

Endogenous Asymmetric Stakes in Litigation: The effects of the Mexican Social Security Authority as Co-Defendant

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1. Introduction

Mexican labor law allows employees that sue their firms alleging unfair dismissal to involve the Mexican Social Security Authority (IMSS) as co-defendant under the claim that the firm did not register the worker correctly for social security purposes. This action by the worker introduces asymmetry between the payoffs of the two parties to the case, making the negative payoff to a firm that does not settle larger in absolute value than the positive payoff to a worker who wins the case. This paper attempts to study the effects of this situation by proposing a simple model of litigation and arbitration with endogenous asymmetry in stakes. We derive empirical implications from the model and test them using data from a Mexican labor court. Our data is particularly useful for testing this type of model because we observe the amount of money paid to the plaintiff in out-of-court settlements. The main hypothesis we test is whether introducing

asymmetry in the stakes allows workers to increase their likelihood of settling out of court and of obtaining higher levels of compensation. The model we propose predicts that the greater the possibility of a firm being affected by the asymmetry produced by the inclusion of a co-defendant, the more likely the firm is going to settle, and the larger the settlement amount. However, when the worker decides to involve IMSS as a co-defendant, and for some reason the firm and the worker go to court, the plaintiff receives a lower payoff. These results are borne out in the data. However, the model is too simple to account for some important features of the data, specifically because it does not analyze the decision to drop the case and does not consider any asymmetric information besides the likelihood of the firm being immune or not to the threat of a social security inspection. Evidence from the data shows that workers who involve IMSS in their lawsuit are less likely to drop their cases than workers who do not name a co-defendant. It is also the case that workers who choose not to involve IMSS in their lawsuits nevertheless go to court with some frequency, indicating that there may be an additional source of asymmetric information between the

parties. The rest of the paper proceeds as follows. Section 2 focuses on the legal environment that allows the existence of asymmetries in a lawsuit due to the figure of a co-defendant, and its connection to existing literature on asymmetry of stakes. Section 3 describes the data and section 4 presents a litigation model in which workers choose to name IMSS as co-defendant or not, and then proceed to either settle with the firm or go to court. Section 5 tests the model's predictions about the effect of asymmetry in the stakes of the litigation game. Section 6 concludes and discusses future work.

2. The legal environment and asymmetric stakes

A worker may decide to sue her firm for several reasons, such as unfair dismissal, reinstatement, or demands for fringe benefits. To initiate the suit, the worker must file an initial letter of demand (*escrito inicial de demanda*) at the labor conciliation and arbitration board (*Junta de Conciliación y Arbitraje*) with jurisdiction over her company's geographical location. This letter has four sections: the demands, alleged facts, proof, and legal basis. In the first section, the worker presents her claims. Most of these are computable in monetary terms (with the notable exception of re-instatement). In the second section, the worker states facts about her job, salary, tenure, and other job characteristics and conditions, usually including a description of the events surrounding her being fired by the firm. The proofs section includes evidence to support the facts, while the last section cites the articles of Mexican Federal Labor Law (*Ley Federal del Trabajo* (LFT)) that support the worker's claims. Once the suit is initiated,

the labor board notifies the defendant(s). A conciliation hearing is scheduled, at which a court clerk seeks to reach an out-of-court settlement between the parties. At any time before or after this hearing, up to the date the labor board issues a decision, the parties can come to a settlement that ends the case. However, any settlement is not legally binding unless it is registered at the labor board, and this includes revealing all aspects of the settlement as well as exchanging the settlement amount under the board's supervision. If the parties do not reach a settlement, the labor board (consisting of a judge and two lay magistrates) decides the case and chooses the amount of compensation the firm must pay to the worker. Whether a case is dropped, settled, or decided by the labor board, each party pays its own litigation costs.

2.1. IMSS as Co-Defendant

Although according to Mexican Federal Labor Law, all workers should have social security benefits such as retirement pensions, health services, and insurance against work-related injuries, sometimes the worker lacks these benefits either because she is never registered at IMSS, or because the firm under-reports her wage or tenure. These situations have a negative impact on the welfare of

the worker, for example: in case of no benefits. the worker has no medical insurance, and in case of irregularities the worker will receive a smaller pension when she retires. If the worker claims she was not registered at IMSS or was

registered with some irregularity, she can name IMSS as a co-defendant, defined as “a person or entity that can be affected by any resolution or pronouncement in a conflict, and may therefore be involved in the conflict and their presence required by the authority”.¹ The worker can introduce the co-defendant in her initial letter of demand or at any pre-court hearing. If the worker chooses to name IMSS as co-defendant, the firm will be notified of this. Should IMSS choose to answer the lawsuit formally, it makes a statement about whether or not the worker’s claim of irregularities is true. According to social security law in Mexi-

co (), when IMSS finds unregistered workers or other irregularities, it can punish the firm with back-payments or fines depending on the type of mis-reporting. For instance in case of wage under-reporting, the firm must pay the labor-tax difference between the reported and true wages as well as a 5 % fine. In case of no registration, the firm would have to make all the relevant back-payments as well as a penalty that varies between 40 % and 100 % depending on the number of unregistered workers the firm has and the number of times the firm has been caught mis-reporting. IMSS may also choose to inspect the firm’s records and premises, and if it finds other workers who were not duly registered, it can apply the same back-payments and fines to the firm.² It is important to note that all these penalties can only be implemented by IMSS; the local Labor Board (and labor courts in general) has no jurisdictional authority other than to notify IMSS and formally require its presence in the lawsuit. Should IMSS ignore the court summons, while theoretically the court could issue new summons, we rarely observe additional summons. When IMSS is named, whether or not it sends an official response to the court or sends a representative to the court hearings related to the case, the judge generally states that his decision “does not touch” the worker’s rights to pursue her social security rights by following an administrative procedure within IMSS.

Having a co-defendant introduces an additional fixed cost (time and money) for the worker because IMSS must be notified along with the principal defendant, and this notification must be carried out before the worker knows if IMSS will respond, whether formally as part of the lawsuit or informally by directly contacting or inspecting the firm. Administrative records from IMSS indicate that in 2003 the social security administration was involved in 168,623 cases, lawsuits or administrative processes, of which 115,617 were labor lawsuits, and 85.6 % of these cases were complaints of workers like those described above³.

