

REGULATORY CAPTURE: A REVIEW

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This article reviews both the theoretical and empirical literatures on regulatory capture. The scope is broad, but utility regulation is emphasized. I begin by describing the Stigler–Peltzman approach to the economics of regulation. I then open the black box of influence and regulatory discretion using a three-tier hierarchical agency model under asymmetric information (in the spirit of Laffont and Tirole, 1993). I discuss alternative modelling approaches with a view to a richer set of positive predictions, including models of common agency, revolving doors, informational lobbying, coercive pressure, and influence over committees. I discuss empirical work involving capture and regulatory outcomes. I also review evidence on the revolving-door phenomenon and on the impact that different methods for selecting regulators appear to have on regulatory outcomes. The last section contains open questions for future research.

I. INTRODUCTION

The economics profession has devoted substantial effort to answering two broad questions. First, why do we observe state intervention in economic life? And second, what are the politico-economic processes that shape state intervention? In a broad sense, regulation encompasses all forms of state intervention in the economy, although a more narrow definition concerns the control of natural monopolies. Thus, the term ‘regulatory capture’ also receives both a broad and a narrow interpretation. According to the broad interpretation, regulatory

capture is the process through which special interests affect state intervention in any of its forms, which can include areas as diverse as the setting of taxes, the choice of foreign or monetary policy, or the legislation affecting R&D. According to the narrow interpretation, regulatory capture is specifically the process through which regulated monopolies end up manipulating the state agencies that are supposed to control them.

Most of the literature that is explicitly concerned with regulatory capture has been developed in the context of utility regulation, although a literature on

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political influence has grown alongside it. The dominant normative argument for the regulation of utilities posits that natural monopoly situations call for a sole firm. Then regulation is needed to prevent that firm from exploiting its market power (Demsetz (1968) challenged this view; see Berg and Tschirhart (1988) for a clear exposition of the economics of natural monopolies, and Joskow (2005) for a more complete explanation of the normative argument). Highly complementary to this argument is the view that regulators will be motivated by the duty to protect consumers from monopolistic abuse. This perspective on regulatory motivation came to be known as the ‘public interest’ view (see, for instance, McCraw (1975) for an exposition). Eventually, observers of regulation came to challenge this perspective. Even when a regulatory body has been set up to prevent monopolistic abuse, regulation ends up being ‘captured’ by the firms it is supposed to discipline. This view was articulated in an influential paper by Stigler (1971), and since then it has been refined and expanded in a variety of ways.

The purpose of this review is twofold: first, to provide a technically accessible account of the main theoretical views on regulatory capture held by academic economists, and, second, to provide an overview of available evidence on causes and consequences of capture. The scope of this review is broad although contributions focusing on utility regulation are emphasized. Some of the work on capture overlaps with the literature on corruption. We touch on the latter when connected to the problem of the purchase of official favours, but abstract from that part of the corruption literature dealing with harassment or extortion by public officials.

This review is structured as follows. The next section discusses briefly the argument on regulatory capture put forward by Stigler (1971) and the formalization of these ideas by Peltzman (1976). This initial theory of regulatory capture is, in fact, common to other areas of public policy and, like many of the theory’s developments, it may be applied to the problem of political influence as it is broadly understood. Peltzman (1976) made progress by leaving a number of elements in a black box. In other words, important links in the theory’s logical chain are assumed to work in a particular way, without our knowing whether those assumptions are reliable. Two elements that deserve to be probed

further are the precise nature of influence and the origin of regulatory discretion. Section III presents a three-tier principal–agent model where influence and regulatory discretion are linked to the exchange of favours and asymmetric information. This theory has a strong normative component. We briefly discuss the alternative ‘common agency’ approach. Both approaches emphasize influence through incentives that can be construed as bribes, such as direct payments or lucrative post-agency employment, and model regulators as a single actor. In section IV I discuss alternatives to influence through bribes, such as the provision of information and coercion, and briefly review work studying influence over collective bodies. Section V discusses models on the ‘revolving door’ phenomenon, which involves a tendency of regulators to favour industry when they have an industry background or when they expect rewards in the form of future industry employment.

Section VI switches attention to empirics. First, I discuss the scarce evidence on the effects of asymmetric information (or the lack of transparency). Then I review evidence of a connection between capture and regulatory outcomes; I survey empirical studies on the revolving-door phenomenon and on the potential role of regulators’ personal characteristics. Lastly, I review evidence that regulatory outcomes may respond to the methods used to select officials who have an impact on regulation, such as regulators and judges. Section VII provides a summary and highlights open questions for future investigation.

II. A SIMPLE MODEL OF REGULATORY CAPTURE

(i) Stigler’s Approach

Stigler (1971) advocated an economic theory of how the regulation of business comes to be. This included, but was not limited to, the regulation of monopolies. Stigler’s starting point was the observation that, as a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit. An additional piece of data was that regulation is not only observed in association with natural monopolies, for which a normative rationale exists. Many other economic activities attract state

intervention, in the form of price-fixing and entry control. In order to account for these observations, an economic theory of regulation had to specify the determinants of the supply and demand for regulation. The demand for regulation would be connected primarily to two features of the group of beneficiaries. First, whether the beneficiary group is large and, second, whether the group has large stakes in regulation. Excessive group size could hamper successful organization of the beneficiary group. Such organization requires the resolution of the well-known collective-action problem. This problem arises from the temptation that each potential beneficiary has to shirk his obligations in the common lobbying effort. (This echoes Olson's (1965) view that large group sizes can hinder collective action.) Large stakes could mobilize group members and give them an incentive to demand regulation. On the supply side, one would have to pay attention to the machinery that produces regulation: the public sector, which responds to political pressures. Stigler viewed politicians as potential suppliers of regulation who pursue selfish objectives, among which one should count the desire to augment their power. If power depends both on money and votes, the costs of regulation could include its potential to bring unpopularity to the politician that promotes it. However, Stigler counted one factor that could mitigate this cost: the fact that the very many voters that are only marginally affected by regulation would have poor incentives to be well informed about the regulation in question.

Stigler illustrates his way of thinking through a simple study of the regulation of trucks in the United States. By the late 1920s, trucks emerged as a competitor to railroads on inter-city freight. Railroads responded by influencing public authorities to impose limits on the weight trucks could carry in inter-city hauls. Stigler listed various factors that should affect the demand for regulation.

- (i) In states with numerous farm trucks, railroads would have a harder time overcoming the agricultural interests that relied on truck services, making weight limits less likely, or less stringent.
- (ii) Trucks posed less of a threat on long-haul freights than on short-haul. So, states where the

average haul is shorter would be associated with stronger demand for restrictive limits by railroads.

- (iii) States with better-quality roads would have less of a reason to worry about truck weight, so that the friends of railroad interests would have a harder time making the case that weight limits were urgently needed to keep roads usable.

Stigler measured the degree of regulatory favours to railroads by looking at the weight limits on four- and six-wheel trucks by 1932–3 in each state. The explanatory variables corresponding to the arguments in points (i)–(iii) were, respectively: the number of farm trucks per 1,000 labour-force members (by 1930); the average haul of railroad freight (by 1930); and the percentage of state roads of high-type (a higher-quality paved surface) by 1930. All three explanatory variables appeared significant in the cross-state regressions (except for high-type surface on the six-wheel trucks weight-limit regression).

It is worth noting that Stigler's ideas were neither typical at the time they were published, nor wholly without precedent. The idea that economic policy may not stem from a benevolent planner (as in the public-interest view) was not as well established in the mainstream economics literature as it is today.² The Stiglerian approach has been related to the Chicago view of public policy, even when it could be seen as complementary to the emerging literature on *public choice*, which was, in turn, associated with the names of Buchanan, Tullock, and the Virginia school. This literature focused on the role of political institutions in affecting collective decision making in the face of heterogeneous societal interests. The view of public policy emerging from the Stiglerian and the public-choice school emphasized the idea that regulators could be swayed by special interests. This idea had an impact on a larger ongoing debate on the optimal size and scope of government. On the microeconomics side, insights due to Pigou and Samuelson justified state intervention: in the presence of externalities or public goods, the decentralized allocations determined by markets with private property will be inefficient.³ It was at that stage that Stigler's call for an economic theory

² This was so even when libertarian and Marxist mistrust for state-sponsored goals was far from new.

³ A counterpoint was offered on the macroeconomic side. The monetarist school was beginning to upset the prevailing views of the macroeconomy as a system in need of activist intervention.

of regulation was made. If regulators are the nexus of a set of special-interest pressures, should we call for even larger state controls in the hope of neutralizing the potential special-interest bias? Or should we roll back existing regulation and live with market failures? A lot of the work in economics in the following decades can be organized in terms of the position taken regarding these questions, and we can view Stigler's proposed programme as an important step towards answering them.

