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The Distributive Impact of Reforms in Credit Enforcement: Evidence from Indian Debt Recovery Tribunals

*Ulf von Lilienfeld-Toal (Stockholm School of Economics), Dilip Mookherjee (Boston University) and Sujata Visaria (Boston University)

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Ulf von Lilienfeld-Toal†
Dilip Mookherjee‡
Sujata Visaria§

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Abstract

It is generally presumed that strengthening legal enforcement of lender rights increases credit access for all borrowers, by expanding the set of incentive compatible loan contracts. This is based on an implicit assumption of infinitely elastic supply of loans. With inelastic supply, strengthening enforcement generates general equilibrium e ects which reduce credit access for small borrowers while expanding it for wealthy borrowers. We find evidence from a firm-level panel data set of such adverse distributional impacts of an Indian judicial reform which increased banks' ability to recover non-performing loans in the 1990s.

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†Stockholm School of Economics
‡Boston University
§Boston University

1 Introduction

One of the many contexts where the views of economists diverge from popular opinion involves bankruptcy law and the enforcement of credit contracts. Laws or institutions which weaken the rights of lenders to appropriate secured assets of borrowers when they default are popularly justified on grounds of distributional fairness. Economists, on the other hand, generally believe that weakening lenders rights adversely affects the functioning of credit markets through associated *ex ante* incentive effects. If lenders cannot seize collateral when borrowers default, borrowers cannot credibly commit to repay their loans. As a consequence, lending involves a high level of risk, causing lenders to charge high interest rates, lowering access to credit particularly for poor borrowers. The economists' argument is that apart from impairing the efficiency of credit markets, weak enforcement ends up hurting the poor by limiting their access to credit and raising its cost. More generally, it is argued that strong enforcement

the credit-worthiness of borrowers, and shifts outwards the incentive-constrained demand function for credit. We call this the partial equilibrium (PE) effect. However, the increased demand for credit increases the equilibrium profit rate earned by lenders, which means a rise in the cost of credit. This GE effect causes a reduction in credit granted, opposite to the direction of the PE effect. Since the reform operates on the borrower's collateral, the PE effect is (proportionately) greater for wealthier borrowers, while the GE effect affects all borrowers uniformly. As a result, wealthier borrowers experience larger PE effects, which overwhelm the GE effect, enlarging their access to credit. On the other hand, the poorest borrowers experience an increased cost of credit, and lose credit access. In this way, the reform in enforcement can result in a redistribution of credit, if the supply of credit is sufficiently inelastic.

We investigate this issue empirically by analyzing the distributive effect of the Indian legal reform studied previously in Visaria (2009). In this reform, new specialized institutions called debt recovery tribunals (DRTs) were set up to reduce delays in debt recovery suits, and strengthen the rights of lenders to recover the assets of defaulting borrowers. The DRTs were established at different times in different states, allowing us to exploit state-time variation to identify the effect of the reform. We show that the reform increased credit access for large borrowers, but decreased credit access and raised its cost for small borrowers, consistent with the general equilibrium effects postulated by our theoretical model.

The empirical analysis uses a firm-level panel data set collected by the Centre for Monitoring the Indian Economy (CMIE).[3] The data set contains detailed information on both financial and real variables for this firm, which allows us to examine the effect of the reform on firms' borrowing as well as the real effects on its fixed assets, profits and wage bill. We find that the reform reduced borrowing for the bottom three quarters of firms organized by asset size, and raised it for the top quarter. We additionally find parallel effects on fixed assets, profits and wage bills. Interest payments rose relative to borrowing, especially for small firms. These results obtain after controlling for borrower fixed effects, size-specific year dummies and state-specific time trends.

We subsequently examine competing explanations for these distributional effects of DRTs. Any factor of production (such as labor) with inelastic supply can generate general equilibrium effects with distributive consequences. For example, if labor were scarce, then the increased demand for credit and increased production caused by DRTs would raise the wage rate. If small firms were relatively more labor intensive, a rise in the wage rate would cause their output and profits to contract. For large firms, the relaxation of the credit constraint can out-

those involving borrower exemption limits (as in US law). Changes in exemption limits are fundamentally different from changes in enforcement: a lowering of exemption limits results in an equal absolute increase in borrower liability, whereas strengthening enforcement results in a higher increase in liability for wealthier borrowers. Therefore, lowering the exemption limit increases relative credit access for poor borrowers, whereas strengthening enforcement *a la* DRTs reduces it.