¹Article 690 of the LFT.

²Articles 25, 185, and 304 of the LFT.

³IMSS Annual Report (2003)

2.2. Asymmetric Stakes

As discussed above, introducing the IMSS as a co-defendant has the effect of making the stakes between the worker and the firm asymmetric, and this obviously has effects over the development of the litigation game between the parties. Previous literature has dealt with asymmetric stakes and established general implications which we review here. Bebchuk (1984) develops a litigation model with asymmetric information over the probability of winning in court. Bebchuk's game consists of two stages. In the first the worker makes an offer, and in the second the firm must decide whether to accept the offer or reject it and go to court. In this model the worker knows the distribution of the probability of winning in court, and with this information she has to make an offer to maximize her utility considering both scenarios, reaching a settlement or going to a trial. In the perfect Bayesian equilibrium of this game, higher litigation costs decrease the propensity of going to court.

Priest and Klein (1984) argue that asymmetric stakes in a litigation model allow for larger errors in the parties' predictions of their probability of winning at trial. This results in a larger proportion of trials than optimal, in which the party affected by the asymmetry tends to lose more often. The difference between this model and Bebchuk's is that information is incomplete but symmetric for the parties. In this model both agents, the worker and the employer, observe a private signal of the real value of a case. When the estimates of both parties are far from the decision rule that establishes the "winner" according to the law, going to trial is less attractive and they reach a settlement more often. On the contrary, when the estimates of both parties are very close to the decision rule they are more likely to go to trial. This logic results in the fifty percent rule, which states that litigated cases with true and estimated values very close to the decision rule go to court and around one half of these trials are won by each side. In order to measure the effect of asymmetric stakes over the fifty percent rule, Priest and Klein study lawsuits between retailers and machine manufacturers and concluded that stakes asymmetry produced a lower win rate in court for parties adversely affected by the asymmetry.

Waldfoegel (1995) tests Priest and Klein's selection hypothesis. He performs a structural estimation of their model, taking as given the level of asymmetry, to measure its effect over the deviation from the 50 percent rule. His results confirm Priest and Klein's selection hypothesis as well as their conclusions about the effects of payoff asymmetry. Other work such as that of Marco (2006) shows that in the case of patent disputes, asymmetric stakes are irrelevant to the deviation of the 50% rule due to the possibility of out of court bargaining. All

previous models and research take the asymmetry of stakes as a given, whereas the framework of Mexican labor law suggests a game in which one of the parties (the worker/plaintiff) decides whether or not to introduce asymmetry in the stakes of a case. Using as a starting point the bargaining models proposed by

Rubinstein (1982) and Bebchuk, we set up a model that makes asymmetry of stakes an endogenous decision in a litigation environment.

3. The Data

The data used in this paper come from casefiles of labor lawsuits filed at the Junta de Conciliación y Arbitraje del Valle Cuatitlán-Texcoco (JLCAVCT)⁴ during 2002. From these files we obtained information about the worker's claim, whether the lawsuit ended up being dropped, settled, or going to court, the final compensation obtained by the worker, and worker-job characteristics such as gender, age, wage, tenure, alleged firing cause, managerial/non-managerial post, and others. To calculate the amount at stake in the case, we use the amount claimed by the worker when this is made clear in the lawsuit, and when it is unclear we use formulas derived from the LFT to quantify claims made by the worker.

Only cases presented by individual workers were studied; claims which join the demands of more than one worker, including collective claims made by unions, are not studied in this paper. We also restrict our analysis to claims involving firing. After these exclusions, 2836 case files were studied and of these, only five percent involved IMSS as co-defendant. 69.4% of all cases reached a settlement, 13.3% went to court, and the rest were dropped. The average final reward of cases where IMSS was involved is 28,866 pesos versus 16,398 pesos for all cases. Table I shows that in general the average final compensation of workers who involved IMSS in the lawsuit is greater as compared with lawsuits that had no co-defendant. Similarly, the percentage of cases in which the worker dropped the case is greater for those who did not name IMSS.

⁴The JLCAVCT has jurisdiction over all labor conflicts in a large geographical area within the State of Mexico, and which are not under federal jurisdiction due to not being in one of the industries considered strategic in the Mexican constitution and therefore to be judged by federal labor courts. It is important to note that labor law in Mexico is federal and therefore both federal and local courts apply the same law. This labor court is located to the northeast of Mexico City, in an area dominated by small to medium sized firms mainly in the manufacturing sector. The data were obtained from paper files in the court's archive under the Mexican Transparency Law.

Table I. Average final reward in pesos pesos, by termination mode

	All	Settlement	Trial	Dropped
All	16398.34 [63297.85]	17718.17 [47453.41]	37032.17 [135391.7]	22.21 %
obs	2836	1828	378	
IMSS	28866.71 [141145]	26979.93 [76462.45]	75773.05 [346937]	17.19 %
obs	157	109	21	
No IMSS	15667.64 [55419.87]	17130.89 [44959.69]	34753.29 [112055.3]	22.5 %
obs	2679	1719	357	

The possibility of a co-defendant clearly produces asymmetries in the payoffs of the two parties involved. This situation may allow the worker to reach a settlement under more favorable terms. Although naming IMSS as co-defendant may seem to be an attractive option for workers, only a very small proportion of the cases presented to this court have a co-defendant, and of these cases not all workers reach a settlement. In the following section we present a model to help understand this situation.

4. Model

Consider two players, the worker Π , and the firm Δ , both risk neutral. The worker's possible actions are: involving IMSS in the lawsuit or not *IMSS*, *NoIMSS*, and making a settlement offer $s \in [0, \infty)$ to the firm. The set of the firm's possible actions is {settlement, trial} depending on whether the firm accepts or rejects the worker's offer s . The sequence of events is as follows:

- Nature decides the type of firm, i.e. if Δ will be immune or not, $\{\Delta_I, \Delta_N\} = \Theta$, to the involvement of the IMSS in the lawsuit. Only the firm knows its type. The probability of the firm being non-immune to the IMSS, $\Pr(\Delta_N) = p$, is common knowledge. Note that the immunity of lack thereof of the firm is the only source of uncertainty in this model.
- The worker Π has to decide between naming IMSS as co-defendant, with a cost $c_\Pi > 0$, or not.
- Once the decision to involve IMSS or not is made, the worker makes a settlement offer s .