As indicated by Posner (1974), a problem with Stigler's approach was the lack of clear implications as to the profile of groups benefited by regulation. Stigler emphasized that industries with concentrated ownership would have an easier time at overcoming the hurdles facing collective action. However, large groups could attract favourable regulation by vote-seeking politicians. What consideration should prevail to define the profile of regulated industries?

(ii) Peltzman's Model

Peltzman (1976) refined and expanded Stigler's ideas. He offered three distinct formal set-ups, the second of which focuses on price-entry regulation. This model rationalizes intervention in industries that have both small and large numbers of beneficiaries. It is this second set-up that is of interest here.

The model comprises three classes of players: a politician who holds the coercive power of the state, an undefined quantity of producers, and an undefined quantity of consumers. The politician wants to maximize his 'majority' or 'power' as given by $M = M(p, \pi)$, where p is the price paid by consumers and π is the profits for producers. Assume that the politician's majority decreases with higher prices to consumers (high prices are vote losers), but that it increases with the profits of producers (presumably because those producers vote, but also because they can mobilize voters or other elements of the community through their financial power). Both the power-losing effects of higher prices and the power-increasing role of profits are assumed to be of marginally decreasing intensity. Formally, these assumptions on the majority $M(p, \pi)$ take the form: $M_p < 0, M_\pi > 0, M_{pp} < 0, M_{\pi\pi} < 0$. Assume also that the marginal effects of prices are unchanged by the level of profits and vice versa: $M_{p\pi} = 0$. All supply

and demand information is captured in the function $\pi = f(p, c)$, where $c = c(q)$ are the production costs of firms. Assume $f_p \geq 0, f_{pp} < 0, f_c < 0$.

The politician then chooses the price he will allow producers in order to maximize his majority $M(p, \pi)$ subject to the constraint $\pi = f(p, c)$. Or,

$$\text{Max}_p M[p, f(p, c)].$$

The first-order condition for this problem is

$$M_p + M_\pi \frac{df}{dp} = 0 \Rightarrow M_p = -M_\pi \frac{df}{dp}.$$

For a firm facing no competitors, at prices lower than monopolistic pricing, an increase in price increases profits (i.e. $df/dp > 0$). Recalling the assumptions $M_p < 0$ and $M_\pi > 0$, the first-order condition then tells us that, starting from a position of monopolistic pricing (i.e. a relatively high price), the official will lower the price to gain consumer votes until the marginal vote gain equals the marginal power loss from dissatisfying producers. Inversely, starting from a competitive price, the official will raise the price to please industry, up to the point where the marginal value of the favours from industry equals the marginal loss of consumer votes. This effect will also benefit a multi-firm industry when prices are fixed and enforced above competitive prices. (In such a case, the first-order condition above can be seen to reflect the interests of the entire industry, rather than those of a single firm.)

The model predicts that regulation will typically entail less than 100 per cent producer protection but also less than perfect protection of consumers against market power. The 'political' price will usually lie between competitive and pure monopoly levels. Moreover, incentives for 'regulator entry' appear highest when industry is fully monopolistic or perfectly competitive to begin with, because the power gains from moving price towards a middle range are highest (this is a result of the concavity assumptions on the function M). In other words, monopolies such as utilities will attract regulation, but not for the normative reason commonly accepted, but because a politician can act as a broker that trades moderate political losses with producers for a large political gain among consumers. In this case, and as long as the political price allows for the reposition of capital, the regulator's intervention is

beneficial for social welfare (understood as profits plus consumer surplus). The reverse of the picture of entrepreneurial regulatory intervention is that competitive industries will attract regulation as well, because the initial marginal losses of power owing to angry consumers can be small relative to the gains owing to grateful producers. Examples of the latter type of regulatory presence are when the state engages in price fixing in competitive industries and when it controls entry (through licensures) in occupations. The model can then account for the apparent puzzle of regulation being present in technologically diverse industries.

The main feature in Peltzman's model is that the official appears to be trading off the benefits from favouring two different masters: consumers and producers. However, little is said about how those benefits materialize. Neither of the two stakeholders in the model is explicitly considered an active, strategic player. Moreover, no detail is given as to how a politician can equally depart from monopolistic or competitive pricing. In the case of a natural monopoly, for instance, a regulator may be limited by the fact that he is supposed to leave the firm a reasonable rate of return, but allowing for higher prices may be denounced as a give-away to industry. The following section covers models tackling these limitations.

III. PRIVATE INFORMATION AND COLLUSION IN HIERARCHICAL AGENCY

(i) Overview

One way to understand capture is by thinking of a three-tier hierarchy comprising a political principal (the government), a regulator, and an agent (the firm). Why use a principal–agent model? This is the set-up used when we want to analyse incentive problems in detail. The simplest possible model would have only two parties: a firm and a (potentially capturable) government. Can we justify complicating the model by considering more players? The introduction of a third element allows differentiation between the government and the regulator (the

reader may think that a similar structure can be used to think of a hierarchy featuring citizens, government, and the firm). The extra player (the regulator) allows one to analyse how the political principal might want to respond to the risk that its delegate may be captured.

Tirole (1986) was probably the first to analyse regulatory capture in a three-tier set-up. As I will present it, the model has two building blocks. The first is the model of regulation of a monopolist with unknown marginal costs (Baron and Myerson, 1982). In this set-up, the firm has private information on its costs. Thus, the government is unsure about how much of a cost reimbursement (or how high a price) the firm should be allowed. The optimal best response for the regulator is to offer a second-best contract to the firm, one that attempts to limit the benefit the firm derives from the asymmetric information. However, because the firm is valuable to consumers even when costs are high, and because costs are high with some probability, the contract offered to a firm when the government does not know the state of nature necessarily leaves the firm some rents in situations when costs are actually low. The second building block, as proposed by Tirole (1986), then further developed by Laffont and Tirole (1993, ch. 11), assumes that the regulator, who specializes in learning about the industry, may find out the true costs of the firm. Then the firm has an incentive to bribe the regulator into not telling the government when costs are low. If the regulator says he has learned nothing, the best possible contract that the government can offer the firm is one that leaves rents to the firm. The government then has an incentive to offer the regulator a contract inducing him not to lie and simultaneously to offer a contract to the firm that reduces incentives for collusion with the regulator.

(ii) The Model

In this set-up, the firm has private information about the marginal cost of providing a service to consumers, and the government wants to maximize an objective including consumer surplus.⁴ In keeping with the notation of last section, the firm's operating profits are $\pi(p) = q(p)p - C(q(p))$, where $q(p)$

⁴ Spiller (1990) analyses a related problem where Congress lacks information on the regulator's amount of effort directed at improving regulatory outcomes.

is the demand function, p is the allowed price, and $C = F + qc$ is the cost of provision, where F is a fixed cost. The marginal cost c takes one of two values in the set $\{c_l, c_h\}$, where $0 \leq c_l < c_h$. Marginal costs are determined by unpredictable developments that are beyond the players' control, such as oil discoveries, weather changes, etc. So, we will say they are determined by 'nature'. Nature picks low costs with probability γ and high costs with probability $1 - \gamma$. In addition to approving a price, the government has the ability to make transfers T to the firm, which are paid for by consumers. The total pay-off for the firm is $\Pi = \pi(p) + T$. The pay-off for consumers is their consumer surplus minus their tax payments to finance transfers to the firm (we assume the government keeps a balanced budget; the taxes paid by consumers equal the transfers to the firm). The government seeks to maximize social welfare as given by

$$S = s(p) - T.$$

Hence, the government would like to use transfers to reimburse the firm just for its fixed cost and set prices equal to marginal cost in order to maximize net surplus. When the government knows the realization of c , such an arrangement is feasible. But it is not when the government does not know the realization of c . Suppose for a second that the government has offered the full information contracts $\{[T = F, p_l = c_l], [T = F, p_h = c_h]\}$. Then even when costs are low the firm has an incentive to claim that costs are high and obtain better compensation. The informational rent the low-cost firm would obtain in the asymmetric information regime is

$$\begin{aligned} \Pi^l &= q(p_h)(p_h - c_l) = q(p_h)(p_h - c_h) + q(p_h)(c_h - c_l) \\ &= q(p_h)(c_h - c_l) \equiv q(p_h)\Delta c, \end{aligned}$$

where $\Delta c = c_h - c_l$. Clearly, $q(p_h)\Delta c > 0$, and the low-cost firm obtains a positive rent owing to its informational superiority.

