A Note on Wealth as a Corruption-Controlling Device[1]

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Abstract

In the standard moral hazard model, withholding of effort by the agent is not observable to the principal. We argue that this assumption has to be changed in applications that study corruption. The overwhelming majority of cases where corrupt politicians have been punished involve the detection of consumption levels that appear to be too high. The informativeness of an agent's level of consumption depends on his initial level of wealth as conspicuous consumption of luxuries by wealthy agents leads to little updating of the principal's belief about their honesty. This introduces a tendency to choose poor agents as they are easier to monitor. More generally, we show that, even if agents have similar preferences, there are contractual advantages to selecting particular types. We describe the basic problem of choosing agents and monitoring consumption, and discuss a number of features of the practical applications. We show that selecting rich politicians may not help fight corruption and that the political class will exhibit lower variance in consumption than the population. In settings were formal contracts matter, we show that monitoring consumption introduces a tendency towards low powered incentive schemes (and more generally low wages) and that the measure of "moral" costs that is often employed in the literature can be derived (not assumed).

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I. Introduction

Castrated slaves, called eunuchs, were employed by Sultans to guard their harems. This solution to a particularly distressing principal-agent problem is one instance of a general strategy that can be called choosing agents. In this strategy, the principal selects an agent, on whom he is about to delegate a task, based on an observable characteristic. In the standard agency model it is clear that the agent's degree of risk aversion can be costly to the principal. Perhaps because of the difficulty in observing risk aversion, economists have emphasized other potential benefits of using particular agents. Schelling (1960), for example, discusses the use of agents with a low personal cost of conflict and mentions the strategic advantages of delegating authority *"to a military commander of known motivation"*. More recently, Vickers (1985) emphasizes the potential value of hiring a manager that is committed to maximize the company's sales instead of profits. Similarly, Rogoff (1985) analyses the benefits of delegating the conduct of monetary policy to a conservative central banker in a setting where there is time inconsistency, while Rotemberg and Saloner (2000) study how hiring a manager biased towards pursuing certain type of projects (a "visionary") helps employees exert effort on innovative tasks. In all these examples there is a *commitment* benefit of choosing agents with particular preferences. In this paper we focus on the *contractual* benefits of choosing certain agents out of a population of similar preferences. The example of the eunuch illustrates an extreme example whereby selecting some agent eliminates the principal agent problem altogether. In general, the amount of rents left to the agent and/or the efficiency costs of the optimal incentive scheme will depend on the agent's observable characteristics. We are particularly concerned with applications to corruption, where a strategy of choosing agents is often employed in practice. Although all our examples come from corruption settings, it is possible that there are more general benefits from using observable characteristics to help reduce the informational costs.[2]

The corruption literature has discussed the effects of higher income on the behavior of agents that work in positions where there are opportunities to take bribes. This is the theme, for example, of the early seminal paper of Becker and Stigler (1974), as well as Rasmusen

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[2] For example, a firm may prefer to collude with a small rather than a large rival as deviations from an agreement by a small firm may be easier to observe. We thank Hugo Hopenhayn for suggesting this example.

(1992), Besley and McLaren (1993) and Mookherjee and Png (1995), and the large policy literature discussing how paying higher wages can reduce corruption (see, for example, World Bank (1997)). The idea is linked to standard economic intuition through diminishing marginal utility. There are also a number of examples of very wealthy individuals that have been elected in countries where corruption is an important political preoccupation. One the famous cases is that of Silvio Berlusconi, who was elected prime minister in Italy of 1994, in the aftermath of *tangentopoli*, the corruption scandals that shocked the Italian political establishment in the early nineties. The owner of a vast business empire, Berlusconi's acknowledged net annual earnings at the time were U$13.5 million.

There is, however, a second effect of wealth. It is illustrated by the actions of the leaders of the popular uprising against President Ferdinand Marcos of the Philippines in 1986. After finding a number of luxury items at the presidential palace, including 2,300 pairs of shoes in First Lady Imelda Marcos' closet, they decided to protect and exhibit them, together with all of the contents as evidence of corruption on a grand-scale by the Marcos'.[3] They reasoned that, since Marcos was not a wealthy man before entering politics, these items where probably acquired with dishonest income. Put differently, finding 2,300 pairs of shoes in Mrs Berlusconi's closet, would make her an eccentric rather than a crook. Interestingly, this is the logic used in the overwhelming majority of the cases where corruption has been detected and punished. As part of a mild campaign against corruption in the early 1980's, the Mexican government charged (in absentia) the former chief of police of Mexico City with fraud. One of the reasons for the charges was his high standard of living. Apparently he was able to keep 15 racehorses and 19 vintage cars in his home. He also had 1,200 servants and had a second home modeled (in marble) on the Parthenon, all whilst on a U$1,000 monthly salary.[4] The biggest spy scandal in the CIA's history occurred when counter espionage agents inquired how one of their top agents, Aldrich Ames, was able to afford a Ferrari. In the end, Ames' luxurious lifestyle prompted an investigation that uncovered the sale of secrets to the Soviet Union on the largest scale ever. Amongst these secrets was a list of CIA agents that were subsequently killed by the Soviets.[5] According to Judge Gherardo Colombo from