- If the firm accepts s the parties settle and the game ends. The worker receives s and the firm pays s . If the firm rejects the offer they go to court and both parties pay a trial cost j_Π , $j_\Delta \geq 0$.
- When IMSS is co-defendant and the parties go to a trial, an immune firm pays $w + j_\Delta > 0$, and a non-immune firm pays $A + w + j_\Delta \geq 0$ where $A > c_\Pi$.
- When the worker chooses to involve IMSS, regardless of whether or not the firm is immune, at trial the worker receives $w - j_\Pi - c_\Pi$ ⁵
- In case of a trial in a case without IMSS as co-defendant, the worker receives $w - j_\Pi$ and the firm pays $w + j_\Delta$.

The following diagram shows the extensive form of this game:

To solve this game we use the concept of Bayesian Nash Equilibrium, in which the plaintiff plays against two potential “types” of the defendant, the immune type and the non-immune type. To arrive at the game’s solution, consider the following propositions.

Proposition 1: If $p < \frac{j_\Delta + j_\Pi + c_\Pi}{j_\Delta + j_\Pi + A}$, \exists a BNE in which Π does not involve the IMSS and makes an offer $s = w + j_\Delta$. Both Δ_N and Δ_I accept the settlement offer if $s \leq w + j_\Delta$ and reject if $s > w + j_\Delta$.

If the worker decides to name IMSS as co-defendant, she can make two potential offers to the firm, a high offer which only a non-immune firm will accept, and a low offer which both types of firms will accept. With a larger offer, the worker may end up at trial and will pay litigation costs. Under the same condition in proposition 1, even if the worker calls IMSS as co-defendant, she will prefer to make a low offer; however, in this case paying the cost of notifying IMSS has no benefits, and therefore the worker would not call on IMSS in the first place. This leads us to the next proposition.

Proposition 2: If $p \geq \frac{j_\Pi + j_\Delta + c_\Pi}{j_\Pi + j_\Delta + A}$ \exists a BNE in which Π involves the IMSS and makes an offer $s = A + w + j_\Delta$. Δ_N accepts to *settle* if $s \leq A + w + j_\Delta$ and Δ_I *settles* only if $s \leq w + j_\Delta$

This proposition states that if the probability of facing a non immune firm is high enough, it will be more attractive to the worker to make an offer that considers the asymmetry generated by the co-defendant. The immune type firm will settle only with a small offer, and will reject all larger offers, resulting in a trial with litigation costs for both parties. Given that the possibility of facing a non immune firm is high, the worker will prefer to make a larger offer, in order

⁵The asymmetry is captured by the parameter A ; the greater the punishment IMSS can impose on a firm, the larger A is. A is considered to be independent of the size of the worker’s claim because it is likely to depend heavily on the number of other unregistered workers the firm has.

to benefit from the asymmetry in payoffs, and for the same reason the worker will prefer to name IMSS as co-defendant.

4.1. Comparative Statistics

The equilibria described above show that the decision rule chosen by the worker depends on the probability of the firm being immune to IMSS. Given litigation costs, the size of the asymmetry, and the cost of having a co-defendant, the worker has a critic value p^* to compare with the probability of a firm being immune.

In other words, let

$$p^* = \frac{j_{\Delta} + j_{\Pi} + c_{\Pi}}{j_{\Delta} + j_{\Pi} + A}$$

Then the effect of the cost of involving IMSS, c_{Π} , on the critic value p^* is:

- let $c_{\Pi} > 0$

Then the partial derivate respect to c_{Π} is:

$$\frac{\partial p^*}{\partial c_{\Pi}} = \frac{1}{j_{\Delta} + j_{\Pi} + A} > 0$$

Therefore, the larger the cost of naming a co-defendant, the higher is the probability of a non immune firm which is needed to reach an equilibrium with a co-defendant and a larger settlement offer $s = A + w + j_{\Delta}$

The impact of litigation costs of the parties on the critic value p^* is:

- j_{Π} or $j_{\Delta} > 0$

$$\frac{\partial p^*}{\partial j_{\Pi}} = \frac{A - c_{\Pi}}{(j_{\Delta} + j_{\Pi} + A)^2} = \frac{\partial p^*}{\partial j_{\Delta}} > 0$$

This implies that the higher litigation costs, regardless of whose costs they are, the higher is the probability of a non immune firm which is needed to reach an equilibrium with a co-defendant and a larger settlement offer $s = A + w + j_{\Delta}$

The effect of the asymmetry of stakes on p^* is

$$\frac{\partial p^*}{\partial A} = \frac{-(j_{\Delta} + j_{\Pi} + c_{\Pi})}{(j_{\Delta} + j_{\Pi} + A)^2} < 0$$

The bigger the asymmetry of stakes, the more attractive the benefits for the worker of involving IMSS as co-defendant. Thus a lower probability of a firm being immune is needed for an equilibrium with an offer $s_{NI} = A + w + j_{\Delta}$ and a co-defendant.

5. Empirical Evidence

The model’s implications are that among workers who reach a settlement, those who decided to involve the IMSS obtain a larger settlement than those who do not. Similarly when a worker faces an immune firm and makes a large settlement offer, she goes to court and receives a smaller payoff due to litigation costs. So we would expect that those employees who include IMSS in their suits and later go to court receive smaller payoffs than those who settle or who have no co-defendant.