[3]The advantage of using this rather than the dataset in Visaria (2009) is that it includes all publicly listed Indian firms, their borrowings from all sources rather than a single one, as well as various measures of firm performance such as fixed assets, secured borrowing, profits, and salary costs. Nevertheless, as will become clear later, we draw upon some of her results to justify assumptions underlying our empirical analysis and the identification strategy. Moreover, the results we find in this paper turn out to be similar when we use her data-set as well. In fact, earlier versions of this paper used that data-set instead of the CMIE database.

weigh the rise in the wage rate to yield an expansion in output and profit.[4] However, this fails to explain observed patterns for the wage bill, borrowing and capital stocks. We find a significantly negative effect on wage bills, both on average and for firms in the first two quartiles. This suggests that wage rates fell as a result of DRTs, and that their adverse effects extended to workers as well.[5] We show that it also fails to explain the redistribution of capital assets and borrowing levels.

An alternative explanation for observed redistribution of borrowing and capital assets is that strengthening lender rights reduces the insurance value of default (Gropp *et al* (1997), Bolton and Rosenthal (2002), Perri (2007) or Vig (2005)). In other words, when their projects fail, small risk-averse borrowers benefit from default. Making default more costly thus lowers their *ex ante* demand for credit, which can explain the adverse distributional effects observed in the Indian context. In contrast to our model, this approach is based on the assumption that loan contracts are incomplete, with interest payments that are not state-contingent.[6] However, in this approach, strong enforcement also reduces the risk borne by lenders, which should have led to a fall in interest rates. In contrast, as noted above, small firms faced higher interest costs after DRTs were established. This finding cannot be explained by the incomplete contracting approach.[7]

We therefore conclude that the hypothesis of GE effects operating through the credit market provides a parsimonious explanation of effects observed for different firm-level variables, unlike hypotheses based on GE effects operating through other factor markets, or explanations that rely on the insurance value to borrowers of weak lender rights.

The paper proceeds as follows. Section 2 develops the theoretical model. Section 3 describes the Indian judicial reform that we study, 4 describes the data that we employ, followed by Section 5 which explains the empirical specifications used based on the theory. Section 6 presents the empirical results. In section 7 we consider alternative explanations of the empirical findings, and attempt to use the empirical findings to differentiate between the explanations. Finally, Section 8 concludes.

2 The Model

Consider an economy populated by risk neutral borrowers, differentiated by (collaterizable) fixed assets W, distributed according to cdf G over support $[\underline{\Omega}, \bar{\Omega}]$. Each borrower seeks to invest in a project at scale $\gamma \geq 0$. A project of scale γ requires upfront investments of $\gamma \cdot I$. It generates returns of $y \cdot f(\gamma)$, where $y \in \{y_s, y_f\}$ is a

[4] This is a modified version of the model in Biais and Mariotti (2006). In their model as well, the wage rate increases. But small firms benefit and expand, while the opposite is the case for large firms, which is not what we observe the effects of the Indian DRTs to have been.

[5] Labor market regulations in India make it difficult for Indian firms in the formal sector to lay off workers. So a fall in wage bill is unlikely to arise from sharply reduced employment following a rise in the wage rate.

[6] If loan contracts were state-contingent, borrowers whose projects fail could renegotiate their contract, and hence would not lower their demand for credit *ex ante* in response to stronger lender rights.

[7] To be sure, this is not evidence against the incomplete contracting approach *per se*, but rather against the particular version described by earlier authors which did not include any general equilibrium effects. We cannot reject a version which is based both on incomplete contracts and GE effects in the credit market.

borrower-specific productivity shock, and f is an increasing, continuously differentiable, S-shaped function with $\frac{f(\gamma)}{\gamma}$ rising until b and falling thereafter, for some $b \geq 0$. Hence $f'(\gamma)$ is rising over some initial range $(0, b')$ and falling thereafter, where $b' < b$. We assume the borrower does not have any liquid wealth to pay for the upfront investments. In contrast to von Lilienfeld-Toal and Mookherjee (2007), we simplify by abstracting from project moral hazard: the probability of success ($y = y_s$) is given and denoted e. It is useful to introduce

$$\bar{y} \equiv e \cdot y_s + (1 - e) \cdot y_f$$

2.1 Credit Contracts

A loan contract stipulates the amount borrowed ($\gamma \cdot I$), and the amount T_k to be repaid in state $k \in \{s, f\}$. We assume *contracts are complete* (CC) in the sense that the repayment obligation T_k can vary with the state $k \in \{s, f\}$. One can think of the payment T_s as corresponding to the stated or nominal interest rate, which the borrower is expected to repay in the event of success. In the event of failure, this interest obligation is scaled back in accordance with the borrower's ability to pay. One can think of this as a state in which the borrower defaults on the nominal obligation, followed by a subsequent adjustment of what the borrower is required to pay which is mutually agreed upon by the two parties. The two parties can anticipate in advance what this adjustment will be in state f.

