

Delay and corruption: a simple model with empirical tests

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1 Introduction and Background

There is a general consensus that the quality of institutions has pervasive effects on individual choice, markets, and economic outcomes.¹ The legal system is one of the most important institutions in any economy, so much of the drive to improve institutions works through legal reforms. However, relatively little attention is paid to the fact that mid and low level bureaucrats are the mechanism through which any institutional improvement or legal reform must be implemented. When these bureaucracies are examined, two of the most systematic problems found across countries and legal systems are delay and corruption. Often the bureaucrats providing service to the public whether in education, health, social assistance, or justice, are over worked and manage a large backlog of cases. Therefore bureaucrats must decide how to best use their effort in managing and reducing the backlog. The public users of the government service need it to be delivered in a timely fashion, so they are often willing to pay for priority service. The more delay there is, the more willing users of the service will be to make side payments. This situation creates incentives for bureaucrats to engage in deliberate or strategic delay, so that the backlog may be partly endogenous.

This paper proposes a simple two period model of the interaction between a bureaucrat and a user of a public service. In the equilibrium of the model, users with an intermediate value for the service opt for making a payment to the bureaucrat only in the second period, and the bureaucrat chooses not to input effort unless she is promised a direct payment for providing the service. The model's testable implications are that the higher the valuation of the user for the service he is waiting for, the more likely it is that he will offer a payment to the bureaucrat, and hence the less delay there will be for that particular user. If as the model assumes there is some uncertainty involved in the correct provision of the service, then users with higher valuations are also more likely in equilibrium to receive the service successfully.

We test this model by exploiting three related data sets that arise from two projects carried out in the same labor court just north of Mexico City. One project was concerned with experimentally testing the effects of low-cost monitoring on the performance of notifiers who constitute the most important bottleneck in the course of unfair dismissal lawsuits. As part of the measurement of effects of the experiment after the intervention period concluded, data was collected from all hearings and all initial case filings. We merge these data sets by case file number, and this allows us to measure the expected value of a lawsuit (and hence the value of proper notification of the defendant taking place), characteristics of the worker and the job, and delay, using the time elapsed between the initial filing and a successful hearing which implies notification of all parties must have taken place.

The second project carried out in the same labor court is related to measuring aspects of the costs of litigating firing disputes. Labor law reforms in Mexico and other countries have been motivated by the conviction that the costs of litigation are high, and in particular that a large portion of compensation decreed by labor courts is paid out to lawyers in the form of contingency fees. However, there is no micro level data on the contracts between lawyers, plaintiffs, and defendants, in the context of unfair dismissal suits. In addition, there

¹Just one example of a highly cited work is Acemoglu and Robinson's recent book «Why Nations Fail», which posits a relationship between political and economic inclusion in institutions as the key to growth-promoting social infrastructure.

is ample anecdotic evidence of side payments made to court bureaucrats, but very little hard evidence of such payments is available in any country, including Mexico. To remedy both deficiencies in the measurement of the total costs of litigation, we surveyed around 760 parties and lawyers involved in hearings at the labor court between November and December 2013. We report results from over 200 surveys of plaintiffs showing that a significant proportion report side payments to bureaucrats, and that these payments are positively related to the self-reported opportunity cost of delay for the plaintiff.

This work is related to literature on corruption, bureaucracy, efficiency, and economic development and growth. Mauro (1995) uses a cross-country data set to show a negative correlation between corruption, bureaucratic efficiency, and growth.² Later work has been more based on microeconomic theory and has examined the extent to which corruption can promote efficiency in models where not all applicants for a particular service or permit should receive this service in an efficient equilibrium. Choi and Thum (2003) show that under certain circumstances the extortion power of bureaucrats who must approve entrants' decision to operate in a market can result in entry delay, reducing social welfare and bribes at the same time.³ Ahlin and Bose (2007) consider the relationship between the proportion of honest bureaucrats and social welfare in the sense of proper allocation of licenses to applicants who should efficiently receive them. They show that welfare may not be monotonic in the proportion of honest bureaucrats, and therefore that small changes in monitoring technology can have large effects on outcomes.⁴ Kaplan, Sadka, and Silva-Mendez (2013) describe the monitoring experiment with notifiers.⁵ They show that monitoring effort in real time is effective only to the extent that the bureaucrat cannot manipulate her backlog of cases. In fact, the most powerful result of the monitoring experiment occurred when it became necessary to take control of the work load that notifiers previously managed without supervision. This intervention doubled the average number of successful notifications carried out per day.