Suppose that the amount received by a worker after the litigation process is a linear function of factors specific to each individual

$$y_i = \beta_0 + \beta_1 lclaim + \beta_2 female + \beta_3 tenure + \beta_4 settle \cdot codemimss + \beta_5 trial \cdot codemimss + \epsilon_i$$

where y_i is the logarithm of the final amount collected by the worker after the lawsuit⁶, β_0 is a constant, $lclaim$ is the logarithm of worker’s initial demands, $female$ is a dummy variable that equals to 1 if the worker is a woman, and $tenure$ is the number of years the individual worked for the firm. Given that the model predicts contrary effects of co-defendant presence, depending on whether the lawsuit ends as a settlement or a trial, we use as interactive terms as regressors. These are $settle.codemimss$, a dummy equal to 1 when the worker involves the IMSS and the parties reach a settlement, zero otherwise, and $trial.codemimss$, a dummy that equals to 1 when both parties go to court and the IMSS was a co-defendant, zero otherwise.⁷ Finally, ϵ_i is an individual measure error characteristic of every worker. In the error term we consider non-observable effects like the attitude of the judge towards specific cases. Given that cases are assigned randomly to judges, this error should have no relation with the other explanatory variables.

The ability of the lawyer is another factor considered in the error term, which is related to the amount requested by the worker, because a more experienced or better lawyer might have a better understanding of the law and therefore could ask for more (or less) compensation in the initial demand. For this reason and in order to avoid inconsistent parameter estimates, we will instrument for the logarithm of the worker’s claim by using the logarithm of the minimum legal claim.⁸ For the following statistical work those observations in which the

⁶Logarithms were normalized to zero when the final award was zero

⁷Codemimss is a dummy equal to 1 every time the IMSS was named as co-defendant. Settlement is a dummy that takes the value of 1 if the termination mode is a settlement, similarly for the dummy Trial.

⁸We compute the “minimum legal claim” using facts that are easily verifiable such as worker salary and tenure. All elements of the claim that are difficult to verify such as unpaid fringe benefits or unpaid overtime are excluded from this measure. The lawyer’s strategy or ability should have a much larger impact on the elements of the claim that are excluded from this measure.

worker decided to drop the case were eliminated, because the model considers only cases in which the parties reached a settlement or went to court

Table II. Estimators for lclaim controlling by number of appearances

	OLS			
	All	≥ 2	≥ 3	≥ 4
lminclaim	0.945*** (0.017)	0.959*** (0.019)	0.945*** (0.021)	0.934*** (0.023)
female	-0.012* (0.007)	-0.010* (0.005)	-0.010* (0.006)	-0.047 (0.032)
tenure	0.025*** (0.003)	0.023*** (0.003)	0.023*** (0.003)	0.024*** (0.003)
codem_imss	0.156*** (0.037)	0.131*** (0.048)	0.103* (0.054)	0.110* (0.058)
_cons	0.998*** (0.170)	0.861*** (0.184)	1.006*** (0.202)	1.115*** (0.227)
obs	4934	2579	1910	1546
R^2	.713	.755	.740	.743

Standard Deviations in parenthesis, Heteroskedasticity allowed

for OLS, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, p is the p value

The use of the instrument described above is justified by the results of Table I, which estimates, through OLS, the log claim as a linear function of log of minimum claim, tenure, gender and whether the worker involved IMSS or not. The results are the following: On average, when the minimum claim increases by 1 %, the worker's initial claim increases by 0.94 %, everything else constant. The results show also that on average women make demands that are 10 % smaller in comparison to men's. The most important result, which justifies the use of this instrument, is that the model explains 67 % of the total variance in the data.

A very interesting fact highlighted by this regression is that workers who decide have a co-defendant demand on average 19.2 % more than workers who do not. Recall that the model showed that once the worker decided to involve IMSS, he should make a higher offer. Otherwise he would do better by making a lower offer without mentioning IMSS.

Tabla III. Regressor of log final reward

	lclaim		lminclaim		
	OLS	TOBIT	OLS	TOBIT	IV
lclaim	-0.371*** (0.088)	-0.521*** (0.081)			0.508*** (0.099)
lminclaim			0.611*** (0.116)	0.622*** (0.128)	
gen	-0.210 (0.146)	-0.246 (0.174)	0.059 (0.146)	0.073 (0.175)	0.061 (0.152)
tenure	0.107*** (0.016)	0.122*** (0.016)	0.054*** (0.017)	0.060*** (0.017)	0.059*** (0.017)
settleimss	1.426*** (0.219)	1.644*** (0.380)	1.171*** (0.212)	1.332*** (0.380)	1.133*** (0.215)
trialimss	-6.366*** (0.609)	-10.291*** (1.264)	-7.160*** (0.593)	-11.280*** (1.259)	-7.573*** (0.618)
_cons	11.548*** (0.929)	12.944*** (0.896)	1.611 (1.106)	1.259 (1.234)	1.910* (1.077)
obs	2205	2205	2204	2204	2204

Standar Deviations in parenthesis, Heteroskedasticity allowed
for OLS, *** p<0.01, ** p<0.05, * p<0.1, p is the p value

Table III shows regressions for log of final reward, using three estimation methods, OLS, TOBIT, and Instrumental Variables (second stage of 2SLS), instrumenting log of initial claim using log of minimum legal claim. The first two columns show estimators using log of initial claim, and the next two columns show the same estimators using log of minimum claim. The resulting estimators are similar and in most cases significant.

The last column using IV estimators shows that on average, an increase in the log claim of 1% increases the final compensation received by the worker by 0.5%. A 1% increase in tenure increases the final reward a 5.9%, while the effect of the interaction term between naming IMSS and settling is around 113% (approximately 7,233 more pesos). On the other hand going to court once the IMSS was named is associated to a decrease in the final reward of 757% (about 2,624 less pesos).

The equilibria of the model suggested that, under certain conditions over the probability of a firm being immune, have the IMSS as co-defendant and making a large settlement offer maximizes the expected utility of the worker. However,

when the sued firm is actually immune, a high settlement offer will be rejected and the amount received by the plaintiff in court will be smaller due to litigation costs. Using the interactive effect of IMSS and going to court, the data show evidence to support the hypothesis that workers who involve the social security administration and go to court generally do worse. On the other hand there is strong evidence showing that workers who settle once IMSS is involved do better, as predicted by the model.