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[3] Ex-President Marcos, however, has always denied allegations suggesting he was worth U$10bn (based on papers found at the palace). He has only admitted to owning assets worth U$2bn. See *The Times*, June 12, 1986.
[4] Reported in *The Economist*, April 7, 1984.
[5] Reported in the front page of *The Times*, December 29, 1994.

Milan, a former prosecutor in the *"mani pulite"* process, the value of monitoring the assets and lifestyles of public officials is one of the key lessons of the Italian experience. A recent paper summarizing the main practical issues (Colombo (1997)) goes further and argues that this is the only approach with some chance of success.[6]

This argument can be put in terms of the traditional moral hazard model. It suggests that applying it to study corruption requires more than a mere re-labeling of effort for bribes because withholding effort is unobservable while bribe consumption may be observable in some type of agents (the poor or those on very low wages). A direct implication is that there may be other quasi-observable characteristics of the agent that may facilitate this transmission of information besides their income, such as the agent's rate of discount. We conjecture that agent's with children, or with sick relatives may be easier to monitor, as they would have a higher tendency to consume education and health care services.

In the next section we describe the general problem and a measure of the gain from choosing agents to lay down the basic idea. Given that high-level politicians typically are bound by informal contracts, whereas lower level bureaucrats are motivated through formal incentive contracts, we separate the channels through which choosing agent matters into two. First, in the absence of a formal contract, monitoring consumption will still lead some type of agents to behave better than others. Second, writing a formal incentive contract may be cheaper to write for some type of agents. In section III we study informal contracts and show that we should not always expect lower corruption levels from richer politicians. In section IV we develop the case of formal contracts and show that the observability of the hidden action leads incentive contacts motivated to reduce bureaucratic corruption to have low power. This is an argument against paying high wages to deter corruption. The main point of the paper naturally leads to a distinction between money earned legally and money earned illegally, something that we argue is a natural interpretation of the "moral costs" that are used in the analysis of corruption since the work of Rose-Ackerman (1975).

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[6] The secret nature of corrupt agreements, the fact the victims (taxpayers) are dispersed and there are incentives for free riding, the fact that penalties are stipulated to both those receiving bribes and those giving them, all conspire to make corruption a crime with extremely low rates of indictments.

II. The Basic Problem of Choosing Agents and Monitoring Consumption

II.a. Basic Problem

Assume that a principal wishes to hire an agent to do some task. The agent's original observable characteristic is t_i^0. The resulting observable characteristic of the agent after the implementation of payment scheme r by the principal is $t_i(t_i^0, r)$. The principal chooses a payment scheme r^* and an agent with original characteristic t_i^{0*} such that

$$t_i^{0*}, r^* \in Arg \max U_p(r, a^*(t_i^0, r))$$

where

$$a^*(t_i^0, r) \in Arg \max U_a(r, a, t_i(t_i^0, r))$$

The principal's utility, $U_p(.)$, depends on the payment scheme (r) and the agent's optimal action (a^*). And the agent's utility $U_a(.)$ depends on the payment scheme, the agent's action and the resulting characteristic.

A way to solve this problem, in the spirit of Grossman and Hart (1993), is to find the optimal payment scheme for each type and then choose the optimal type. Guided by the empirical applications which involve cases of high level (political) corruption as well as low-level (bureaucratic) corruption, we distinguish two channels through which the principal benefits from using observable characteristics. First, even in the absence of formal contract, some agents will be more inclined to choose the actions desired by the principal. Second, some agents are cheaper to motivate through a formal incentive contract. We develop two simplified versions of these problems, designed to highlight the two channels.

To illustrate the first channel, we look for the optimal characteristic assuming that the principal cannot choose the formal payment scheme. In this case the solution is such that

$$t_i^{0*} \in Arg \max U_p(a^*(t_i^0))$$

where

$$a^*(t_i^0) \in Arg \max U_a(a, t_i^0)$$

The principal's utility depends on the agent's action, while the agent's utility depends on the action and the original characteristic. The lack of formal contracts is common in high level political settings, where corruption is often a preoccupation. In this context, it is sometimes conjectured that there may be practical advantages to selecting wealthy politicians who will not be tempted to become corrupt (although there may be costs in terms of a lower political legitimacy). Note that in this case, there are no benefits originating in the fact that the principal can write a different (cheaper) contract for some type of agents, but rather from the fact that some agents are more likely to take a desired action. Note that this general description includes the case of agents who take particular actions due to the informal incentives they face. And also the cases of agents whose preferences make them select actions that have commitment value (as with Rogoff's conservative central banker and Rotemberg and Saloner's visionaries).