Our work contributes to these lines of research first because we bring new data into an area which suffers greatly from the difficulty of measuring corruption, delay, and efficiency in bureaucratic outcomes. Due to the simple set up for measuring both efficiency and delay, and the success of our survey strategy in obtaining self-reported side payments, we are able to overcome the lack of data that has prevented testing most available models. Second, we provide a very simple model which is able to characterize the relationship between delay, side payments to bureaucrats, and efficiency, and which provides testable implications consistent with our preliminary data analysis.

²Paulo Mauro (1995). «Corruption and Growth». *The Quarterly Journal of Economics* 110(3):681-712.

³Jay Pil Choi and Marcel Thum (2003). «The Dynamics of Corruption with the Ratchet Effect». *Journal of Public Economics* 87(3-4): 427-443.

⁴Christian Ahlin and Pinaki Bose (2007). «Bribery, Inefficiency, and Bureaucratic Delay». *Journal of Development Economics* 84(1): 465-486.

⁵David S. Kaplan, Joyce Sadka, and Jorge Luis Silva-Mendez (2013). «Monitoring and Notification: Evidence from a Field Experiment in a Mexican Labor Court». Working paper.

2 Model

Consider a model with two players: a bureaucrat **B** and a public service user **U**. The public service user attaches a valuation V to having the service provided successfully (in our motivating example, his defendant notified on time for the initial hearing of the lawsuit to take place as scheduled). Success has a random element, which depends on costly effort exerted by the bureaucrat. Suppose two periods, $T \in \{1, 2\}$; in each period the user can promise to make a transfer $t_T \in \mathbb{R}$ to **B** after observing success or failure in the provision of the service. The bureaucrat can exercise effort or not, denoted by $w_T \in \{0, 1\}$. Note that we assume the user only needs to receive the service successfully one time, so that if success is obtained in the first period, the user proceeds to benefit from the service and will never choose to induce effort through a promise of payment in any subsequent period.

The sequence of events is straightforward. In each period, the potential transfer is first determined by the user. Then the bureaucrat decides whether to input effort or not. Success or failure then materializes, and if success is obtained, the promised payment (which may be zero) is made. In either period, the bureaucrat's effort costs her $c \geq 0$. The service is provided successfully without effort from the bureaucrat in any period with probability g , with probabilities p and q for $w_1 = 1$ or $w_2 = 1$, respectively. We assume $p > q > g$.

We assume that **U** can commit perfectly to make the promised payment in case he receives the service successfully, so that perfect commitment is possible in the promise made by the user to pay when he observes success. Figure 1 shows the game in extensive form, including all the payoffs associated to each profile of actions. The upper case letter at the right of each decision node indicates the player who chooses at that node. N represents nature, the non-strategic player that implements the randomness in the success of the public service.

We find the subgame perfect Nash equilibrium of this game by backward induction. Our main interest is to determine whether there is a reasonable range of parameters in which the spne indicates delay, a side payment to the bureaucrat, and welfare loss with respect to a situation in which optimal effort is exerted in each period. We define the functions $t : H_U \rightarrow \mathbb{R}$ and $w : H_B \rightarrow \{0, 1\}$, where H_j is the set of histories for which $j \in \{\mathbf{B}, \mathbf{U}\}$ takes an action, such that:

1. In each subgame starting with a decision node in which a transfer or level of effort is chosen, these actions constitute a Nash equilibrium within the subgame.
2. In each subgame after a history in which **U** has observed success, the transfer announced by the user in that history is implemented. That is, offered contingent payments are credible.

We will search for the restrictions on the model's parameters such that in the spne with commitment, we can observe delay and corruption ($w_1 = 0, w_2 = 1$, and $t_T > 0$ for some T).