The government can do better than simply offer the full information contracts and have firms obtain an informational rent whenever costs are low. One way of doing this is to raise the price that is allowed

in high-cost situations, so that lower demanded quantities will reduce the informational rent. The problem with this is that it reduces consumer surplus when costs are high. Hence, the trade-off facing the government can be characterized as being between lowering informational rents in low-cost situations and not reducing consumer surplus in high-cost situations. There are many potential arrangements the government could choose from. However, the government loses nothing by restricting itself to imposing arrangements that are tailored to each type, while respecting the condition that each type should have incentives not to misrepresent its private information.⁵ Therefore, whatever arrangement the government offers must entail,

$$\Pi^l(p_l, T_l) \geq \Pi^l(p_h, T_h),$$

which is called the incentive compatibility constraint of the low-cost firm. Analogously (although not binding in equilibrium), the offered arrangement must give the high-cost firm incentives for sincerity, i.e. $\Pi^h(p_h, T_h) \geq \Pi^h(p_l, T_l)$. Simultaneously, the participation constraint on the two types of firm is that the government must offer terms that will not induce any type to shut down: $\Pi^l(p_l, T_l) \geq 0$, $\Pi^h(p_h, T_h) \geq 0$. In fact, the government will offer the following arrangement,

$$\begin{aligned} \Pi^h &= 0; \Pi^l = q(p_h^*)\Delta c \\ p_h^* &= c_h + \frac{\gamma}{1 - \gamma} \Delta c \\ p_l^* &= c_l. \end{aligned}$$

A sketch of the proof is in the Appendix. Two observations are worth making. First, in order to reduce the informational rent that the firm gets in low states, the government raises the price in high-cost states by $(\gamma/(1 - \gamma))\Delta c$ (which reduces demanded quantities and thus the informational rent $q(p_h^*)\Delta c$). Note that the government raises p_h further when γ is high, so the expected benefit of a reduced informational rent is high, and the expected cost of a reduction in consumer surplus is small. Second, marginal cost pricing is preserved in the low-cost state and no rents are left to the high-cost firm.⁶

⁵ The revelation principle (Myerson, 1979) implies that the optimization over all possible arrangements can be reduced to one where the player with private information simply reveals its type truthfully. See Laffont and Tirole (1993, ch. 11) for a complete proof in a very similar context to that presented here.

⁶ The solution is completed with the characterization of transfers: $T_l = F + q(p_h^*)\Delta c$; and $T_h = F - q(p_h^*)(\gamma/(1 - \gamma))\Delta c$.

The government should be interested in finding a regulator who specializes in learning c in order to try more often to implement first-best allocations. In this way the government can save on rents left to the firm and on distortions in the high-cost state. Suppose, then, that when the firm has low costs, the regulator learns it with probability λ , and learns it in a way that is verifiable to the government. With probability $1-\lambda$ the regulator finds nothing. When costs are high, the regulator can never learn anything.⁷ The timing of interaction is as follows. First, nature determines the firm's costs, and the firm learns it. Second, the government announces both a wage to the regulator and regulatory contracts to the firm, both potentially contingent on the regulator's report. Third, if $c = c_l$, the regulator learns it with probability λ (and the firm learns whether the regulator learned costs or not). Fourth, the firm and the regulator decide whether to collude. Fifth, the regulator sends a report to the government $r \in \{c_l, \emptyset\}$. This means that the regulator, when seeing that $c = c_l$, can reveal it, but can also claim to be uninformed, both in that situation and when he really is uninformed. After getting the report, r , wages and contracts are made available to regulator and firm.

Note that when costs are low and the regulator learns this is the case, a truthful report to the government will induce the latter to offer the full information contract to the firm and not accept any claims that costs are higher. Thus, the firm's informational rent evaporates. Hence, the firm has an incentive to pay the regulator a bribe up to the value of the informational rent in order to buy his silence. The value of the informational rent is $q(p_h)\Delta c$. It is clear that if the government wants to compete with the firm and push the regulator towards honest reporting, a payment conditional on $r = c_l$ should be promised. Denote this payment w and assume that the reservation wage of regulators is zero. Assume that every dollar that the firm may offer the regulator in side payments costs the firm $1 + \psi$. For the regulator to want to report that costs are low, the wage must satisfy,

$$w > \frac{q(p_h)\Delta c}{1 + \psi}.$$

The benefit of preventing collusion fully is to gain full information more often. The cost is the incentive

⁷ I model regulatory learning as Armstrong and Sappington (2005) do. Assuming that the regulator can also become informed in the high-cost situation complicates notation without adding insight.

payments to the regulator and the potential distortions to the contract to be offered by the firm. We now assume that deterring collusion is worthwhile and focus on the consequences for equilibrium allocations.

If a regulator is colluding with the firm, he will always claim to know nothing, and the probability of a low state is simply γ . Under a collusion-proof contract, though, the regulator behaves honestly. So, the probability that costs are low when the regulator claims to be uninformed is

$$\mu \equiv P(c = c_l | r = \emptyset) = \frac{\gamma(1-\lambda)}{\gamma(1-\lambda) + (1-\gamma)} = \frac{\gamma(1-\lambda)}{1-\lambda\gamma}.$$

We assume that the government does not care about the income of regulators from a welfare point of view, except in that it detracts from consumers' income. Recall that when the government obtains no information, it will offer the second-best contract characterized earlier, although taking into account that the regulator claiming to be uninformed affects the perceived probability of the low state. The second-best contract specifies marginal cost pricing for the low-cost firm but leaves rents in it, and these rents depend on the price chosen for the high-cost firm. No rents are left to the firm in the high-cost situation. Then, expected social welfare, as seen by the government, can be written as

$$EV = \gamma\lambda \{s(c_l) - F - w\} + (1-\gamma\lambda) \{\mu [s(c_l) - T_l(\mu)] + (1-\mu) [s(p_h, \mu) - T_h(\mu)]\},$$

where $T_i(\mu)$ ($i = l, h$) denotes that transfers are being determined in the second-best solution corresponding to the case when the government has received $r = \emptyset$ and hence holds beliefs μ on the low-cost state. The maximization of this problem yields,

$$p_h = c_h + \frac{\gamma}{1-\gamma} \Delta c - \frac{\gamma\lambda}{(1-\gamma)} \left[1 - \frac{1}{1+\psi} \right] \Delta c.$$

This expression contains a familiar term, $(\gamma/(1-\gamma))\Delta c$, which is the distortion introduced in the optimal contract seen before, when a regulator was not available. But the extra term,

$$- \frac{\gamma\lambda}{(1-\gamma)} \left[1 - \frac{1}{1+\psi} \right] \Delta c$$

implies that the distortion to the high-cost price when a regulator is available will be smaller, even if the regulator is corruptible. The parameter ψ might be seen as a ‘capture’ parameter. When it is zero, the firm has no difficulty sharing the information rent with the regulator. So, a dollar from the firm has maximum purchasing power. In that situation, the term

$$\left[1 - \frac{1}{1 + \psi}\right]$$

goes to zero, and the distortion-saving power of having a regulator with learning capabilities disappears. The price set for the high-cost firm converges to that when the government has no access to a regulator. When ψ is positive, however, the distortion savings increase. In the limit, when ψ goes to infinity, the regulator becomes essentially incorruptible because even the smallest bribe is infinitely costly to the firm. In that case, we obtain

$$p_h = c_h + \frac{\gamma}{1 - \gamma} \Delta c - \frac{\gamma \lambda}{(1 - \gamma)} \Delta c = c_h + \frac{\gamma}{1 - \gamma} (1 - \lambda) \Delta c.$$

The last expression indicates that, relative to the case with no regulator, the distortion is diminished in proportion to the amount of information brought by the regulator (measured by the probability λ that he is informed). Note that the informational quality of the regulator also affects the solution. When the regulator is never informed ($\lambda = 0$), things are exactly as when the regulator does not exist, and the solution reverts back to the original one. If the regulator is always informed ($\lambda = 1$), the savings on pricing distortion are maximal. Note that the ideal combination of a regulator that is perfectly informed and incorruptible ($\lambda = 1$, $\psi \rightarrow \infty$) eliminates all distortion, yielding $p_h = c_h$. The reason is that if the regulator is effectively incorruptible, and always alerts the government if costs are low, the problem reverts back to one where the government is perfectly informed.

At this point it may be useful to provide a brief non-technical summary of the model and findings. The model relies on a few basic assumptions. The regulated firm has superior information about its production costs, and the government wants the firm to produce as much as would be convenient for consumers. The firm, however, cannot be forced to produce when doing so would trigger losses, so the

remuneration allowed by the government must be sensitive to production costs. Thus, the government will want to appoint a monitor (the regulator) to mitigate the informational advantage of the firm. The danger is then that the firm may tempt the regulator not to disclose information that would reduce the approved compensation. Thus, regulators and firms may collude to keep the money owing from consumers even when the prevailing low costs would justify a reduction in compensation. The scope for such capture of the regulator by the firm depends on the amount of information that the regulator may obtain, and on how easy the environment makes it to bribe regulators.