To illustrate the second channel, we develop an example with homogeneous agents (there are no differences in the original characteristic) where the principal designs a formal incentive contract. The focus is on the way the payment scheme affects the resulting characteristic and hence how easy it will be to observe consumption for the principal. The solution is given by

$$r^* \in Arg \max U_p(r, a^*(t_i, r))$$

where

$$a^*(t_i, r) \in Arg \max U_a(r, a, t_i)$$

The utility of the principal depends on the payment scheme and the agent's action. The utility of the agent depends on the contract and on the resulting characteristic. The emphasis on formal contracts to deter corruption is common in bureaucracies. In this context, it is sometimes observed that bureaucracies are characterized by the use of low powered incentive schemes (e.g., Tirole (1993)). And raising wages for bureaucrats, as well as for politicians, is one of the most popular policy proposals to fight corruption. In this example, the benefits originate in the fact that a contract that takes into account a (given) characteristic and monitors consumption is cheaper for the principal. Different types may certainly be associated with differences in how big such benefits are, but the two channels are conceptually different.

II.b. Measure of the Gain from Choosing Agents and Monitoring Consumption

In the general case the gains from choosing agents and monitoring consumption to the principal is

$$M(0) = U_p\left(r^*(t_i^{0*}), a^*(t_i^{0*}, r^*)\right) - \int U_p\left(r^{av}, a^*(t_i^0, r^{av})\right) dG\left(t_i^0\right)$$

where r^{av} is the payment scheme that maximizes principal's utility given that it cannot be made contingent on the type, and where $G(t_i^0)$ is the cumulative distribution function of types.

In the case where incentive contracts are not used (or are not tailored to each characteristic), the gain from choosing agents is

$$M(1) = U_p\left(a^*(t_i^{0*})\right) - \int U_p\left(a^*(t_i^0)\right) dG\left(t_i^0\right)$$

These gains are only going to be zero when the principal is indifferent among all types.

In the case where incentive contracts are tailored to the characteristics of the agent, a measure of the gain has two components. First, we have the gain from having a contract that fits the characteristic, even though the latter may not be the optimal one. This is given by

$$M(2a) = \int U_p\left(r^*(t_i^0), a^*(t_i^0, r^*)\right) dG(t_i^0) - \int U_p\left(r^{av}(t_i^0), a^*(t_i^0, r^{av})\right) dG\left(t_i^0\right).$$

These gains are only going to be zero when the optimal payment scheme is the same for all types.

Second, we have the gain from choosing the optimal characteristic.

$$M(2b) = U_p\left(r^*(t_i^{0*}), a^*(t_i^{0*}, r^*)\right) - \int U_p\left(r^*(t_i^0), a^*(t_i^0, r^*)\right) dG(t_i^0)$$

Note that the gain in the general case, $M(0)$, can be quite large. Consider the standard problem of inducing an agent to exert effort in a task. Now allow for the possibility that agents differ in their skin pigmentation and that the only way to enjoy leisure is to spend time under the sun. In this case white agents are to be preferred to black agents, as white agents would exhibit sunburns if they were to withhold effort on the job, whereas black agents would exhibit no change in color. In this extreme example, the gain from choosing agents and monitoring consumption is $M(0)$. This is so because using a black agent takes us to the traditional principal agent model and using a white agent takes us to a world where there are no principal agent problems because not providing effort is always fully revealed to the principal. When the agents find it very costly to have no leisure at all, the optimal contract will include some leisure (besides a monetary payment). Interestingly, it will differ between the two types with white agents having relatively less time under the sun than black agents. The reason is that allowing white agents to spend time under the sun is more "expensive" since it would reduce the information that is transmitted to the principal when the agent withholds effort.

III. No Contract, Choice of Agent: Politician wealth may not help control corruption

In this section we consider the possibility of corruption in a setting where formal contracts cannot be written (by assumption), so this is an example of only choosing the agent's

characteristics, as explained in section II. The setup we consider has the advantage of being applicable to cases of corruption by high level officials and politicians, an area where there has been comparatively little research done. The only thing the public can do is to monitor the agent's consumption patterns, which are affected both by the bribes he takes and by the random changes to his wealth.