Call $v_j(\cdot|t, w)$ the payoff function of $j \in \{\mathbf{U}, \mathbf{B}\}$ given strategies t, w . To allow a credible choice of effort in the second period, we need $v_B(w_2 = 1|t, w) \geq v_B(w_2 = 0|t, w)$ for whatever history H induced by t, w such that the next decision to be taken is w_2 . That is, for effort to be exerted in period 2, we need:

$$(1 - q)(-c) + q(t_2 - c) \geq gt_2$$

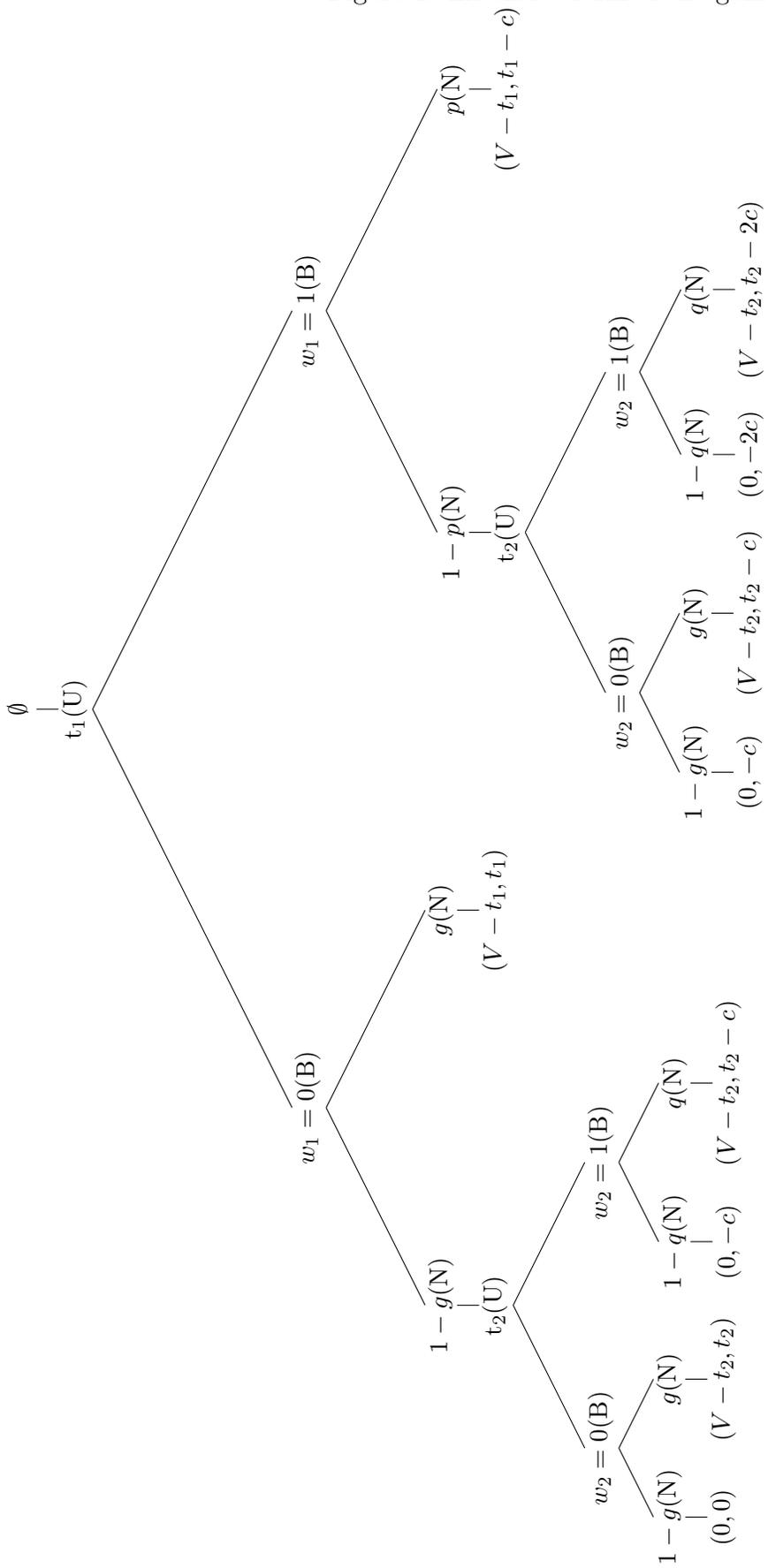


Figure 1: Extensive form of the game

$$\Leftrightarrow t_2 \geq \frac{c}{q-g} \Leftrightarrow (q-g)t_2 \geq c$$

This condition simply means that for **B** to exert effort, it must be the case that the expected increase in her payment after exerting effort is at least as large as the cost of effort. Going back to the subgame immediately previous to this last subgame takes us to the decision of the user to make a contingent promise of payment in period 2, conditional on no success in period 1. **U** will optimally choose $t_2 = 0$ or $t_2 = \frac{c}{q-g}$, since it is never a best response to offer a strictly positive payment which is not sufficient to induce effort in the bureaucrat. Hence, if the user's payoff is greater with positive effort by the bureaucrat, then he will choose the minimum contingent transfer that will induce effort, and this is $(\frac{c}{q-g})$. Otherwise, he will choose $t_2 = 0$. Hence the condition that must be satisfied in order for the user to offer a contingent payment in period 2 is:

$$\begin{aligned} (V - \frac{c}{q-g})q &\geq Vg \\ \Leftrightarrow \frac{(q-g)^2}{q}V &\geq c \end{aligned}$$