(iii) Discussion

The model just reviewed offers a precise framework to understand how asymmetric information is the source of regulatory discretion, making capture possible. The model also considers optimal responses by the political principal, and how these will affect implemented allocations. This emphasis may strike some readers as pertaining to a normative, rather than positive, approach. It may also be argued that the offer by the government of regulatory wages that are contingent on the regulators’ reports is implausible. In the current model, the inability to offer contingent wages would eliminate the possibility of combating collusion.

The literature has long considered alternative ways to use wages to fight capture. Becker and Stigler (1974) consider wages that are not directly contingent on the regulator’s actions. However, the wages are higher than the regulator’s alternative earnings and make the latter eager to keep his job. In combination with above-market wages, the government could then audit the reports of regulators and fire those who are found to have misrepresented the firm’s private information. This introduces a cost to regulators of engaging in wrongdoing, and a judicious choice of wages and auditing frequencies can contribute to mitigate capture.⁸ A large literature has used similar ideas in connection with crime deterrence and corruption control (on crime, see, for example, Becker (1968), and on corruption see, for instance, Besley and McLaren (1993) and Ades and Di Tella (1997)). In real life, the scope for using

⁸ On the role of external supervisors in collusive hierarchical agency, see Kofman and Lawarree (1993).

wages and monitoring to deter regulatory favours is limited. The stakes are so large that, fines being infeasible and monitoring being imperfect, the required wages would be astronomical. Thus, more complex institutional responses may be required. One possibility is the separation of regulatory powers so as to lower the stakes in collusion (Laffont and Martimort, 1999). Another possibility is to level the playing field by incorporating the different stakeholders into the bureaucratic design of regulatory decision-making (McCubbins *et al.*, 1987).

(iv) An Alternative Model that does not Rely on Private Information

Bernheim and Whinston (1986) introduced the ‘common agency’ model of influence, which has a more positive angle. In this set-up, multiple parties offer ‘price lists’ for different favours or allocations that the official, or common agent, may set. Those parties compete, offering such schedules reflecting the prices they are willing to pay for different policy choices, and hence this model is built upon a ‘menu’ auction. This model allows a more precise characterization of the nature of influence in situations where there is competition for policy favours, as originally studied by Peltzman (1976) and Becker (1983). In the common-agency set-up there is no asymmetric information, and the origin of the discretion of the official remains unmodelled. The model features multiple equilibria which may be inefficient.⁹ Grossman and Helpman (1994) extended the common-agency model to analyse trade policy determination, while sticking with quasi-linear pay-off functions. We comment later on empirical investigations inspired by this model. Dixit *et al.* (1997) further extended the common agency set-up to consider general pay-off functions, which allows us to analyse situations where income effects matter.

IV. ON THE INSTRUMENTS AND TARGETS OF INFLUENCE

The capture models reviewed so far assume that firms will provide incentives to regulators, and that

regulators can be thought of as single person. Two important questions are whether the provision of incentives is the only, or even the most relevant, instrument of influence, and what happens when the target of influence is a collective body. This section then begins by discussing the provision of information as opposed (or in addition) to incentives. A related matter is that the type of incentives used in the models of section III can, broadly speaking, be understood as ‘bribes’. So an additional question arises as to what form of incentives can be understood that way, and whether other forms of incentives may play a role. The second part of this section then discusses alternative forms of influence that do not exclusively rely on the provision of incentives that can be construed as bribes. Finally, the third part of the section briefly discusses work studying influence over collective bodies.

(i) Are Incentives the Only Instrument of Influence?

A literature in political science and economics has analysed the provision of information, rather than incentives, as a form of exerting influence. Calvert (1985) proposes a particular model of information-processing where the known bias of an advisor (or interest group) cannot be fully ‘undone’ by the receiver of information (say, the regulator).¹⁰ This model yields that the decision-maker may in fact prefer to use biased advisors, much as when regulators receive information from firms and other players of the regulatory game. The benefit of having a biased advisor is that it can become a more credible source in extreme situations where a mistake would be particularly costly. Austen Smith and Wright (1992) offer a model where there are two, rather than one, sources of information. In their set-up, two interest groups may make costly searches for information and then offer messages to a decision-maker. Although the model is intended to capture informational lobbying to win over a legislator, the set-up can help explain situations when firms and consumer advocates offer information to try to affect a regulator’s decision. For example, these stakeholders may commission costly consultants to

⁹ Equilibria that are ‘truthful’ are also efficient. Truthful equilibria involve truthful strategies in that the schedules of prices offered by interest groups must reflect the shape of those groups’ pay-off functions. This class of equilibria coincides with the set of coalition-proof equilibria.

¹⁰ The bias does not merely affect the expected levels of advice, but also the shape of the probability distribution over possible advice messages.

provide industry-specific studies. In this model, messages need not be truthful, but the regulator has the possibility, at a cost, of verifying the information he has received (possibly by commissioning further consulting). For some parameter values it is shown that none, one, or both interest groups may acquire information with positive probability and then submit messages to the regulator. Moreover, there are regions of the parameter space where the regulator ends up making perfect decisions.

Lohmann (1993) tackles the (very different) question of whether mass political action can convey information. This set-up is different from the previous ones in that signalling is costly. In her model, engaging in the activity that may ultimately convey information is costly in itself; in other words, the cost is the message. Although the connection with regulation is tenuous, the basic message of her model is useful: by engaging in costly actions (such as commissioning consulting that may be in itself irrelevant) an interest group such as the firm may signal its private information about the appropriateness of a particular policy.

(ii) What are the Incentives Provided by Industry?

As suggested by the model reviewed in section III, one possibility is for firms to offer outright bribes. Another possibility is money payments with political use, such as campaign contributions to politicians with electoral goals. In the case of regulators without electoral ambitions, a much talked about form of incentive is the promise, tacit or explicit, of future lucrative employment in industry. The twin facts that regulators have often had industry jobs before, and sometimes end up in industry after their tenure, is referred to as the ‘revolving doors’ phenomenon. In section VI discuss some theoretical contributions regarding this phenomenon and I review evidence about it in section VI.

Another possibility is that firms may attempt to influence regulators through negative incentives, such as threats, tacit or explicit, of lowering their utility. This could be attained through direct physical punishment. Although perhaps not so relevant for economies where the rule of law is well established, this form of incentive to officials is more widespread in some emerging economies (see Dal Bó and Di

Tella (2003) for some examples). Firms may perhaps more often be able to spread negative rumours about the competence of a regulator, which may damage the latter’s career. Also, they may destabilize a regulator’s grip on his job by open confrontation, which may raise the political costs for government of backing up the regulator. Indeed, Hilton (1972) argued that in real life the main objective of regulators is to minimize complaints by firms, or keeping regulated firms from ‘squawking’. However, when it is known that regulators may be influenced through potential complaints from firms, the observation of such behaviour may simply indicate that the regulator is performing his duties well. Thus, the power of squawk to damage the regulator is not a logically foregone conclusion. Leaver (2002) offers a model where regulators may take more or less aggressive stances toward firms, and both positions may be right or wrong depending on the state of nature (say, cost levels facing the firm). Because regulators do not exactly know the state of nature, they may make mistakes and hurt firms unnecessarily. Regulators come in two types: smart and dumb. The latter are more likely to make mistakes, and the market will learn about mistakes when firms squawk. When regulators’ concerns about reputation are strong, there is a Bayesian perfect equilibrium where two things happen: firms complain against mistaken tough policies, but not against generous ones (even if mistaken). Less able regulators, fearing that firm complaints may damage their reputation, are generous to the firm some of the time, even when having information indicating that a tough policy is called for. The overall message is that the possibility that firms may complain publicly about tough regulatory decisions buys firms some regulatory slack.

The incentive-based models reviewed so far assume that a special interest such as the regulated firm will use either bribes or some form of coercive inducement. However, there is no reason to suppose that firms will restrict themselves to using only positive or only negative incentives to influence regulators, if both instruments are available. Dal Bó *et al.* (2006) offer a model where an interest group offers both bribes and threats to officials in its attempts to influence public policy. Three main implications follow from this model.

- (i) When firms have a way of imposing disutility on regulators, they will save on rewards by

simultaneously threatening potential retaliations, private or political, against the regulator.

- (ii) Relative to a world in which firms cannot exert coercive pressure, the pay-off to regulators is lower. If pay-offs determine competence, competence in regulation will be lower when coercive pressure is feasible.
- (iii) When retaliations are feasible the cost of influence is smaller. Hence, even when the gain in profits from a price favour may not be as large, influence may be affordable.