Consider an agent that is paid a fixed wage (normalized to zero) who has the opportunity to choose the amount of bribes b to take. For concreteness, consider the case of a high level, elected politician in charge of privatizing a state enterprise that can under-invoice the sale without leaving any proof of wrongdoing.[7]

Assume the agent has a stock of wealth t, that produces a flow of honest income freely available for consumption, v. While wealth is verifiable, the amount v is not observable to the public. A number of factors affect the size of the income realization v, including the returns to his legitimate investments and the amount of gifts the agent may receive like inheritance. After observing the return to his wealth v, the agent decides to take bribes in the amount b, for a total amount of income available of $v+b$. This is fully spent on consumption, z, as allowing for savings somewhat complicates the analysis without adding insight. Thus, consumption by the politician is

$z = v + b$

A standard way to think of z is as consumption on luxury goods, such as spending on fancy cars or golden watches. However, successful cases of corruption detection, suggest including goods on which consumption cannot be postponed. Indeed one of the lessons of the *mani pulite* investigations is the usefulness of monitoring spending on activities that have a very high discount rate, such as the education of children or spending on medical care (see Colombo (1997)). This reduces the possibility of having the agent shifting consumption

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[7] We do not model the source of the agent's power because we do not need so much detail to lay down the basic ideas. All we need is a situation where the politician can take bribes, and that he has complete legal discretion to do so. In other words, the politician runs no risk of detection or of ever receiving any form of legal punishments. The assumption is a bit extreme, but given the extraordinary low rate of detection of corruption, seems a reasonable first approximation.

across time. Although we assume that there is no (verifiable) trace of the agent's corrupt activities, we do assume the agent's consumption of luxuries is observable (presumably, that is the point with luxury goods). When the public observes these displays of wealth, it doesn't know if the agent was lucky or if he took bribes.[8] Thus, the state of the world where the agent takes bribes and inherits nothing is observationally equivalent for the public to the state where the agent takes no bribes and receives inheritance.
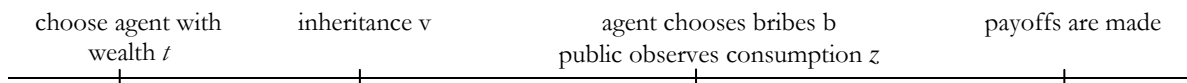
We assume that the variable v, the return to wealth, is distributed with a certain distribution function; that this is common knowledge; and that this induces a distribution function over z that we denote with $F(z)$. Call the associated density function $f(z)$.

The agent's objective function is

$$I = U(z) - F(t, z)m$$

The function $U(.)$ is the agent's utility function that satisfies standard Inada conditions. The second term represents punishment for suspicions of corruption. When the public observes the politician's level of consumption, it calculates the probability that such a level was generated with zero bribes. The agent is punished by the public with reductions to their moral prestige (in units of utility) in the amount m. A simple interpretation is that $F(.)$ is the probability of dishonesty and m is the personal cost of the public's lack of trust, possibly expressed as the number of votes.[9]

The timeline is as follows.

choose agent with wealth t	inheritance v	agent chooses bribes b public observes consumption z	payoffs are made

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[8] When asked about his 2,300 pairs of shoes, Marcos can always claim that he inherited money from a relative or invested his salary wisely.

[9] A simple game where this punishment scheme is optimal is the game of keeper of the treasure. A guard is in charge of protecting the kingdom's treasure from some thieves. After they leave with their pickings, the guard confronts the king and reports how much was stolen. The king can only observe the guard's standard of living before and after the raid, and reward the guard with honors, status, etc.

First the public chooses a politician from a pool of agents that can only be distinguished by their wealth. Second, the random realization to wealth is revealed to the politician. Third, the politician chooses a level of bribes and total consumption of luxuries is revealed to the public.[10] Lastly, the payoffs to the politician and the public are made.

Agent's Choice

The problem for a politician that observes a realization equal to v is to

$$Max_b \quad I$$

The first order condition is

$$U' - f(t, z)m = 0$$

The agent equates the marginal utility of consumption to the marginal punishment for exhibiting conspicuous consumption. This punishment is simply the change in the probability the agent is considered corrupt times the punishment implied by these beliefs. Indeed, since the public cannot see what part of the politician's consumption pattern originates in a genuine wealth realization and what part originates in a bribe, it must punish all displays of "excessive" consumption. The agent observes the shock to his wealth and decides what the level of bribes he should take is. Note that this may imply negative bribes. The interpretation in this case is that negative bribes represent attempts by the agent to conceal his wealth. In normal circumstances the agent would certainly consume according to his wealth realization, but his chosen profession (of politician) means that he will have to abstain.[11] Calling these activities "negative bribes" is less odd than it seems. Since all the public can see is displays of conspicuous consumption, all the distinctions must be made in one plane: we must either have positive and negative bribes or positive and negative

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[10] The main conclusions of the paper do not change if the timing is changed to allow the politician to observe the wealth realization after deciding on the amount of bribes.