Each borrower has the option of not honoring the loan agreement *ex post*. Should this happen, lenders can take the borrower to court, and thereafter expect to seize the fraction θ of *ex post* assets owned by the borrower. Ex post assets equal $W + \nu \cdot y_k \cdot f(\gamma)$, where $1 - \nu$ is the fraction of firm's returns diverted by the entrepreneur. We shall treat ν as a parameter and assume that $\nu < I/(\bar{y} \cdot \theta \cdot f'(b'))$. This limits the extent to which the returns from the project itself can serve as a significant source of collateral; the borrower's assets remain the primary source of collateral.

This formulation also assumes for simplicity that the assets financed by the loan cannot be seized by the lender: for instance, the loan finances working rather than fixed capital. This is inessential; later we shall consider an extension where the loan finances the purchase of fixed assets, a fraction of whose value can also be appropriated by the lender if they go to court.

The enforcement institution is represented by θ, incorporating delays and/or uncertainties in the legal process. Enforcement is affected by judicial reforms such as DRT. The main focus is thus on the effects of raising θ.

Should the entrepreneur honor the loan agreement, he obtains ex-post utility $W + y_k \cdot f(\gamma) - T_k$ in state $k \in \{s, f\}$. In contrast, utility in case of disagreement in state $k \in \{s, f\}$ is given as

$$(1 - \theta) \cdot [W + \nu \cdot y_k \cdot f(\gamma)] + (1 - \nu) \cdot y_k \cdot f(\gamma) - d$$

where d is an additional deadweight loss incurred by the borrower (for example, reputation loss or legal costs). The borrower will honor the agreement in state k if and only if

$$T_k \leq \theta[W + \nu \cdot y_k f(\gamma)] + d. \tag{IC_k}$$

It is a standard result that with complete contracting the loan agreement will always be honored, so the parties never actually go to court. For if they do, a Pareto-improving outcome can be generated with a revised loan agreement which lowers the repayment obligation in the failure state, so that the borrower is provided the incentive to honor the agreement. This avoids the deadweight losses associated with going to court. Hence the parties do not go to court on the equilibrium path. The enforcement institution affects the actual contract by determining the *ex post* outside option of the borrower, which affect the incentive constraints.[8]

2.2 Supply

We consider a 'competitive' supply of loans, represented by an upward sloping supply curve $L_s(\pi)$ of loanable funds, where π denotes the lender's expected return per rupee loaned.[9] We suppose that there is a nonnegative lower bound α to the return that lenders must be assured for there to be some supply of credit, i.e., $L_s = 0$ if $\pi < \alpha$ and $L_s > 0$ if $\pi > \alpha$. To avoid a vacuous analysis, assume that $\bar{y} \cdot f(b)/b > I(1+\alpha)$, i.e. some projects will be funded in the absence of any enforcement problems.

The elasticity of this supply function will play a key role in our analysis. We treat this as an empirical matter. According to one view, globalized financial markets guarantee an infinitely elastic supply of capital to any given economy, in which case $L_s = \infty$ for $\pi \geq \alpha$. In that case the profit rate will be pegged at α always. We shall refer to this case as involving *no GE effects*. An alternative view emphasizes that financial intermediaries need local knowledge to monitor loans, and argues that this local knowledge is in limited supply. In that case financial markets are not perfectly integrated, and the supply curve $L_s(\pi)$ has a finite elasticity. A limiting case of this is when the supply curve is perfectly inelastic: $L_s = \bar{L}$ for any $\pi \geq 0 = \alpha$. In either of these cases, the equilibrium profit rate π will be endogenously determined.

2.3 Demand

As a benchmark, we start with the *first-best* demand $\gamma^F(\pi)$ which solves

$$\max_{\gamma}[\bar{y}f(\gamma) - \gamma I(1+\pi)], \tag{FB}$$

with $\bar{y} \equiv ey_s + (1-e)y_f$.

[8]Modifications of the model to allow some asymmetric information or costs of state verification will yield the feature that with some probability the parties will actually go to court and incur costs of state verification. The current model can be viewed as a limiting case of such a setting where the extent of asymmetric information or costs of state verification are vanishingly small.