Therefore, regulatory capture may be more prevalent in countries where regulators are less protected from violence or from firm-originated rumours, as would be the case when the rule of law is weaker or when regulatory job stability is lower. If the term length of regulatory positions is a proxy for relative stability, one would expect longer-term regulators to feel more insulated against firm retaliations that damage the market value of regulator's reputations. The section on empirics presents evidence on the connection between term lengths and regulatory outcomes. Implications (ii) and (iii) together imply that countries with more prevalent capture will have less competent regulators.

(iii) Influence over Collective Bodies

The literature on influence over collective bodies is relevant for regulation both when regulatory agencies are run by boards and when legislatures affect regulatory policy. This literature has been mainly associated with concerns about the capture of legislators. Denzau and Munger (1986) attack the problem by focusing on a single legislator who faces a problem analogous to that studied by Peltzman (1976): on the one hand, a special interest may offer rewards such as campaign contributions, but on the other, constituents may punish a legislator who sells out. The authors then indicate that a special interest will typically face legislators with varying 'prices', and that the purchaser of legislative favours will try to assemble a majority of minimum-cost legislators. Snyder (1991) was probably the first fully to model the vote-purchasing decision of an outsider while considering a multi-member legislature. In equilibrium, an optimizing principal will direct its resources

to legislators who are not 'friendly' enough to vote for the principal's project, but who are at the same time not unfriendly enough to become too expensive. At the same time, the outside interest will limit what it asks for in order to lower the costs of influence. In his model, passing a bill will typically require bribing entire blocks of legislators, suggesting that influencing larger bodies will be typically more expensive. Neeman (1999) studies a multi-agent contracting problem under uncertainty and applies it to voting. He shows that in very large voting bodies a member will attach a small probability to being pivotal and sell her vote cheap. Dal Bó (2000) seeks to unveil vulnerabilities of collective bodies to outside influence that will operate even under certainty, and then studies potential remedies. He considers the possibility that a lobby may make offers that are not only contingent on the way an individual committee member acts, but also on the way other members do. This flexibility tends to allow a lobby acting unopposed to capture committees of any size at no cost. The main protections against this vulnerability are committee members that can enforce cooperation among themselves, committee members that are accountable to outside parties, or secret voting.

Bennedsen and Feldmann (2002) extend the literature on informational lobbying to the case where the target is not an individual but a collective body, such as a legislature. In their model, an interest group wants a particular public good provided (say, environmental protection). The legislature is made up of representatives coming from districts that have different valuations for the public good. They show that a lobby may have an incentive to generate information on what districts would benefit the most from the public good. This information will allow an agenda-setter a more finely tuned coalition-building strategy that relies on high-valuation districts. This minimum-cost coalition made of high-valuation districts leads to the approval of higher levels of the public good desired by the lobby. When party cohesion is very strong in a legislature and legislators vote in large blocks, the heterogeneity of districts cannot be easily exploited by an agenda-setter seeking to form a minimum-cost coalition. Thus, party cohesion in parliamentary democracies (as in Europe) dilutes the incentives to direct informational lobbying efforts at legislators. As a result, informational

lobbying should target regulatory bodies more heavily in countries displaying high party cohesion in legislatures.

V. REVOLVING DOORS

The fact that many regulators come from industry, or end up there, has long been thought to be a source of bias in regulatory decisions. In keeping with the rest of the paper, this section uses a ‘public utility’ lens, but the topic of the revolving doors is more general and the models reviewed here can certainly be thought to have implications for other areas of regulation. For example, defence procurement officials may go to work in the defence industry, government health policy-makers may eventually take jobs with private health companies, tax officials may become corporate tax advisers, etc. The list of possible moves from the public to the private sector (and vice versa) is, indeed, long.

The channels through which industry employment may affect regulatory performance are multiple. An important distinction is whether such employment is held before or after regulatory involvement. Coming from industry may induce regulators to make pro-industry decisions because of the regulator having been ‘socialized’ in an industry environment. This in turn may yield different cases. In one extreme, we might find fairly irreflexive, partisan pro-industry types; on the other, well-meaning individuals who tend to see the concerns of industry as more legitimate, salient, or relevant to general welfare, because those are the concerns they are most familiar with. An example of the latter case might be a person with industry background who worries about the fact that low prices may discourage investment, and in turn hurt future consumers.¹¹ The possibility of post-regulatory employment is different: regulators may bias their decisions in order to enhance their chance of future employment in industry. An explicit *quid pro quo* may exist, whereby lenient regulation is rewarded with future employment in industry. At other times, firms may mainly hire former regulators because the latter possess valuable skills and not because such hiring is part of a reward scheme. Still, given skills, firms may prefer

employees that seem to have industry interests more at heart. Then, regulators may try to signal their appeal to industry by being lenient to it. In this last situation, a pro-industry regulatory bias is more of an instance of the ‘collateral damage’ of a free circulation of human capital.

The set-ups explored so far illuminate a way in which posterior employment in industry may affect regulatory decisions: such a possibility acts like a covert bribe and induces lenient decisions toward industry. Having explored models in sections II and III that can help rationalize the negative side of the revolving doors, I now review more optimistic views. The remainder of this section explains in detail the arguments in two papers pushing the view that the revolving doors may not only allow industry a larger pool of human capital; the revolving doors may even induce better regulatory outcomes.

The first of these two papers is by Che (1995). He considers a hierarchical agency model *à la* Tirole (1986) and provides three different treatments. In the first, it is assumed that regulators may invest in human capital during their tenure. Two forms of capital are available: ‘technical’ capital, or expertise, and ‘lobbying’ capital, or contacts. The first type of capital reduces the marginal cost of monitoring the firm, while the second does not. When industry future employment is associated to firms wanting to obtain technical expertise, then regulators will want to obtain such expertise. This will in turn lower a regulator’s costs of monitoring the firm. Under the optimal contract placed by the overall principal (the government, say), this lower cost of monitoring translates into better regulatory outcomes and lower informational rents left to the firm. Thus, opening the revolving doors would in this case encourage the acquisition of useful expertise by regulators. However, if firms employ former regulators because of their contacts and potential lobbying usefulness, then opening the revolving doors may have the opposite effect, namely that of discouraging the acquisition of useful expertise. An important empirical question is then what is the primary drive behind firms employing former regulators: expertise or lobbying potential?

¹¹ Thus, one could argue that very harsh regulation may reduce investment and affect capacity to serve future consumers. Navarro (1982) studies the cost of capital and the rankings of Public Utility Commissions (PUCs) from the point of view of stockholders. Firms under the watch of harsh PUCs appear to face higher cost of capital.

A second treatment in Che (1995) considers the possibility that regulators may want to be aggressive in order to signal their intellectual quality. More able individuals, when acting as regulators, will more often obtain information about the firm that can be used to justify harsher regulation. When firms want to employ more able individuals, and ability is not readily observable, the firm may want to employ former regulators that were harsh because this provides a positive indication of ability. A crucial assumption here is that regulators cannot separate their manifestations of intellectual fire-power from their use of discretion. In real life, a regulator may be able to convey both great intellectual qualifications and a disposition towards leniency. Also, in complex situations, such as those surrounding tariff reviews, a person may convey great intellectual ability by finding apparently good arguments that get the firm to more favourable ground.

The third treatment by Che (1995) is when he allows for explicit collusion between the firm and the regulator. The key assumption is that such collusion may not always succeed. As we saw in section III, collusion happens because the regulator may shield the firm from the tightest regulatory policy that the state of nature justifies. For the regulator to find out about whether the firm has a stake in hiding information, the regulator must monitor the firm. Thus, more intense monitoring by the regulator increases the chance that the latter will sign a profitable side contract with the firm. Open revolving doors can be seen to facilitate such transactions by giving the firm a currency with which to buy off the regulator. Therefore, revolving doors increase the regulator's incentives to monitor the firm. But because some of the time collusion fails, the extra monitoring sometimes translates into better regulatory outcomes.

The second paper offering a revisionist view on the revolving doors is by Salant (1995). His focus is on the classic hold-up problem facing a party that has sunk a relationship-specific investment. Suppose the regulated firm has invested to create production capacity. Regulators that aim at maximizing consumer surplus may then push down prices so much as to expropriate the firm's sunk investment, instead of allowing for capital recovery. Foreseeing this, firms will under-invest. In a game where both the firm and the regulator are infinitely lived, there is a (sub-game perfect Nash) equilibrium where both

players 'cooperate': firms invest, and regulators allow for capital recovery. In real life, however, no player is infinitely lived, but rather made up of subsequent generations of players. When generations of regulators and firms overlap (with young regulators facing old firm managers and vice versa), some degree of cooperation is possible, even if each generation is finitely lived (see also Cremer, 1986). Salant (1995) shows that the amount of cooperation between overlapping generations of regulators and firms can be enhanced by the revolving door. The possibility of future consulting income 'on the other side of the fence', depends on players having behaved cooperatively during their tenures as managers and regulators. This endows the ongoing relationship between firms and regulators with an extra instrument to punish noncooperative behaviour, and thus allows the system to sustain investment and capital recovery. One important associated risk of the revolving doors in this model is that it gives players 'too much' of an incentive to cooperate, in the sense that they would find it worthwhile to over-accumulate capacity. Projects that are not beneficial to consumers can be sustained in equilibrium. An important assumption behind the result that the revolving doors cannot damage welfare is that projects not satisfying a break-even constraint will not be approved.