This condition requires that the value to the user from a successful public service be sufficiently large to cover the expected costs of the bureaucrat and induce her to exert effort. Proceeding backwards, the next step is to identify the level of t_1 which makes the bureaucrat indifferent between exerting effort or not in period 1, given that if no success is achieved in period 1, $w_2 = 1$ y t_2 is as specified above. Simple algebra leads to the condition:

$$\begin{aligned} p(t_1 - c) + (1-p)[q(\frac{c}{q-g} - c) - (1-q)2c] &\geq gt_1 + (1-g)[q(\frac{c}{q-g}) - c] \\ \Leftrightarrow t_1 &\geq \frac{c}{p-g} + g\frac{c}{q-g} \end{aligned}$$

Note that if the two periods were identical, that is if $q = p$, the payment necessary so that **B** would exert effort is larger in the first period than in the second, and this is entirely due to the fact that the model has two periods. The intuition behind this result is the following: $w_1 = 1$ implies a contingent benefit to the bureaucrat is success if achieved in period 1, but success in period 1 also implies inability to receive any payment in period 2. Hence, to induce effort in period 1, the user must compensate the bureaucrat for the higher probability of losing the chance to charge a side payment in the next period.

As the last step to reach the equilibrium of the game, we need to evaluate the payoffs of **U** from offering $t_1 = \frac{c}{p-g} + g\frac{c}{q-g}$ and $t_1 = 0$. The condition for the user to prefer not promising a positive payment in period 1 is:

$$\begin{aligned} gV + (1-g)[q(V - \frac{c}{q-g})] &\geq p(V - \frac{c}{p-g} + g\frac{c}{q-g}) + (1-p)[q(V - \frac{c}{q-g})] \\ \Leftrightarrow V(p-g)(1-q) &\leq p[\frac{c}{p-g} + \frac{(1-q)c}{q-g}] + \frac{gqc}{q-g} \end{aligned}$$

This condition requires that the valuation V be sufficiently small, so that U prefers not to cover the additional cost of inducing effort in the first period, which results from the inter temporal structure of this game. Since the restriction on the user's valuation in order for a positive payment to be promised in period 2, conditional on no success in period 1, imposed a minimum level of the user's valuation, we have found an interval for V such that delay, corruption, and a suboptimal level of effort in at least one period persist, that is: $t_1 = 0, t_2 > 0, w_1 = 0, \text{ and } w_2 = 1$.

For users with sufficiently high valuations, it will be optimal to offer a side payment starting in the first period. For these users, the dynamic aspect of this game results in higher payments being made, and hence in reduced payoffs as compared with a one period game. For users with somewhat lower valuations (for which the condition for the side payment in the first period to be positive is not met), a payment will be made in the second period only, so that effort is not exerted in the first period, and there is suboptimal delay along with corruption. For users with a sufficiently low valuation, no side payment will be offered, and the probability of receiving the service successfully is very low. So a clear empirical implication of this model is that higher valuation users will be more likely to receive successful service, and more likely to receive this service in a more timely fashion.

In this model, applied to our motivating example, if the notifier cannot manipulate the case files to which she gives priority, but can rather be credibly forced to attempt notification of a specified set of case file each day, the inter temporal structure of the game would be eliminated, and even when bribes are paid these will be lower.

This simple model provides a useful structure to understand the relationship between delay and corruption in the daily work of low level government bureaucrats. The key parameter to determine whether side payments are made, effort is inputted, and how likely success is, is the valuation of the user for the service, which is generally observable to the bureaucrat under many circumstances. We now proceed to explain the data we use and to test the basic empirical implications of our model.

3 Empirical Evidence

This section relates the predictions of the model with stylized facts observed in labor court trials. In this context, users are plaintiffs that require courts to notify defendants for legal action to proceed, and bureaucrats are the court employees responsible for notification. We observe the existence of delay and corruption, and the relationships between valuation and success and between valuation and corruption are consistent with the predictions of our model.