[9]The following micro-foundation for the supply function of credit can be given. A given lender incurs a loan monitoring (screening/collection) cost of c per rupee loaned, which has to be subtracted from the gross rate of return π on loans to obtain the net profit. Each lender is capacity constrained and a lender with monitoring cost c has capacity to lend up to $L(c)$. Monitoring costs are distributed according to a given distribution $H(.)$ over c. Hence, if the going rate of return on loans is π, lenders are only willing to lend if $c \leq \pi$. As a result, $L_s(\pi) \equiv \int_0^{\pi} L(c)dH(c)$.

However, the *first-best* is not always implementable due to the no-default incentive constraint (IC). The relevant demand thus takes these constraints into account:

Definition 1 *In a π-incentive compatible loan contract, each borrower i with assets W demands credit $\gamma_i(W, \theta, \pi)$ which solves*

$$\max_{\gamma, T_s, T_f} e[y_s f(\gamma) + W - T_s] + (1-e)[y_f f(\gamma) + W - T_f]$$

subject to

$$T_k \leq \theta[W + \nu y_k f(\gamma)] + d, k = s, f \tag{IC}$$

and

$$eT_s + (1-e)T_f \geq \gamma I(1+\pi) \tag{PC}$$

Aggregate incentive compatible demand for credit is then given as $L_d(\theta, \pi) = \sum_i \gamma_i(W, \theta, \pi)$.

If we add up the IC and PC constraints, it becomes clear that a project size γ is implementable if and only if

$$\theta[W + \nu \bar{y} f(\gamma)] + d \geq \gamma I(1+\pi). \tag{IC'}$$

Condition (IC') reduces to the existence of a credit ceiling. To see this, note that it can be rewritten as

$$\theta.W + d \geq \gamma I(1+\pi) - \theta.\nu \bar{y} f(\gamma). \tag{IC''}$$

The assumption that $\nu < I/(\bar{y} \cdot \theta \cdot f'(b'))$ implies that the right-hand-side of (IC") is increasing in project scale γ. In other words, since the returns on the project do not serve as a substantial source of collateral (owing to the low value of ν), larger project scales are more difficult to implement. A borrower with given wealth W will face a credit ceiling uniquely defined by the value of γ which solves the equality version of (IC"). We shall denote this project scale ceiling by $\gamma_i^H(W, \theta, \pi)$. It is increasing in W, θ, and decreasing in π.

To characterize the optimal demand for credit, the following definitions are useful:

Definition 2 *First best asset threshold: $W^F(\pi) \equiv \{\gamma I(1+\pi) - d\}/\theta - \nu \bar{y} f(\gamma^F)$.*

Maximum project size: $\gamma_i^H(W, \theta, \pi)$ which solves $\theta[W + \nu \bar{y} f(\gamma)] + d = \gamma I(1+\pi)$

Minimum project size: $\gamma^L(\pi)$ is the smallest solution to $\bar{y} \cdot f(\gamma)/\gamma = I \cdot (1+\pi)$

Minimum viable asset threshold: $W_L(\pi, \theta)$ solves $\gamma_i^H(W, \theta, \pi) = \gamma^L(\pi)$.

At a given profit rate π, it is clear that a firm will operate and gain access to a loan only if its maximum project size γ_i^H exceeds the minimum viable project scale γ^L. This translates into a wealth threshold W_L below which borrowers are excluded from the credit market altogether, which we call the minimum viable asset threshold.

Among the borrowers with wealth larger than W_L, those with sufficiently high wealth (we call this the first-best asset threshold, W^F) will operate at a scale equal to the first-best scale, and are not rationed. The remaining

borrowers, who have assets between W_L and W^F, obtain a loan but are rationed with regard to the scale of the loan.

This leads us to the incentive-constrained demand function for loans.

Lemma 3 *The incentive-constrained demand function for credit is*

$$\gamma_i(W,\pi;\theta) = \begin{cases} 0, & \text{if } W < W_L(\pi,\theta); \\ \gamma_i^H(W,\theta,\pi), & \text{if } W_L(\pi,\theta) < W < W^F(\pi); \\ \gamma^F(\pi), & \text{if } W > W^F(\pi). \end{cases}$$

2.4 Market Equilibrium

Next, we solve the market equilibrium in order to determine the equilibrium profit rate. We consider a competitive market for loan contracts and use a standard Walrasian equilibrium notion, where the profit rate is determined by the equality of aggregated supply and incentive-constrained demand:

Definition 4 *An incentive-constrained Walrasian allocation is a credit allocation in which each borrower receives his incentive-constrained demand corresponding to a profit rate π^*, which has the property that supply of loans at π^* equals incentive-constrained demand at π^* aggregating across all borrowers.*

It can be shown (along the lines of Lilienfeld-Toal and Mookherjee, 2007) that Walrasian allocations characterize stable allocations of a matching market between borrowers and lenders, under suitable assumptions on the distribution of lenders.[10]

Since market demand changes with θ, the equilibrium profit rate π^* will be a function of θ and denoted by $\pi(\theta)$ where required.