VI. EVIDENCE

The evidence on the determinants of regulatory capture is still well short of abundant. Evidence involving corruption at the national level was established relatively early, and studies have shown that lack of market competition and closeness to trade are determinants of corruption (see, for instance, Ades and Di Tella, 1999). The related questions at the regulatory agency level, such as whether regulators with overlapping jurisdictions or budgets tied to outcomes fare better or worse, have, to my knowledge, not been tackled by empirical research. The emphasis of theory on asymmetric information and on the use of wages as a capture deterrent also seem unmatched by empirical research. An exception is Di Tella and Schargrodsky (2003), who investigate the use of wages and monitoring in hospital procurement. Reinikka and Svensson (2005) also find that more information through a newspaper campaign in Uganda gave schools more of a chance

to claim funds to which they were entitled, reducing the probability that the funds would be captured by local officials. Also, some work has been done on the role of transparency in inducing fiscal responsibility. Lowry and Alt (2001) offer a model and evidence that more-restrictive fiscal institutions may enhance transparency by allowing investors to extract better signals regarding the government's fiscal responsibility. Alt and Lassen (2006) use survey data on the perceived transparency of budgetary information for OECD countries and find that lower-transparency countries have a political fiscal cycle, while high-transparency countries do not. Apart from this relatively scant evidence on the role of transparency, none of which is related to industrial or utility regulation, there is virtually no evidence of how (or whether) asymmetric information fosters regulatory capture.

In the remainder of this section I review available evidence of four types. The first pertains to the potential impact of capture on policy outcomes. The second type specifically concerns the revolving doors. The third relates to whether regulator characteristics matter. Some of this evidence comes out in work investigating the effects of revolving doors and is covered then. The fourth type of evidence is on whether regulators appear to reflect pressure from citizens. To get at this issue I survey evidence on whether the mechanisms to elect regulators play a role. If they do, then under certain institutional setups regulators may be more accountable to citizens. This is important in order to ascertain the extent to which models such as Peltzman's are accurate when portraying regulation as the outcome of a balance of pressures in which consumers play a role.

(i) Capture and Regulatory Outcomes

Relating the amount of capture to regulatory outcomes is difficult, mainly because measuring capture is tricky. One way of doing this is using nationwide measures of corruption, which may be correlated to regulatory capture. Dal Bó and Rossi (2004) test a simple model for why countries where regulators are more easily capturable should have more inefficient utilities. When regulators are more likely to be vulnerable to influence and approve price hikes, firm managers do not have incentives to try their best when coordinating and supervising the use of production factors. This will induce more mana-

gerial shirking and lobbying instead of effort exertion, and the way to meet service obligation targets is to use more inputs per unit of output. Dal Bó and Rossi (2004) study a panel of 80 electricity distribution firms in 13 Latin American countries for the period 1994–2001. They find that firms are more inefficient in countries and times displaying higher corruption.

Another way of analysing the connection between capture and outcomes is looking at whether influence in the form of campaign contributions to politicians matters. Because the focus of this article is on regulation, I do not cover the large literature studying whether campaign contributions affect dimensions of legislative behaviour such as roll-call voting. Rather, I comment on the (unfortunately scarce) evidence regarding the link between political influence and regulatory outcomes. We may see legislators as regulators themselves, or, given, for example, the Congressional oversight on regulatory agencies, one may conjecture that campaign contributions to legislators may affect the inclination of the latter to exert pressure over agencies.

De Figueiredo and Edwards (2005) analyse wholesale price determination by state regulatory commissions in telecommunications. They focus on the price that incumbents are allowed to charge entrants to local networks in densely populated areas. The authors have a panel of price decisions made at the state level in the United States, corresponding to three electoral cycles (1997–8, 1999–2000, and 2001–2). The main explanatory variable they consider is the campaign contributions to candidates to the state legislature made by incumbent firms relative to entrant ones. Although limited by the number of regulatory decisions, the authors find evidence consistent with the idea that campaign contributions affect price regulatory decisions. When campaign contributions by incumbent firms are relatively higher, so are the prices that incumbents are allowed to charge entrants.

Taking regulation in a broad sense, we may consider trade policy as a regulatory outcome. Hansen and Park (1995) study the determinants of the International Trade Administration (ITA) decisions when US domestic firms report unfair practices by foreign competitors. In implementing US laws, the ITA eventually faces a confrontation with foreign

governments and firms, creating a cost to simply yield to domestic pressure. The authors use over a thousand decisions by the ITA (which may end up in the granting of protection or not) between 1980 and 1990. They find that protective decisions are significantly associated with the industry's Political Action Committee (PAC) contributions to trade oversight committee members. Further work on trade policy has tested the predictions of Grossman and Helpman's (1994) menu auction, common agency model. Goldberg and Maggi (1999), Gawande and Bandyopadhyay (2000), and Eicher and Osang (2002) offer econometric studies of the determination of imports, trade protection, and lobbying expenditures. They show that the pattern of non-tariff protection and lobbying expenditures through industry PACs contributing to legislators fits the predictions of the Grossman and Helpman model. Sectors with more elastic import demands are less protected, the import penetration matters differently for organized and unorganized industries, and industry lobbies seem to contribute in accordance to the strength of opposing lobbies. For instance, upstream firms seeking protection lobby harder when their potential opposition (downstream firms) is more concentrated. The work studying how well the Grossman and Helpman (1994) set-up fits trade policy data tends to show that the model does a good job at accounting for the patterns of protection. I believe it is noteworthy that a model that altogether abstracts from asymmetric information explains trade policy well. It is unclear, however, to what extent the inclusion of 'transparency' variables could improve explanatory power.

(ii) Revolving Doors and Regulators' Personal Characteristics

Interest in the empirics of revolving doors emerged first in political science. Gormley (1979) presents a study of the voting patterns of the seven members of the Federal Communications Commission (FCC) between 1974 and 1976. He focuses on the idea that industry background may affect the behaviour of regulators. Thus, his work lies at the intersection of the concern for the revolving doors and the role played by personal characteristics. Given that, in a strict sense, only two of the seven commissioners in Gormley's study were former broadcasters, the analysis should be seen as a quantitative case study. Gormley finds that former broadcasters do tend to

vote in support of the broadcasting industry more often. For instance, they voted to renew broadcast licenses 88.7 per cent of the time, while other commissioners only supported that decision 69.2 per cent of the time. However, Gormley also finds that party allegiance matters as much, and for some decisions, more. Republicans tend to vote consistently in the interests of industry. Thus, Gormley's conclusion is that although industry background seems to matter, it is not clear that it has a very strong effect once one considers the role of political affiliations. On a similar note, Navarro (1982) reports that liberal PUCs tend to create a more 'rate suppressing' climate (i.e. to bring consumer prices down). Beyond the incentives connection highlighted by the capture model reviewed in section III, the evidence seems to indicate that the personal characteristics of regulators, as well as the endowments and capabilities of regulatory agencies, play a potentially crucial role. In this connection, professionalism appears to have non-innocuous effects. Berry (1979) presents evidence compatible with the idea that regulatory commissions enjoying higher degrees of professionalism (as related to budgets and recruitment policies) tend to reduce prices to consumers relative to large users. This is especially the case when the value of power consumption is higher and hence more salient to consumers.

Cohen (1986) revisits the issue of whether industry employment may affect decisions in the FCC, using data from 1955 to 1974. He analyses both the problem of previous and posterior industry employment. In addition, he looks at effects at different points along agency tenure. He finds that commissioners with previous industry experience are more supportive of industry interests all along their careers as regulators. As with Gormley's study, it is difficult to tell to what extent industry background really matters, because it is highly correlated with the party affiliation of commissioners. In fact, no Democratic administration appointed a commissioner with industry background during the sample period. Commissioners that take industry employment after leaving office are less supportive of industry in average, which may be surprising. One interpretation is that such difference supports Che's (1995) model: more-able regulators planning to obtain post-agency employment in industry signal their quality by being tougher. However, commissioners who take industry employment after leaving the

FCC increase their support for industry interests by nearly 11 per cent during their last year in office. This may suggest two things. Maybe explicit *quid pro quos* are realized close to the end of tenure, when the terms of such exchanges can be made concrete. Alternatively, consider a commissioner near the end of his term who finds out that alternative employment opportunities are dwindling and realizes he has been tough. That person may well decide unilaterally to improve his profile as 'employable' by voting in support of industry.