Table IV. Logit Termination mode

	Settlement		Trial		Dropped
	DI	DE	DI	DE	DI
lclaim	-0.032 (0.021)	-0.059** (0.029)	0.055** (0.028)	0.059** (0.029)	-0.000 (0.024)
gen	-0.008 (0.026)	-0.036 (0.022)	0.044** (0.022)	0.036 (0.022)	-0.084 (0.065)
tenure	-0.000 (0.000)	0.000 (0.001)	-0.001 (0.001)	-0.000 (0.001)	0.001*** (0.000)
codem_imss	0.243** (0.118)	0.126 (0.160)	-0.037 (0.156)	-0.126 (0.160)	-0.298** (0.141)
_cons	0.708*** (0.218)	1.922*** (0.300)	-2.223*** (0.286)	-1.922*** (0.300)	-1.094*** (0.254)
obs	5486	4150	5486	4150	5486

Standard Deviations in parenthesis, Heteroskedasticity allowed for OLS, *** p<0.01, ** p<0.05, * p<0.1 , p is the p value

Table III shows logit regressions for termination mode, given characteristics of the observed cases. The results are consistent with those of Kaplan, et. al. (2008). Estimates with the lclaim label were obtained using lclaim as an explanatory variable, while the columns under the title lminclaim are regressions using log of minimum legal claim instead of log of claim; the results are the following: For the average individual, a marginal increase in the initial demand

decreases the probability of settlement by 4.3 %, controlling for log claim, but when controlling for log minimum claim this probability decreases by only 1.5 %. Similarly for the average worker a 1 % in tenure raises the probability of settlement by 2.5 %, and the presence of IMSS as co-defendant increases that same probability by 10.9 %, both results controlling for log claim. For those cases

that went to court, a small increase in the initial amount requested by the average worker, everything else constant, increases the likelihood of settling by 6 %

(controlling for log min claim the effect is only 2.6 %). Another result is that a marginal increase in the number of years worked increases the probability of a settlement 0.1 %. The effect of naming IMSS as a co-defendant is statistically significant in increasing the likelihood of a settlement. For dropped cases the

results of both regressions yield the following results: for the average individual of the population, *caeteris paribus*, a small increase in the worker's initial offer increases the likelihood dropping by 2.4 % (the effect of an increase in the minimum legal claim is 2.6 %); on the other hand, a marginal increase in tenure decreases the probability of dropping the case by 1.4 %. The same probability decreases 6.1 percent if IMSS is involved, in both regressions. According to the

model, a decisive factor for a worker to choose the best strategy to follow in the lawsuit is the probability of the firm being non-immune to possible actions taken by IMSS. The equilibrium described above implies that when this probability is low, workers prefer not to involve IMSS and reach settlement with smaller rewards. Whereas when the plaintiff believes that this probability is high, she prefers to join the social security administration to the lawsuit and make a larger settlement offer, so in case of settlement she receives more compensation. We

can assume that the plaintiff knows the conditions under which she used to work for the defendant, specifically those related to social security benefits. However, the worker does not necessarily know whether other employees of the firm were duly and regularly registered. Also, the worker may not know the relationship between the firm and the social security authority. For empirical purposes we would like to have a measure of the probability of a firm being immune to IMSS' actions, but such data does not exist. However, we believe larger firms are less likely to be immune to IMSS actions (IMSS is more likely to mandate an inspection of a relatively large firm that is accused in a lawsuit of not registering its workers correctly). As a proxy of firm size, we use the number of times a firm appears in our database, since larger companies dismiss more workers and are therefore sued more often. Table V presents the results of regressions of the log

of final payment using IV, taking into account the number of times a firm was sued in 2002 at the JCAVCT. The average number of times a company appears in the record is 3.77. Four subsamples were considered to measure the impact of the co-defendant on the compensation received by a worker at the end of a lawsuit: firms with at least two, three, four, and five appearances in the data. The results of the regressions are as follows: the coefficient of log claim lies between 0.401, and 0.281. This means that on average, if the claim of a worker increases by one percent the final payment she receives increases by 0.40 % for workers who sued companies with at least 2 appearances, at significance level of 99 %, 0.29 % for companies with at least 3 appearances, and 0.32 % for firms sued at least four times in 2002, both estimators with a significance level of 90 %. The results for the effects of tenure range from a 10.4 to a 11.5 percent, raising the final reward of workers by 10.4 %, 10.9 %, 11.1 % and 11.5 % for companies with at least 2, 3, 4 and 5 appearances respectively.

Table V: lreward by number of appearances

	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	≥ 2		≥ 3		≥ 4		≥ 5	
lclaim	0.527*** (0.059)	0.674*** (0.090)	0.490*** (0.070)	0.714*** (0.110)	0.467*** (0.078)	0.684*** (0.130)	0.467*** (0.078)	0.837*** (0.169)
gen	-0.131*** (0.020)	-0.108*** (0.017)	-0.131*** (0.019)	-0.107*** (0.015)	-0.214 (0.191)	-0.064 (0.204)	-0.214 (0.191)	0.061 (0.231)
tenure	-0.005*** (0.002)	0.050*** (0.014)	-0.005*** (0.002)	0.052*** (0.017)	-0.007*** (0.002)	0.059*** (0.019)	-0.007*** (0.002)	0.050* (0.026)
setimss	0.833*** (0.215)	1.071*** (0.209)	0.719*** (0.270)	1.042*** (0.247)	0.934*** (0.269)	1.330*** (0.226)	0.934*** (0.269)	1.347*** (0.275)
trimss	-6.577*** (0.582)	-6.411*** (0.522)	-6.460*** (0.652)	-6.251*** (0.569)	-6.936*** (0.582)	-6.675*** (0.459)	-6.936*** (0.582)	-6.444*** (0.462)
_cons	2.472*** (0.601)	0.640 (0.908)	2.861*** (0.719)	0.197 (1.118)	3.129*** (0.804)	0.445 (1.331)	3.129*** (0.804)	-1.227 (1.720)
obs	2007		1495		1228		965	

Standard Deviations in parenthesis, Heteroskedasticity allowed for OLS, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, p is the p value