[11] The conversation is as follows:

WIFE: Darling, why don't we go to Cancun for the holidays? You know we can afford it this year as my father is paying for it.

POLITICIAN: I know but, what will the people say?

consumption, which also sounds involved.[12]

Since we are not restricting $F(.)$ in any way or form (beyond the standard $F(0)=0$ and $F(\infty)=1$), in order to ensure that the solution is an interior one we assume that for all the types, exists a $b<\infty$ such that $U(v+b)-F(t,v+b)m>U(\infty)-m$.[13] Note that the conditions on the utility and distribution functions imply that we must have positive bribes at $v=0$. Given the sequence of play, bribes are monotonically decreasing in the realization of income, v. A more general result, which is also empirically testable, is the political class exhibits less variance in the consumption of luxuries than the non-political population. In fact, in the extreme example we present the variance is zero (for a given level of wealth). It is also straightforward to see that if z is separated into different goods, each with a different discount rate, there will be more consumption of goods with a high discount rate.

Agent Participation

The agent's participation constraint is

$$\int \left[U\left(v+b^*\right) - F\left(t,v+b^*\right)m \right] f\left(t,v\right) dv \geq \int U(v) f\left(t,v\right) dv$$

Note that monitoring consumption has the effect of introducing a form of punishment for people who choose to enter politics that they would otherwise not have. Accordingly, the public has a smaller set of agents from which to elect its leaders. We could not obtain general conditions under which such a constraint binds more for particular groups (e.g., the rich).

On this account, the model predicts that countries with more access to information about the lifestyle of politicians would tend to have less people interested in becoming politicians. For example, a practical decision that countries must make is if the statement requiring politicians of disclose their wealth prior to entering politics is going to be made public (such

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[12] What may be misleading is that a "negative bribe"' sounds like the agent is returning some ill-gotten gains to the public. No such thing happens in this model. As we emphasized, the agent simply engages in a sub-optimal pattern of consumption from a personal point of view.

[13] Of course, the first order condition could hold for any number of values of the realization.

as in the US) or will not (such as in the UK prior to the 1990's). Cultural habits that allow media enquiry would again have the benefit of monitoring consumption but the cost of reducing the pool of potential politicians.

The Public's Problem

Faced with this behavior by the agent, the public must choose a politician with a level of wealth such that expected bribes are a minimum. The public has very little information about the agent's activities, and its objective function is accordingly simple. The public may have a number of specific objectives in mind, but may be unable to combine them analytically when designing the optimal compensation package. Thus, concentrating on bribe taking is the best it can do. Alternatively, the public may have very little information about the structure of uncertainty faced by the politician, or the agent's responsibilities could be secret, so there is actually no practical way to do this.

Call $v_1(t)$ the level of the wealth realization for which we have $b^*(v_1(t)) = 0$. Then the probability of the agent being corrupt is

$$F\left(t, v_1\left(t\right)\right)$$

The expression B gives the expected (positive) bribe that the agent takes, where

$$B = \int_0^{v_1(t)} b^* \left(v\left(t\right)\right) f\left(t, v + b^*\right) dv \quad s.t. \ b^* \in \arg\max I$$

Thus the problem of the public is to

$$Min_t \quad B$$

$$s.t. \quad \int \left[U\left(v + b^*\right) - F\left(t, v + b^*\right) m \right] f\left(t, v\right) dv > \int U(v) f\left(t, v\right) dv$$

$$and \quad b^* \in \arg\max I$$

The first constraint is a participation constraint to ensure the agent is willing to take part in

political life and the second is an incentive constraint. This leads us to our basic proposition

Proposition 1: *The effect of increasing the agent's wealth on*
         1. the probability that he takes bribes is ambiguous
         2. the expected total bribes that he takes is ambiguous.

Proof: The expressions for both $dF(t,v_1(t))/dt$ and dB/dt cannot be signed.   ∎

Wealth affects bribe taking in our simple model in two ways. First we have that richer agents would tend to take lower bribes because of diminishing marginal utility. The second effect of wealth operates through reducing the punishment of conspicuous consumption to the richer, since is less indicative of malfeasance. Proposition 1 shows that, from the point of view of controlling corruption, there is no reason to prefer richer agents. More precisely, *F(t,z)* is decreasing in *t*, which means that for the same level of consumption the rich gets a lower punishment. If this were not true, and for example we would have *F(t,z)=F(z)* for all *t*, then the level of consumption z^* would be the same for all types. This means that poorer agents would be getting more bribes (both in size and frequency) and it would always pay to hire a richer agent. Thus, when richer people can hide better the bribes they have obtained they will tend to bribe more, so the level of wealth of the agent that maximizes the public's utility becomes an empirical question. It is possible that this point is connected to the anecdotal evidence we have, which does not suggest that richer politicians have an overwhelming advantage over poor ones when it comes to anti-corruption debates.