One interesting connection is between the revolving-doors phenomenon and the choice of term lengths in regulatory commissions. If terms are very short, then banning former regulators from taking post-agency employment in industry may be difficult to sustain in practice. High-ability individuals may simply decide to forgo agency employment in order not to lose their chance of obtaining industry jobs. On the other hand, the combination of short terms and the possibility of moving on to industry may lead regulators to care too much about their reputations with the market. Leaver (2002) studies the effect of regulatory term limits on the incidence of utility rate reviews in the United States.¹² She analyses a panel of 99 electric utilities serving 39 states from 1982 to 1990, which are under the regulation of term-limited Public Utility Commissioners appointed at the state level. The main finding is that reductions in term limits appear associated with a decrease in the propensity of regulators to file for rate reviews in situations of falling operating costs (which is when rate reviews would be bad for firms).

(iii) Advocate Groups, Regulator Selection, and Consumer Power

One important issue that remains to be covered is the extent to which regulatory outcomes are dependent on pressure stemming from consumers. Two main possibilities for consumer control are examined. One is the creation of consumer advo-

cate groups; the other is the direct election of regulators.

The oil shocks in the 1970s ended a long period of declining costs and faced consumers with a scenario where firms filed for rate reviews and typically obtained permission to raise prices. Many state legislatures in the United States then created independent consumer advocates in order to protect consumers from what was perceived as one-sided lobbying. These groups were officially funded, had the right to be automatically involved in agency hearings, and could bring in information that could diminish informational asymmetries favouring firms. Holburn and Spiller (2002) present evidence suggesting that the creation of those consumer advocates had an important impact on electricity prices. Holburn and Vanden Bergh (2006) investigate the emergence of independent consumer advocates in the USA. They find that Democratic state legislatures were more likely to fund consumer advocate groups. This seems especially true in states and periods in which Democrats saw their grasp on power as transitory. Creating consumer advocate groups appears to have been a way to insulate consumer protection against probable adverse political developments. This expectation by Democrats seems to have played a role especially in the creation of advocate groups representing residential consumers, arguably the most likely to become unrepresented when the legislative majority changed colours.

A different way in which consumers may have regulation going their way is by controlling regulators through the vote. It is not obvious whether the effects operate through the provision of different incentives or through the selection of a different type of regulator. Still, most work in this area finds evidence consistent with the idea that selection methods matter. Most of this work has been done using cross-sections of utilities, which is potentially problematic because of omitted variables problems.

¹² She raises the point that minimal squawk theory is at odds with classic capture theory. According to Stigler (1971), the longer a regulator stays in office, the cosier the relationship with firms gets. Presumably, very long terms allow this, so one could observe a positive correlation between regulatory commissioners facing long terms and policies being more generous to firms (Hagerman and Ratchford (1978) do find evidence in that direction, using a cross-section of 79 electric utilities in the USA). In contrast, if regulators care more about protecting their reputations with the market, when term limits are shorter these concerns may be made stronger, because regulators will be on the job market sooner. Then it should be shorter terms in office that give incentives to do favours for firms, in order to stop firms from squawking.

Hagerman and Ratchford (1978) use a cross-section of 79 electric utilities to investigate determinants of allowed rates of return and find no evidence that the method used to appoint regulators matters.¹³ Boyes and McDowell (1989), however, find that when regulators appointed by the executive require the approval of the legislature, the price of electricity tends to be lower, suggesting that legislatures channel some consumer pressure on executive appointees. Smart (1994) investigates pressures to keep basic rates down in telecommunications following the divestiture of AT&T. Maintaining low basic rates became difficult with the introduction of competition in other service areas. She argues that allowing for basic rate increases would be hardest for regulators running in specific elections because of the salience of the issue to those voting in them. On the other hand, an appointee of the governor would have more political room to let prices go up. After all, the governor is elected on a platform in which telecom prices is only one of many issues, and that very issue may not be salient to the majority of voters. (An argument along these lines would be later formalized by Besley and Coate (2003).) An intermediate institutional case would be that of governor appointees that require legislative confirmation, especially when this confirmation must take place in a divided legislature. Using a cross-section of telecommunication companies, she finds evidence that appointed regulators are associated with higher prices for users in small cities, although this effect is undone when the regulator must be confirmed by the legislature. Kwoka (2002) uses a cross-section of 543 US electric utilities and finds that elected commissioners are associated with lower prices.

A different type of evidence is provided by Fields *et al.* (1997), who perform an event study and show that a substantial drop in the market value of life insurance companies followed the passage of Proposition 103 in California. This proposition altered the mechanism for selecting life-insurance regulators in a way that was presumed to allow for more consumer influence. It is unclear, however, whether the detected effect reflected a more pro-consumer stance of regulators or, alternatively, more unpredictable or incompetent regulation.

Besley and Coate (2003) attack the question of whether selection methods matter using a panel of pass-through decisions regarding fossil-fuel costs. Their panel covers 42 states in the United States from 1960 to 1997. They find that elected regulators allow half as much pass-through relative to appointed regulators. An attractive feature of this study is that by interacting the selection method with cost changes it is possible to identify the role of the selection method even when including fixed effects by state in a sample where no states ever switch the selection method.

It has been noted that the determination of regulatory outcomes is not solely controlled by regulators and, possibly, the legislators that supervise them. In fact, the courts may affect outcomes because firms, regulators, and legislators interact under the shadow of an eventual court intervention (see, for instance, Gely and Spiller, 1990; Spiller and Tiller, 1997, 1999). As a result, the method of selecting judges could also affect regulatory outcomes. Guerriero (2003) provides a panel-data study exploiting states that switched judge-selection methods. His evidence indicates that states that elect their judges tend to allow lower pass-through of costs into electricity prices. One problem with the work on selection methods is that it highlights a relative difference only. When elected regulators choose ‘populist’ prices, they may have in mind the right trade-off between present and future consumers, and more generous pricing by appointed regulators may be a giveaway to industry. It is also possible that populist pricing is too costly from the social point of view because it may lower investment and hinder future service. Analysing regulatory outcomes from the point of view of some social efficiency benchmark appears to be a large pending task for future research.

VII. SUMMARY AND PATHS FOR FUTURE RESEARCH

I have attempted two main tasks in this review. One was to present in an accessible way the main theoretical frameworks that academic economists use to think about regulatory capture. The other one was to review available evidence on what factors

¹³ For other early studies, see Harris and Navarro (1983), Costello (1984), Primeaux and Mann (1986), and Atkinson and Nowell (1994).

may affect capture and what impact capture may have on regulatory outcomes. The main lessons from prevailing theories are that capture is possible because firms have private information that is hard for citizens or their political representatives to obtain. This implies that the emergence of regulatory agencies should be associated to the production of useful, industry-specific, information. However, regulatory agencies can be captured. An example is when firms induce regulators to hide information that could be used to offer consumers a better deal.

The theory we reviewed in section III prescribes responses that tie regulators' pay to their informational performance. Such use of wage incentives appears impractical, given the difficulty of contracting on regulatory outcomes and on the information produced by agencies. Alternatives based on the use of above-market wages and monitoring to induce regulators to want to keep their posts also appear limited when taking into account the size of the stakes involved. These responses may then have to be complemented with more-involved institutional building: the creation of bureaucratic procedures that allow various stakeholders to share information, the creation of legislative committees that specialize in monitoring the regulator, and possibly the creation of consumer advocate groups. These elements are all present, to some extent and with regional variations, in the current regulatory complex of the United States.

Other theories emphasize that the provision of positive incentives (such as bribes or future industry employment) may not be the only way to influence regulators. The provision of 'trouble' may also work. The provision of trouble, for instance in the form of actions that trigger a reputational damage (or a direct utility loss) for the regulator, has the potential negatively to affect the pool of talent that can be attracted to regulation. This will be especially important if less talented regulators are more gullible and therefore more vulnerable to informational influence from political and industry sources. Negative incentives can play a larger role when regulatory employment is weak in terms of stability or time horizons. In such situations regulators may have more to lose from harming powerful firm interests. The view that collusion will be easier to sustain in long-run relationships calls for term limits on agency

employment. However, term limits that are too short may make regulators hostages to an extreme need not to 'rock the boat'. The optimal tenure length should balance the two opposing concerns that have been studied.

In addition to incentives, interest groups may also offer information with the hopes of ensuring more favourable treatment. One possibility that is, to my knowledge, uninvestigated empirically is that firms may out-consult regulators. Thus, regulators may come to view the world the way firms do, not because they have been captured through incentives, but because they have been convinced. More evidence on persuasion and on whether bad funding of regulatory agencies makes it more likely would be valuable.

