or even non-existent) cooling-off period, combined with a high public-sector wage to keep regulators in the public-sector.

In France, where the cooling-off period is long, one might infer that wages in the civil sector are low, and that regulators tend to leave the public service. Yet this is not the case. Rather, firms in regulated industries also tend to be State companies. Civil servants consequently naturally move to employment in key positions in the State companies<sup>22</sup>. The reason for the long cooling-off period that has been legislated in France, therefore, lies in the level of the 'honesty-contour' (see Fig. 3). Our model suggests that this contour is very high in France, which occurs, for instance, if firms have much to gain from lax regulation, or if regulators give little consideration to the welfare of the public (a low  $\beta\psi$  in our model). A long cooling-off period is then necessary to keep the regulators honest, despite their remaining in the public-sector.

#### 4. Conclusions

In this paper we have shown how the wage paid in the public-sector and a 'cooling-off' period for regulators can be used in tandem to ensure that regulators are not 'captured' by a regulated industry. Two quite different possibilities exist for avoiding capture. The first combines a low public-sector wage with a long cooling-off period, while the second does the converse. The principle difference between the two is that in the former case the regulator enters the private-sector, while in the latter case he or she tends to remain employed in the public-sector. Which approach a legislator chooses depends on institutional factors in the country and the legislator's preferences.

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<sup>22</sup> In France, civil servants tend to come from the elite of society, with many of them having attended the prestigious ENA (Ecole Nationale d'Administration). Similarly, in Japan, many civil servants graduated from the law school of Todai.

One qualification on motives for choosing a position in government can shed a different light on our results. In our model, due to the unobservability of the regulator’s level of conscientiousness, the wage paid to the regulator while acting as regulator did not affect his actions once in office. However, a higher wage could act as an efficiency wage, and attract better, and perhaps more conscientious, regulators. With a positive correlation between the quality of the regulator and his level of conscientiousness, a higher wage affects the equilibrium by mitigating the necessity for a long cooling-off period. It is striking that in some countries (e.g., France and Japan) public-sector jobs are considered elitist, while in others public-service positions are not viewed as particularly glamorous. If employment in the public-service is considered a status symbol, a non-pecuniary payment is present, with the same consequences as an efficiency wage. Under these circumstances, employment of ex-regulators, and the types of post-employment restrictions placed on regulators, are also affected by sociological and cultural factors such as social standing and the public perceptions of the enterprise culture.

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**Appendix A**

In this Appendix we show how Eqs. (12) and (14) were derived.

Eq. (12)

If  $MP_L^T \geq W_0(T < \tilde{T})$  then from Eqs. (1) and (2)

$$\Delta I = \int_T^N P(T) B e^{-rt} dt = P(T) B \frac{e^{-rT} - e^{-rN}}{r}. \tag{A.1}$$

The firm will set  $B$  such that RP (Eq. (6)) holds with equality, i.e.,

$$B^* = \frac{\beta \psi r}{P(T)(e^{-rT} - e^{-rN})}. \tag{A.2}$$

Replacing this in Eq. (8) gives Eq. (12).

Eq. (14)

If  $MP_L^T < W_0(T > \tilde{T})$ ,

$$\Delta I = \int_T^N P(T)(MP_L^T + B - W_0)e^{-rt} dt = P(T)(MP_L^T + B - W_0) \times \frac{e^{-rT} - e^{-rN}}{r}. \tag{A.3}$$

The firm sets  $B$  such that RP is just satisfied, i.e.,

$$B^* = (W_0 - MP_L^T) + \frac{\beta\psi r}{P(T)(e^{-rT} - e^{-rN})}. \tag{A.4}$$

Replacing this in Eq. (8) yields Eq. (14).

**Appendix B**

In this Appendix we derive the results for the cases when the regulator remains in the public-sector. Once again, we must differentiate between the cases when  $MP_L^T \geq W_0(T < \tilde{T})$  and when  $MP_L^T < W_0(T > \tilde{T})$ .

If  $MP_L^T \geq W_0(T < \tilde{T})$ , then from Eqs. (1) and (3), the difference between the regulator’s income in the agency and out of the agency (when lenient) is

$$\Delta I_g = \int_0^T W_0 e^{-rt} dt + \int_T^N [MP_L^T + P(T)B] e^{-rt} dt - \int_0^N W_g e^{-rt} dt. \tag{B.1}$$

The firm will set  $B$  such that RP (Eq. (6)) holds with equality, i.e.,

$$B^* = \frac{\beta\psi r}{P(T)[e^{-rT} - e^{-rN}]} + \frac{(W_g - W_0)(1 - e^{-rT})}{P(T)[e^{-rT} - e^{-rN}]} + \frac{W_g - MP_L^T}{P(T)}. \tag{B.2}$$

Replacing this in Eq. (8)

$$\Delta\pi = R_1 - \frac{\beta\psi}{P(T)} - \frac{(W_g - W_0)[1 - e^{-rT}]}{P(T)r} - \frac{(W_g - MP_L^T)[e^{-rT} - e^{-rN}]}{P(T)r}. \tag{B.3}$$

To achieve conscientious regulation, the legislator can choose any combination of  $W_g$  and  $T$  which sets  $\Delta\pi$  less than or equal to 0. The frontier along which  $\Delta\pi = 0$  is found directly from Eq. (B.3):

$$W_g = W_0 + \frac{R_1 P(T) r}{1 - e^{-rN}} - \frac{\beta\psi r}{1 - e^{-rN}} + \frac{(MP_L^0 e^{-\rho T} - W_0)[e^{-rT} - e^{-rN}]}{1 - e^{-rN}}. \tag{B.4}$$

It is easy to show that  $\partial W_g / \partial T < 0$ , and that  $(\partial W_g)^2 / \partial^2 T > 0$  since  $P''(T) > 0$ , so this frontier is convex.

If  $MP_L^T < W_0(T > \tilde{T})$ , the difference between the regulator’s income in the agency and out of the agency is:

$$\Delta I_g = \int_0^T W_0 e^{-rt} dt + \int_T^N [P(T)(MP_L^T + B) + (1 - P(T))W_0] e^{-rt} dt - \int_0^N W_g e^{-rt} dt. \tag{B.5}$$

The firm sets  $B$  such that RP is just satisfied, i.e.,

$$B^* = (W_0 - MP_L^T) + \frac{\beta\psi r}{P(T)[e^{-rT} - e^{-rN}]} + \frac{(W_g - W_0)(1 - e^{-rN})}{P(T)[e^{-rT} - e^{-rN}]}. \tag{B.6}$$

Replacing this in Eq. (8)

$$\Delta\pi = R_1 - \frac{\beta\psi}{P(T)} - \frac{(W_g - W_0)[1 - e^{-rN}]}{P(T)r} - \frac{(W_0 - MP_L^T)[e^{-rT} - e^{-rN}]}{r}. \tag{B.7}$$

The convex frontier along which  $\Delta\pi = 0$  is then

$$W_g = W_0 + \frac{R_1 P(T) r}{1 - e^{-rN}} - \frac{\beta\psi r}{1 - e^{-rN}} - \frac{P(T)(W_0 - MP_L^0 e^{-\rho T})[e^{-rT} - e^{-rN}]}{1 - e^{-rN}}. \tag{B.8}$$

Eqs. (B.4) and (B.8) are plotted in Fig. 3. Note that they are equal both when  $T = 0$  and when  $W_0 = MP_L^T$ . The relevant frontier from the legislator’s perspective is the outer envelope of these two functions. Given the negative slope of these two functions, there is a one-to-one mapping of values of  $T$  into minimum values of  $W_g$  which will lead to conscientious regulation.

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