Table 1 shows the percentage of court users that incurred in costs other than lawyer fees, by procedural stage. These costs happen most frequently during the hearing and notification of defendants stages. The first is expected because parties must attend hearings, and attending court is costly for users: it implies transportation costs and lost workdays. Notification, however, is by law the exclusive responsibility of dedicated court staff. Systematic expenses on the part of the user at this stage therefore suggest that notifiers may engage in corrupt behavior and charge for the notification service.

This intuition is strengthened by the fact that in the surveys collected in November-

Table 1: Extra Payments

	(1)	(2)	(3)	(4)	(5)
	Filing	Notification	Hearings	Final Decision	Enforcement
% Made Extra Payments	0.4294	0.5460	0.5403	0.3865	0.4233
<i>N</i>	163	163	163	163	163

December 2013, more than a quarter of users reported explicit amounts paid to court staff, and more than thirty percent reported either an explicit amount paid or the existence of a side payment, as Table 2 shows. These two separate facts point towards the existence of corruption in the notification process.

Table 2: Paid Corruption

Measure of Corruption	Percentage paid corruption	<i>N</i>
Mentions Explicit Amount	.2777	202
Mentions Payment	.3069	202

As has been discussed before, bureaucrats must be able to control the effort they input for corruption to exist. Different levels of effort must imply different service quality; in terms of notification, there must exist the threat of delay. Table 3 shows that in over seventy percent of conciliation hearings a defendant has not been notified. When this happens the hearing must be rescheduled, implying an average of two months of delay in the legal process.

Once a defendant has been initially notified, it is more likely that he or she will be aware of successive hearings. Therefore, notification of the conciliation hearings (which are the first procedural step) are the most important, frequent, and valuable for the plaintiff.

Table 3: Delay caused by notifiers

	(1)	(2)
	Percentage with non-notified party	<i>N</i>
Conciliation	0.7309	4427
Claims & Defense	0.1794	652
Presentation and admission of evidence	0.1841	516
Evidentiary	0.1060	943

The model predicts that higher valuations should correlate to higher frequencies of side payments to bureaucrats. Table 4 agrees with this prediction by showing that users with higher self-reported costs of attending court (and that therefore face greater costs of the legal process being delayed) are also more likely to have made these payments.

Our theory predicts that users with higher valuations of the bureaucrat's service will make more and greater side payments. This implies these users would receive higher quality service and observe higher success rates. For users of the notification service, one way of measuring higher valuations is measuring the payment the user expects; and given Mexican labor law, these depend mostly on tenure and salary. The model would then imply that higher

Table 4: Corruption and Valuation

	Mentions Explicit Amount	Mentions Payment
Self-reported opportunity cost	0.0000589*** (4.83)	0.0000515** (3.13)
_cons	0.0314 (1.78)	0.0739** (3.11)
<i>N</i>	151	151

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

salaries and tenure would be correlated with higher frequencies of successful notification, and therefore, of successful hearings. Table 5 shows exactly this.

Table 5: Correlation between succesful hearing and worker observables

	Successful hearing: both parties are notified and attend (dummy)			
	(1)	(2)	(3)	(4)
Tenure (days)	0.0000341** (2.66)		0.0000290* (2.28)	0.0000291* (2.31)
Salary (Daily)		0.000263** (3.00)	0.000244** (2.78)	0.000205* (2.28)
Female				-0.150* (-2.03)
_cons	0.662*** (16.44)	0.628*** (13.68)	0.585*** (12.07)	0.648*** (11.13)
<i>N</i>	162	164	162	161

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4 Conclusions

The preliminary results from data extracted from surveys, initial lawsuit filings, and transcripts of hearings are consistent with the basic predictions of our simple model. Further work is required: sample size will increase once surveys of defendants and lawyers are also used, and the match between surveys on the one hand and hearings and initial filings on the other, is accomplished. With more data, it may also be possible to undertake a structural estimation of this simple model, to estimate levels of valuation at which different patterns of side payments, delay, and success in notification take place. Nevertheless, these preliminary findings point to a novel, simple, and intuitive characterization of the relationship between

bureaucratic effort, side payments, and endogenous delay. They also provide an explanation for the finding that reducing a bureaucrat's control over priorities in her pending workload may reduce corruption and make monitoring more effective.