The effect on final compensation of involving IMSS when the parties reach a settlement is, on average, 93.3 %, 162.9 %, 156 % and 170.7 % higher compared to those workers that do not involve IMSS or whose termination mode is not a settlement. In monetary terms the effect is \$5,814.47, \$12,559.48, \$11,852.64 and \$11,022.36 pesos of additional final compensation, for companies with at least 2, 3, 4 and 5 appearances in the database. In cases in which the parties go to court once the co-defendant got involved, on average workers receive rewards 7.02, 6.30, 5.85 and 5.57 times lower than those workers who don't go to court or who don't have IMSS as co-defendant; in monetary terms, this implied \$2,728.22, \$2,617.03, \$2,604.13 and \$2,066.28 pesos less of final compensation, for companies with at least 2, 3, 4 and 5 appearances respectively. One would

expect that companies whose probability of being affected by IMSS is very large would reach an agreement more quickly, to avoid the process lasting long enough for them to be inspected by the co-defendant. Table VI shows the effect of IMSS' presence on the length of the whole legal process, measured in years, controlling by gender, log claim, and tenure. We control for the firm's number of appearances in the data and distinguish between the effect of the co-defendant

in two categories, separating between interactive effects with the mode of termination (IE) and total effects (TE) that measure the effect of IMSS' presence in the lawsuit regardless of the mode of termination.

The results show that on average, a marginal increase in the worker's initial claim increases the duration of the legal process between 0.54 and 1.35 years for companies with at least one (0.54), two (0.82), three (1.19) and four (1.35) appearances, these results are obtained when controlling for interactive effects, while controlling for the overall effect of involving the IMSS, the same change in worker's claim has an effect on the duration of 0.56, 0.82, 1.20 and 1.35 additional years.

An interesting result is that on average the lawsuits filed by women last between 61.14 and 55.43 more days for companies with at least two and three appearances respectively, and controlling for interactive effects. Controlling for the total effect of IMSS' presence, lawsuits filed by women last on average between 59.55 and 53.47 more days than men's lawsuits.

Table VI. Duration of the lawsuit given number of appearances Instrumental Variables

	≥ 1		≥ 2		≥ 3		≥ 4	
	IE	TE	IE	TE	IE	TE	IE	TE
lclaim	0.105*** (0.023)	0.103*** (0.023)	0.086*** (0.027)	0.083*** (0.027)	0.087*** (0.033)	0.084** (0.033)	0.095** (0.041)	0.091** (0.040)
gen	0.031*** (0.010)	0.031*** (0.010)	0.041*** (0.005)	0.041*** (0.005)	0.038*** (0.005)	0.038*** (0.005)	-0.005 (0.065)	-0.005 (0.065)
tenure	-0.004 (0.004)	-0.004 (0.004)	-0.002 (0.003)	-0.002 (0.003)	-0.003 (0.004)	-0.003 (0.004)	-0.004 (0.006)	-0.004 (0.006)
setimss	-0.212*** (0.055)		-0.162** (0.067)		-0.297*** (0.057)		-0.382*** (0.058)	
trimss	0.929*** (0.200)		0.518*** (0.184)		0.424** (0.197)		0.046 (0.085)	
codeimss		0.002 (0.066)		-0.031 (0.069)		-0.130* (0.070)		-0.280*** (0.056)
_cons	-0.170 (0.226)	-0.147 (0.226)	-0.030 (0.268)	-0.001 (0.267)	-0.051 (0.333)	-0.012 (0.333)	-0.082 (0.405)	-0.039 (0.401)
obs	3742		2009		1496		1228	

Standar Deviations in parenthesis, Heteroskedasticity allowed for OLS, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, p is the p value

Having IMSS as co-defendant when the parties reach a settlement has a negative impact on the lawsuit length, however this result is only significant for firms with at least two appearances, resulting in lawsuits 54.60 days shorter than those cases that do not reach an agreement and that didn't involve the social security authority. When looking at the total effect of having a co-defendant on the duration of the process, this turns out to be positive only when considering the whole sample, while the total effect is negative for lawsuits against companies with more than two appearances (although this result is not statistically significant).

Estimators that measure the effect of having IMSS as co-defendant whenever the parties decide to go to court imply that, on average, the lawsuit's length is between 302.40 and 520.18 days longer, in comparison with those cases where the worker does not involve IMSS or settles. These results are significant for the entire sample as well as for companies with at least two appearances. For the rest of cases the estimates are positive but not significant. This situation may be explained by the fact that small firms or high quality firms know they are not attractive for IMSS inspections, so that the asymmetry of stakes introduced by the worker is not a real threat, therefore the firm has few incentives to finish the process quickly. It may also be the case that incorrectly guessing the firm's likelihood of being immune is correlated with incorrectly guessing the value of one's lawsuit, so that workers who use the threat of a co-defendant unsuccessfully also tend to have overall lower quality cases.

Conclusion

The possibility of involving the IMSS as a co-defendant in a labor lawsuit is a bargaining tool for workers. For the defendants the possibility of the IMSS taking legal or administrative action against them, like payment of fines or penalties, introduces asymmetries in the bargaining stakes between the parties, making the firm's stake larger while keeping constant the stake of the worker. Intuitively, the possibility of being punished by the IMSS motivates some defendants to reach settlements more quickly in order to avoid notification of the co-defendant, although reaching a faster settlement will require giving more compensation to the worker.