Proposition 1 may not be very surprising given that we have not imposed any restrictions on $F(.)$ and its relationship to wealth. However, most reasonable assumptions leave this result unchanged. This is the case if we assume, for instance, that the variance of income increases with wealth.[14] This is what we expect to happen if we think that the income generated by a certain amount of wealth is a fixed percentage term of the original amount, such as when we

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[14] If we do not assume this we may have that agents that are worth $10 may have $9 in a bad year and $11 in a good year, but an agent worth $1,000 is worth $1,001 in a good year and $999 in a bad one.

can express returns as plus or minus x%. It is also possible to think of the v term as inheritance. Then this assumption is equivalent to assuming that wealth is correlated across family members or that rich people have rich aunts. Proposition 1 remains true even if we assume other relationships between t and $F(.)$. For example, we cannot sign the effect of wealth on corruption even if we assume that higher wealth implies first order stochastic dominance.

At least two important features are missing from our formulation. First, the agent may be a self made man, so that wealth may be a signal of ability. The model, however, does not make a distinction between these two types of wealth. This, by itself, does not introduce a tendency to prefer the self made over those with inherited wealth. The reason is that individual "ability" may have negative value for society, as in the case of the ability required to pay/get bribes. Maybe the self-made have an ability to understand the bribing technology, or less condemning in moral terms of such activities. Some of the reservations to Premier Silvio Berlusconi could be interpreted in this light, as his companies have been accused of bribe paying. Second, we have not allowed for strategic manipulation of the wealth information made available by the agent prior to taking his job. In many countries there are provisions whereby agents must make a formal statement of their wealth upon taking a job in the public sector (above a certain level). Such statements are sometimes public, facilitating monitoring consumption to deter corruption. Agents could jam the signals they will later produce by claiming to be wealthy when entering politics. However, it may be difficult/costly for agents to do this. The public may want to actually observe conspicuous consumption and the agent may be liquidity constrained (obviously it would be hard to fund such investment projects in the formal finance sector). Also, declaring prior wealth may be costly in terms of tax obligations.[15]

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[15] One could question that agents have such extended planning horizons. However, the experience of Indira Gandhi's chief Minister in the State of Maharashi (Mr Antulay) suggests otherwise. Apparently, he was forced to resign after a high court in Bombay found him guilty of selling cement quotas established by the government. The mechanism used was to ask for "donations" to the trusts he controlled. He *"had established seven trusts, ostensibly for public purposes, but in fact completely controlled by himself. He had obtained income tax exemptions for one trust amounting to U\$110m over the next three years - an indication of the amount he expected generous donors to contribute''* (reported in p. 51 of *The Economist*, January 23, 1982).

IV. Optimal Contract, Same Agent: High wages may not help control corruption

In this section we study the role of formal contracts. This has some relevance because improving the salaries of public officials is often emphasized as a way to fight corruption.[16] The main argument in these debates is the same emphasized by economists, namely that bureaucrats will not engage in risky activities, such as bribe taking, when there is a wage premium to working in the public sector (see, for example, Becker and Stigler (1974), Dickens *et al* (1989), Besley and McLaren (1993), Mookherjee and Png (1995), *inter alia;* for the cross country empirical evidence see van Rijckeghem and Weder (2001)).

This policy, however, has problems. For example, for plausible parameter values, wages would have to be extremely high to deter corruption. This is due to a combination of the very low detection probabilities on crimes of bribery and the large amounts of money that can potentially be embezzled by the bureaucrats. In practice, there are very few examples of countries where politicians earn the kind of money that could deter corruption on this logic.[17] One possible reason is that a policy of high wages for politicians does not carry much favor with the public. The rhetoric suggests this resistance originates in fairness considerations, although it is worth remembering that a stylized fact of bureaucracies, which are more insulated from the public than elected politicians, is the low power of incentive schemes (see, for example, Wilson (1989) and Tirole (1994)).

In this section we point to another practical problem with a formal contract that gives out generous monetary rewards to politicians. To do this we derive the optimal payment scheme when higher consumption levels provide information about the agent's hidden action and compare it to the contract in the standard case where the agent's subsequent consumption is uninformative. To emphasize the main point on how formal contracts change when consumption is informative, we now assume that agents are homogeneous in terms of type

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[16] World Bank (1997) is one of many examples. The approach is also a favorite of the popular press. For example, wage increases are a part of the current effort to reduce corruption in the Mexican federal police. See "Reforming Mexico's police", *The Economist*, December 11, 1999.