The empirical evidence on the causes and consequences of regulatory capture is scarce. Interesting work has been done on the role of monitoring at curbing graft and procurement abuses, but direct tests are still lacking of how asymmetric information raises the probability of regulatory capture. Moreover, common-agency models that abstract from asymmetric-information problems have been shown to fit the data on trade policy quite well. We chose as our main model in section III one that puts asymmetric information at its centre, because it would seem that capture would be very unlikely were wrongdoing immediately visible to citizens. (The only exception would be when citizens are powerless to punish governments that are known to be ineffective.) However, empirical research has not yet fully confirmed this presumption.

The empirical literature on capture, especially in its early years, devoted more attention to the role of the individual characteristics of regulators and the effects of the revolving doors. Those with industry background have been shown to be more lenient towards industry, but not particularly so once one controls for political affiliations. Posterior industry employment does not seem to have a robust effect on regulatory decisions, except in the last year of regulatory tenures. Term limits in regulatory bodies, however, seem to make regulation more lenient, perhaps because regulators are more concerned about their reputations with the market. An important open question in connection with the revolving

doors is whether firms employ former regulators mainly because of their technical expertise, or because of their lobbying potential.

The personal characteristics of regulators may be responsible for the observation that the way in which regulators are appointed seems to make a difference to regulatory outcomes. Much in the same way in which Supreme Court judges reveal the inclination of the presidents that appoint them, regulators may owe their stance to the governors or legislatures that place them in their jobs.¹⁴ Recent work has shown that elected regulators tend to have a more pro-consumer stance. This may reflect both the fact that regulators are responsive to the prevailing pressures (and the electorate is a powerful one), or that pro-consumer regulators self-select into running for office. More work is needed to disentangle the selection and incentives effects stemming from different methods for selecting regulators. Whether having elected regulators is a good idea may depend on whether the main concern is capture by firms or pandering to populist views on utility pricing. Beyond ideology, evidence is extremely scarce on whether the talent, professionalism, and funding of regulators matter, providing another possibility for future empirical research.¹⁵

A final, important issue to consider is that of the costs of capture. Is capture a big problem? On the one hand, capture could have large distributive consequences when it transfers income from, say, consumers to firms. This could be enough of a reason for the political principal to want to curb capture. Moreover, capture may cause net wealth losses. Measuring these is another area in which more research should be done. Lacking a direct estimate of how much wealth is destroyed by captured regulation, I would like to offer an indirect indication that capture can be very costly to society.

I will do this by relying on two studies that offer a micro view of the connection between corruption and firm behaviour.¹⁶ The first study, by Kwhaja and Mian (2005) does not involve regulated firms, but shows that when captured officials grant rents to firms the costs to society can be large. These authors study distortions in the allocation of loans by public banks to firms with political connections in Pakistan. The authors estimate that the politically induced distortions generate social costs ranging from 0.3 to 1.9 per cent of GDP—figures that reach macroeconomic relevance. The second study, by Dal Bó and Rossi (2004), uses a measure of corruption that proxies the corruptibility of all public officials and not just regulators, but contains evidence on the impact of corruption on regulated utilities. They find that if the median Latin American country in terms of corruption in their sample (Brazil) had the corruption level of the least corrupt country (Costa Rica), then electricity distributors would use around 12 per cent fewer employees and would incur 23 per cent less operation and maintenance expenditures. This microeconomic evidence is of limited scope in terms of external validity: it covers a small subset of the firms operating in the countries under study. Clearly, more studies should be performed to complete our picture on the microeconomic consequences of corruption. However, the magnitude of the effects is too large to be dismissed. According to Dal Bó and Rossi (2004), the damage done by corruption to the technical efficiency of regulated utilities is similar in magnitude to that done by operating in an environment characterized by poor law and order, and it is orders of magnitude larger than the damage done by macroeconomic instability. Large efforts in both academia and policy circles have gone into improving macroeconomic policy, and for good reason. The evidence suggests that we should probably do more to understand and curb regulatory capture.

¹⁴ Alt and Lassen (2005) find evidence that the selection method for state Supreme Court members in the United States matters to the corruption levels prevailing in the state. They also provide an indication that the selection effect is likely to be driving the results.

¹⁵ See Domah *et al.* (2002) for a study of determinants of the size of electricity regulatory agencies across countries. Their evidence suggests that smaller countries face a disadvantage at staffing regulatory agencies.

¹⁶ Svensson (2005) includes a review of the costs of corruption from the macroeconomic perspective. On procurement, see Di Tella and Schargrodsky (2003), who show how prices for hospital supplies in Buenos Aires went down by about 15 per cent under a crackdown on corruption. Reinikka and Svensson (2004) show that official graft in Uganda in the mid-1990s absorbed around 80 per cent of the public funds from a central government grant intended to finance schools.

APPENDIX

(i) Optimal Contracts under Asymmetric Information

The four constraints that the contract offered by the government must respect are:

$$\begin{aligned} \Pi^l(p_l, T_l) &\geq \Pi^l(p_h, T_h), \text{ incentive compatibility constraint of low type (IC low);} \\ \Pi^h(p_h, T_h) &\geq \Pi^h(p_l, T_l), \text{ incentive compatibility constraint of high type (IC high);} \\ \Pi^l(p_l, T_l) &\geq 0, \text{ participation constraint of low type (PC low);} \\ \Pi^h(p_h, T_h) &\geq 0, \text{ participation constraint of high type (PC high).} \end{aligned}$$

The government wants to maximize

$$\gamma[s(p_l) - T_l] + (1 - \gamma) [s(p_h) - T_h].$$

PC high implies $T_h \geq F - q(p_h)(p_h - c_h)$, and IC low means $T_l \geq F - q(p_l)(p_l - c_l) + q(p_h)\Delta c$. Raising rents in the high state only makes it more costly to deter the low-cost firm from claiming costs are high. The government will set $T_h = F - q(p_h)(p_h - c_h)$. On the other hand, the government has a clear incentive to lower T_l as much as possible while satisfying IC low. Hence, the government will set $T_l = F - q(p_l)(p_l - c_l) + q(p_h)\Delta c$. From the last expression we see that, given $q'(\cdot) < 0$, setting $p_l > c_l$ could save the government some transfers. However, departing from marginal cost is a more expensive way of maximizing $s(p_l) - T_l$ than setting $p_l = c_l$ and then satisfying IC low by making direct transfers. The reason is that departures from marginal cost pricing destroy surplus. Hence, the government will set $p_l = c_l$ and $T_l = F + q(p_h)\Delta c$. The problem for the government then becomes to maximize

$$\gamma[s(c_l) - F - q(p_h)\Delta c] + (1 - \gamma) [s(p_h) - F + q(p_h)(p_h - c_h)].$$

The first-order condition for this problem is

$$-\gamma q' \Delta c - (1 - \gamma) q(p_h) + (1 - \gamma) q'(p_h - c_h) + (1 - \gamma) q(p_h) = 0$$

which then yields

$$p_h = c_h + \frac{\gamma}{1 - \gamma} \Delta c.$$

(ii) Collusion-proof Optimal Contracts

The government wants to maximize

$$EV = \gamma \lambda \{s(c_l) - F - w\} + (1 - \gamma \lambda) \{ \mu [s(c_l) - T_l(\mu)] + (1 - \mu) [s(p_h) - T_h(\mu)] \},$$

where, following the logic used before, $T_l(\mu) = F + q(p_h)\Delta c$, and $T_h(\mu) = F - q(p_h)(p_h - c_h)$. Considering that wages will be set at the minimum compatible with collusion proofness, the objective of the government becomes to choose p_h to maximize

$$EV = \gamma \lambda \left\{ s(c_l) - F - \frac{q(p_h)\Delta c}{1 + \psi} \right\} + (1 - \gamma \lambda) \left\{ \begin{aligned} &\mu [s(c_l) - F - q(p_h)\Delta c] + \\ &+ (1 - \mu) [s(p_h) - F + q(p_h)(p_h - c_h)] \end{aligned} \right\}.$$

The first-order condition is

$$-\gamma\lambda \frac{q'(p_h)\Delta c}{1+\psi} + (1-\gamma\lambda)\{\mu[-q'(p_h)\Delta c] + (1-\mu)[-q(p_h) + q'(p_h)(p_h - c_h) + q(p_h)]\} = 0$$

which becomes

$$q'(p_h) \left\{ -\gamma\lambda \frac{\Delta c}{1+\psi} - (1-\gamma\lambda)\mu\Delta c + (1-\gamma)(p_h - c_h) \right\} = 0,$$

which then, using the fact that $1 - \mu = (1-\gamma)/(1-\gamma\lambda)$ yields

$$p_h = c_h + \frac{\gamma}{1-\gamma}\Delta c + \frac{\gamma\lambda}{(1-\gamma)} \left[1 - \frac{1}{1+\psi} \right] \Delta c.$$

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