The model presented in this paper, while simple, is successful in explaining some of the key results from the data. For example, the effect over the final award when a worker reaches a settlement and the IMSS is a co-defendant is on average \$7.233 more final compensation as compared with those workers who do not reach an agreement or who do not involve the IMSS. Similarly when the Institute figures as co-defendant and for some reason the parties reach the court, the worker gets on average \$2.624 pesos less than those workers who either do not reach a trial or do not involve the Social Security Institute. Some of the

most robust results of the statistical work are that once IMSS is involved, the possibility of reaching an agreement increases by ten percent, for the average individual of the sample, and similarly the presence of the co-defendant reduces the propensity of dropping by six percent. Other important results are those in

Tables V and VII, that show that workers who sue firms listed in the database more than twice, in case of reaching a settlement obtain, on average, between \$5,814.47, and \$12,559.48 more when the IMSS is a co-defendant, than those employees who do not reach an agreement or do not involve the IMSS, everything

else constant. Similarly workers who go to court when the IMSS is involved, on average, receive rewards significantly lower (between \$2,728.22 and \$2,604.13 less) than those workers who do not have a co-defendant or who do not reach the court. The model's main drawback stems from the fact that it assumes only

one dimension of uncertainty, about the immunity of the firm to IMSS actions, or lack thereof. The model thus ignores the basic uncertainty about the value of one's case, which in the Bebchuk setup results in some plaintiffs going to court. In this paper's model, with a low enough probability of the firm being non-immune to IMSS, the worker should not name a co-defendant, and should also make a settlement offer low enough that any firm would accept it. Hence, in such situations we would not observe workers and firms going to court. In the data, this is simply not true, as many of the cases in which the IMSS is not co-defendant DO end up in court. In order to make the correct predictions about these cases, the model needs to be extended to allow for another dimension of uncertainty. The second weakness of this model is that it does not deal with dropped cases, and the empirical evidence suggests that dropping the case and naming IMSS as co-defendant are jointly determined to a certain extent. Both of these weaknesses can be remedied and will be the subject of future work. However, despite its limitations, the model's main implications prove to be true in the data, and serve as a test of the implications of endogenous asymmetry of stakes in bargaining models with asymmetric information.

Appendix 1: Bayesian Nash Equilibrium

Proposition 1: If $p < \frac{j_{\Delta} + j_{\Pi} + c_{\Pi}}{j_{\Delta} + j_{\Pi} + A}$, \exists a BNE in which Π does not involve the IMSS and make an offer $s = w + j_{\Delta}$. Δ_N accepts if $s \leq w + j_{\Delta}$ and Δ_I accepts if $s \leq w + j_{\Delta}$

Proof: Suppose that the firm, whatever its type, has to choose between *settle* or going to a *trial* at the information set in which the worker has involved the IMSS and made an offer s

Non Immune firm Δ_N compares both actions

$$u_{\Delta_N}(\textit{settle}, IMSS) = -s$$

and

$$u_{\Delta_N}(\textit{trial}, IMSS) = -A - w - j_{\Delta}$$

If $s \leq A + w + j_{\Delta}$ then

$$u_{\Delta_N}(\textit{settle}, IMSS) \geq u_{\Delta_N}(\textit{trial}, IMSS)$$

the firm would prefer a settlement over a trial.

Similarly for the immune firm Δ_I .

$$u_{\Delta_I}(\textit{settle}, IMSS) = -s$$

and

$$u_{\Delta_I}(\textit{trial}, IMSS) = -w - j_{\Delta}$$

If $s \leq w + j_{\Delta}$ then

$$u_{\Delta_I}(\textit{settle}, IMSS) \geq u_{\Delta_I}(\textit{trial}, IMSS).$$

This is a decision rule σ_{Δ} , that maximizes utility for both types of firms Δ_{NI}, Δ_I for any worker's offer s

The worker knows this decision rule and he will consider it to decide what offer to make to the firm. Worker's utility is strictly increasing in s , therefore the worker would ask for the largest possible amount to maximize his utility

let \hat{s} be the maximum amount a non immune firm Δ_{NI} is willing to accept to *settle* and let s be the worker's offer

- If $s > \hat{s}$

The firm will choose *trial* but given that $j_{\Pi}, j_{\Delta} \geq 0$ then:

$$u_{\Pi}(s, \textit{trial}) < u_{\Pi}(\hat{s}, \textit{settle})$$

$$A + \alpha w - j_{\Pi} - c_{\Pi} < A + w + j_{\Delta} - c_{\Pi}$$

$$0 < j_{\Delta} + j_{\Pi}$$

So the worker would prefer \hat{s} over s

- If $s < \hat{s}$

The firm will choose *settle* but clearly

$$u_{\Pi}(s, \textit{settle}) < u_{\Pi}(\hat{s}, \textit{settle})$$

So the worker would choose \hat{s} instead of s

Similarly if the worker is facing an immune firm Δ_I

Hence, the worker has two possible best responses, one for each type of firm. For a non immune firm

$$s_{NI} = A + w + j_{\Delta}$$

For an immune firm

$$s_I = w + j_{\Delta}$$

The worker know that s_{NI} will be accepted only by a non immune firm Δ_N , meanwhile s_I will be accepted by both types of firms Δ_I, Δ_N .

The worker Π , once he has IMSS as co-defendant, has to decide which offer make to the firm. The plaintiff will choose by comparing the expected utility of both possible actions considering the probability of the firm being immune Δ_I

The worker will compare

$$u_{\Pi}(s_{NI}, IMSS, \sigma_{\Delta}) = p(A + w + j_{\Delta} - c_{\pi}) + (1 - p)(w - c_{\Pi} - j_{\Pi})$$

and

$$u_{\Pi}(s_I, IMSS, \sigma_{\Delta}) = w + j_{\Delta} - c_{\Pi}$$

If it is true that⁹

$$p < \frac{j_{\Delta} + j_{\Pi}}{j_{\Delta} + j_{\Pi} + A}$$

Therefore

$$u_{\Pi}(s_{NI}, IMSS, \sigma_{\Delta}) < u_{\Pi}(s_I, IMSS, \sigma_{\Delta})$$

So the worker once he involved the IMSS would prefer to make an offer

$$s_I = w + j_{\Delta}$$

and get a payoff

$$u_{\Pi}(s_I, IMSS, \sigma_{\Delta}) = w + j_{\Delta} - c_{\Pi}$$

Suppose now, we are in the information set in which the firm must decide between *settlement* and *trial*, once the firm observes the worker has no IMSS as co-defendant and made an offer s .

In this situation both firms have the same payoff after choosing an action independently of its type

$$u_{\Delta}(settle, IMSS) = -s$$

and

$$u_{\Delta}(trial, IMSS) = -w - j_{\Delta}$$

If $s \leq w + j_{\Delta}$ then

$$u_{\Delta}(settle, IMSS) \geq u_{\Delta}(trial, IMSS)$$

⁹Appendix 2..