[17] The country that pays highest wages to high level politicians is Singapore, which does not rank well in civic liberties (according to Freedom House). In 1994, for example, it was reported that the annual salary of Goh Chok Tong, Singapore's prime minister, was $780,000, almost four times that of Bill Clinton. Starting annual

(e.g., wealth, etc). Note that a similar point can be made in the context of a model where payments cannot be state contingent. Indeed, in an efficiency wage model, the observability of consumption leads to lower wages and to more investment by the principal in increasing the detection probability (results available upon request). The intuition is that, when consumption is not observable, the cost of increasing the wage one dollar is just this dollar. But when high wages reduce the informativeness of monitoring consumption there is an additional cost from the reduction in the probability of detection. We start with the standard case where the principal does not observe consumption ex-post, which also serves as the benchmark.

IV.a. No Information in Consumption (benchmark)

The principal offers the agent a contract. If he accepts, his task is to observe the realization of a variable (say the level of revenue) Π, which can be high Π_h (with probability p_h) or low Π_l (with probability p_l). He then makes a report Π^a. The agent's only discretion occurs when the state is high, as he may report it is low (and keep the difference). The alternative occupation earns him w_0. The incentive scheme used by the principal is $w(\Pi^a = \Pi_h) = w_h$ and $w(\Pi^a = \Pi_l) = w_l$. When the principal does not observe consumption, the agent will report the truth when $U(w_h) \geq U(w_l + \Pi_h - \Pi_l)$. And will agree to participate when $p_h U(w_h) + p_l U(w_l) \geq U(w_0)$.

Denote $\psi(.)$ the inverse of U. Since U is an increasing and concave function, it is easy to see that both constraints hold with equality, so the optimal incentive contract satisfies

$$w_h - w_l = \Pi_h - \Pi_l$$
$$w_l = \psi\left(\frac{U(w_0) - p_h U(w_h)}{p_l} \right)$$

IV.b. Observing Consumption

To model the fact that consumption is (partially) revealing, we assume that there is some noise in the agent's level of legal income. For example, the agent invests his wage and earns a random return. This is given by
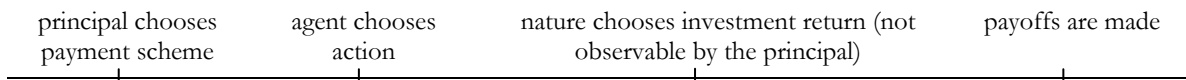
$$\phi \times income$$

where ϕ is the realization of random variable Φ. To emphasize this, we alter the timing (with respect to the one used in section III) and assume that the agent makes his decision to become corrupt prior to observing the realization of this random variable. A second difference is that we now assume that the agent must consume his total income. Thus, he cannot hide the bribe and must consume it under the eyes of the public. Neither of these assumptions is essential but help simplify the exposition. The probability that the agent has taken bribes is derived given the agent's legal income and observed consumption level, and he is punished for such suspicions with a punishment *m*. Thus, total punishment is given by

$$F(legal\ income, consumption) \times m$$

where the first term is the probability that $\Phi \leq \dfrac{consumption}{legal\ income}$. The agent's utility is

$$U\left(\phi\left(total\ income\right)\right) - F\left(legal\ income, \phi\ total\ income\right)m$$

Thus, the timing is

principal chooses payment scheme	agent chooses action	nature chooses investment return (not observable by the principal)	payoffs are made

Agent's Choice

When the agent observes Π_h, the incentive compatibility constraint is

$$\int [U(\phi w_h) - F(w_h, \phi w_h) m] d\phi \geq \int [U(\phi(w_l + \Pi_h - \Pi_l)) - F(w_l, \phi(w_l + \Pi_h - \Pi_l)) m] d\phi$$

Note that legal income increases the agent's utility through two channels. First, we have the standard effect operating through higher consumption. Second, higher income reduces the popularity penalty because a given level of consumption is less likely to originate in corruption by the agent.

Comparing the optimal payment scheme when consumption is informative and when it is not, we obtain the following proposition,

Proposition 2: *The optimal contract when consumption is informative has lower power than the optimal contract in the benchmark case when consumption is not informative.*

Proof: We can rewrite the incentive compatibility constraint as follows

$$\int [U(\phi w_h) - U(\phi(w_l + \Pi_h - \Pi_l))] d\phi \geq \int m[F(w_h, \phi w_h) - F(w_l, \phi(w_l + \Pi_h - \Pi_l))] d\phi$$