Thus the firm will prefer a *settlement* over a *trial*
 With this information the worker's best response is to offer

$$s_I = w + j_\Delta$$

This offer will be always accepted, given that the worker decides *NoIMSS*,

When the worker has to choose between *IMSS*, and *NoIMSS*, he will decide the action that maximizes his utility given the probability of facing an immune firm, as well as the strategies that both players would follow, when the IMSS is a co-defendant and when it is not

Hence the worker will compare:

$$u_\Pi(IMSS, s_I, \sigma_\Delta) = w + j_\Delta - c_\Pi$$

and

$$u_\Pi(NoIMSS, s_I, \sigma_\Delta) = w + j_\Delta$$

since $c_\Pi \geq 0$,

$$u_\Pi(IMSS, s_I, \sigma_\Delta) < u_\Pi(NoIMSS, s_I, \sigma_\Delta)$$

The worker Π , would prefer *NoIMSS* and make an offer $s = w + j_\Delta$. Firms, Δ_N y Δ_I *settle* whenever $s \leq w + j_\Delta$.

q.e.d.

Proposition 2: If $p \geq \frac{j_\Pi + j_\Delta + c_\Pi}{j_\Pi + j_\Delta + A} \exists$ a BNE in which the worker Π , involves the *IMSS* and makes an offer $s = A + w + j_\Delta$. Δ_N prefers a *settlement* if $s \leq A + w + j_\Delta$ and Δ_I , *settles* if $s \leq w + j_\Delta$

Proof: Suppose the firm must to choose between a *settlement* and *trial* once the firm observes the worker involved the *IMSS* and made an offer s . Similarly to Proposition 1, both types of firms Δ_I y Δ_N would prefer a *settlement* rather than going to a *trial* if:

Non immune firms, Δ_N will *settle* if

$$s \leq A + w + j_\Delta$$

Immune firms Δ_I will *settle* if

$$s \leq w + j_\Delta$$

The worker, knowing the behavior of both types of firms. will claim

$$s_{NI} = A + w + j_\Delta$$

for a non immune firm and

$$s_I = w + j_\Delta$$

for an immune firm. Being certain that s_{NI} will be accepted only by non immune firms and that s_I will be accepted by both firms Δ_N y Δ_I

therefore, once *IMSS* was involved, the worker will choose between s_{NI} and s_I . Since

$$p > \frac{j_\Pi + j_\Delta + c_\Pi}{j_\Pi + j_\Delta + A}$$

and given that $c_\Pi \geq 0$, it follows that

$$p \geq \frac{j_\Delta + j_\Pi}{j_\Delta + j_\Pi + A}$$

hence it is true that:

$$u_\Pi(s_I, IMSS, \sigma_\Delta) \leq u_\Pi(s_{NI}, IMSS, \sigma_\Delta)$$

So Π would prefer make an offer $s_{NI} = A + w + j_\Delta$

If the plaintiff chooses *NoIMSS* his best response is $s = w + j_\Delta$

The worker knows how each type of firm would behave when facing any of his offers, so he have to choose between *IMSS* and *NoIMSS*; to decide he will compare:

$$u_\Pi(IMSS, s_{NI}, \sigma_\Delta) = p(A + w - c_\Pi + j_\Delta) + (1 - p)(w - c_\Pi - j_\Pi)$$

and

$$u_\Pi(NoIMSS, s, \sigma_\Delta) = w + j_\Delta$$

If¹⁰

$$p \geq \frac{j_\Delta + j_\Pi + c_\Pi}{j_\Delta + j_\Pi + A}$$

It follows that

$$u_\Pi(IMSS, s_{NI}, \sigma_\Delta) \geq u_\Pi(NoIMSS, s, \sigma_\Delta)$$

Thus, Π chooses to involve the *IMSS* and make an offer $s_{NI} = A + a + j_\Delta$. Non immune firms *settle* if $s \leq A + w + j_\Delta$, while Δ_I *settle* only if $s \leq w + j_\Delta$.

q.e.d.

¹⁰Appendix 2

Appendix 2: Algebra

1. Utility of s_{NI} and s_I once the IMSS is a co-defendant

$$\begin{aligned}
 & u_{\Pi}(s_{NI}|IMSS, \sigma_{\Delta}) < u(s_I|IMSS, \sigma_{\Delta}) \Leftrightarrow \\
 & p(A + w + j_{\Delta} - c_{\pi}) + (1 - p)(w - c_{\Pi} - j_{\Pi}) < w + j_{\Delta} - c_{\Pi} \Leftrightarrow \\
 & p(w + j_{\Delta} - c_{\Pi}) + (1 - p)(w - j_{\Pi} - c_{\Pi}) + pA < w + j_{\Delta} - c_{\Pi} \Leftrightarrow \\
 & p(j_{\Delta} + j_{\Pi} + A) - j_{\Pi} < j_{\Delta} \Leftrightarrow \\
 & p(j_{\Delta} + j_{\Pi} + A) < j_{\Delta} + j_{\Pi} \Leftrightarrow \\
 & p < \frac{j_{\Delta} + j_{\Pi}}{j_{\Delta} + j_{\Pi} + A}
 \end{aligned}$$

2. Utility of no co-defendant

$$\begin{aligned}
 & u_{\Pi}(NoIMSS|s_I) \leq u_{\Pi}(IMSS|s_{NI}) \Leftrightarrow \\
 & w + j_{\Delta} \leq p(A + w - c_{\Pi} + j_{\Delta}) + (1 - p)(w - c_{\Pi} - j_{\Pi}) \Leftrightarrow \\
 & j_{\Delta} \leq p(j_{\Delta} + j_{\Pi} + A) - c_{\Pi} - j_{\Pi} \Leftrightarrow \\
 & j_{\Delta} + j_{\Pi} + c_{\Pi} \leq p(j_{\Delta} + j_{\Pi} + A) \Leftrightarrow \\
 & \frac{j_{\Delta} + j_{\Pi} + c_{\Pi}}{j_{\Delta} + j_{\Pi} + A} \leq p
 \end{aligned}$$

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