When this constraint is not binding, the principal gives the agent a constant wage that minimizes expected costs (as the agent is risk averse and punishment through m is enough to induce truthful reporting). When it holds with equality, the right hand side can be written as

$$\int m \left[\Pr\left(\Phi \leq \phi \frac{w_h}{w_h} \right) - \Pr\left(\Phi \leq \phi \frac{w_l + \Pi_h - \Pi_l}{w_l} \right) \right] d\phi$$

which is less than zero, because $\phi \frac{w_h}{w_h} = \phi$ is smaller than $\phi \frac{w_l + \Pi_h - \Pi_l}{w_l}$ and the probability is an increasing function. (The reason is that Φ, the realization of the uncertainty about the agent's legal income, is independent of the agent's behavior, and because for any realization,

the public's punishment is higher when the agent announces Π_l). The left hand side is also less than zero and

$$w_h - w_l < \Pi_h - \Pi_l \qquad \blacksquare$$

In other words, when consumption is informative, the optimal incentive contract is characterized by a difference in wages that is smaller than $(\Pi_h - \Pi_l)$, which is the difference in the standard case when consumption is not informative.

IV.c. Moral Costs Derived

The principal agent literature sometimes assumes there is a "cost" to misbehaving and not doing what the principal expects. In the corruption applications of this literature the payoff from dishonesty typically includes a bribe but also a negative term often labeled a "moral cost".[18] In this section we argue that our ideas about monitoring consumption can be used to derive a cost to illegal sources of income that plays a similar role.

Proposition 3: *Illegal income is less valuable than legal income.*

Proof: To see how moral costs can be derived, we follow the notation of the state contingent contract (for simplicity). The utility of the agent when he reports the state as low when it is in fact high is

$$U\left(\phi(w_l + \Pi_h - \Pi_l)\right) - F\left(w_l, \phi(w_l + \Pi_h - \Pi_l)\right)m$$

This can be rewritten as follows

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[18] The connection between morality and incentives is unappealing because sometimes incentives are not aligned properly for very large groups of people and it would be strange to claim that their actions are not moral (and, for example, they will not go to heaven). Put differently, even if the incentives in Argentina and Sweden were such that a majority (minority) of people in Argentina (Sweden) are corrupt, few would seriously claim that there are more good people in Sweden. Unless one takes the view that this life is a punishment for what we have done in previous lives. In the Hindu religion there is such a correlation across species (so bad humans end up as crickets).

$$U\left(\phi(w_l + \Pi_h - \Pi_l)\right) - F\left(w_l + \Pi_h - \Pi_l, \phi(w_l + \Pi_h - \Pi_l)\right)m -$$
$$\left[F\left(w_l, \phi(w_l + \Pi_h - \Pi_l)\right) - F\left(w_l + \Pi_h - \Pi_l, \phi(w_l + \Pi_h - \Pi_l)\right)\right]m$$

Note that since *F(.)* is decreasing in the first argument, the term in squared brackets is positive.　　■

The first two terms are the utility units that the agent would get for a given level of income if this had all been earned legally. The third term (in squared brackets) is the difference in punishment because the income coming from illegal sources appears suspicious. The average effect is negative and plays a similar role as the "moral cost" often used in the literature (see, for example, Rose-Ackerman (1975), and many others).

V. Conclusions

There are numerous examples of corruption being discovered because an agent was observed to enjoy an unexpectedly high standard of living, or, more precisely, a level of consumption that cannot be easily explained given the information available about the agent's level of wealth prior to being hired. This suggests to us that there are potential benefits from designing incentive contracts and choosing agent type with the idea of using the information that is obtained from monitoring consumption.

There are two basic effects of hiring agents on a high income. On the one hand, bribe offers are less tempting to the rich due to diminishing marginal utility. On the other, high levels of income also make any observed level of consumption less informative about any bribes taken by the agent. We discuss the general problem of choosing agents and monitoring consumption, as well as two applications to settings where corruption is common. The first is a setting where informal incentive contracts are prevalent, such as the control of a high level politician by the public. Our basic result is that we should not expect there to be a preference for rich politicians when corruption is a concern. It can also be shown that the

political class is expected to exhibit lower variance in consumption, for there to be higher value in monitoring the consumption of goods with high discount rates (such as education or health care) and for there to be higher gains from monitoring consumption and selecting agents according to wealth in countries with high tax rates.

The second setting concerns the control of potentially corrupt bureaucrats through formal incentive contracts. In this case, paying generous wages has problems beyond the fiscal cost because it lowers the value of monitoring consumption. We also show that, when state contingent contracts are used, there is less separation between the wage in the good and in the bad state. This is provided as a potential explanation for why we have low powered incentive contracts in bureaucracies. The argument can be applied to wages that are not state contingent, such as efficiency wages. In this case monitoring consumption introduces a tendency for lower wages (and higher investment in detection), something that is one way of explaining popular resistance to pay politicians well. Finally, our analysis suggests that money made legitimately has higher value than illegitimate money. This introduces a way to derive the moral costs that are often assumed in models where agents take illicit actions.

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