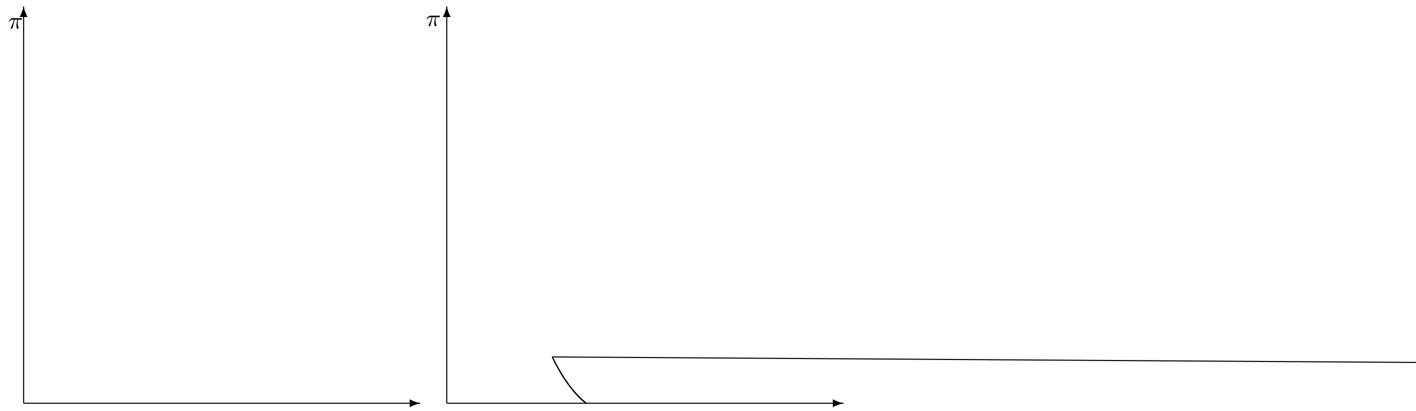
2.5 Effects of Increasing θ with No GE Effects

First, consider the case where the loan supply function is perfectly elastic. Then the equilibrium profit rate is fixed at α, and the equilibrium credit allocation is given by borrower demands evaluated at the profit rate α.

In this case the effect of raising θ is straightforward. See Figure 1. When θ increases, incentive constraints are relaxed, which permits an expansion of credit ceilings for every borrower. The proportion of firms excluded from the market must fall, as the minimum project scale does not change with θ. Borrowers who were previously credit-constrained will obtain larger loans, and thus attain higher payoffs. Those who were not constrained will be unaffected, and the same is true for lenders. The result is a Pareto improvement. Also, the distributional impact is favorable, since poorer borrowers gain access to credit. Borrowers are better off because every contract

[10] Specifically, a sufficient condition is the *Competitive Supply Assumption*, which states that for any lender with cost c and lending capacity $L(c)$, there exist other borrowers with cost at or below c with aggregate lending capacity of at least $L(c)$. For example, suppose there exist at least two lenders of any given "type". Then, Bertrand-like competition among lenders will cause the gross rate of return π on lending to be equal across all active lenders.

implementable under weak enforcement is also implementable under strong enforcement.[11] This is the basis of the conventional intuition concerning the benefits of strengthening enforcement institutions.



achieve the first-best scale, the credit allocated to every active borrower must have risen. This is not possible in equilibrium since the total supply of funds available is fixed.

Hence there must be a rise in the incidence of exclusion at the bottom end of the asset distribution, and those borrowers must be worse off. Since the aggregate supply of funds is fixed, there must exist wealthier borrowers who receive a larger supply of funds. Indeed, the argument above shows that there must exist a cutoff wealth level $\widehat{W}$ such that the credit level of borrowers with that wealth level is unaffected. For borrowers with wealth above $\widehat{W}$ credit expands, and for borrowers with wealth below $\widehat{W}$, credit contracts. Thus, there must be a regressive redistribution of credit across borrowers.

We summarize the preceding discussion as follows.

Proposition 6 *Suppose $\bar{\Omega} < W(\pi(1))$, $\nu = 0$, and supply is perfectly inelastic. If θ increases, the profit rate and the proportion of borrowers excluded rises. Moreover, there exists threshold asset size $\widehat{W}$ such that:*

(a) If $W < \widehat{W}$, credit falls, and the borrower is worse off

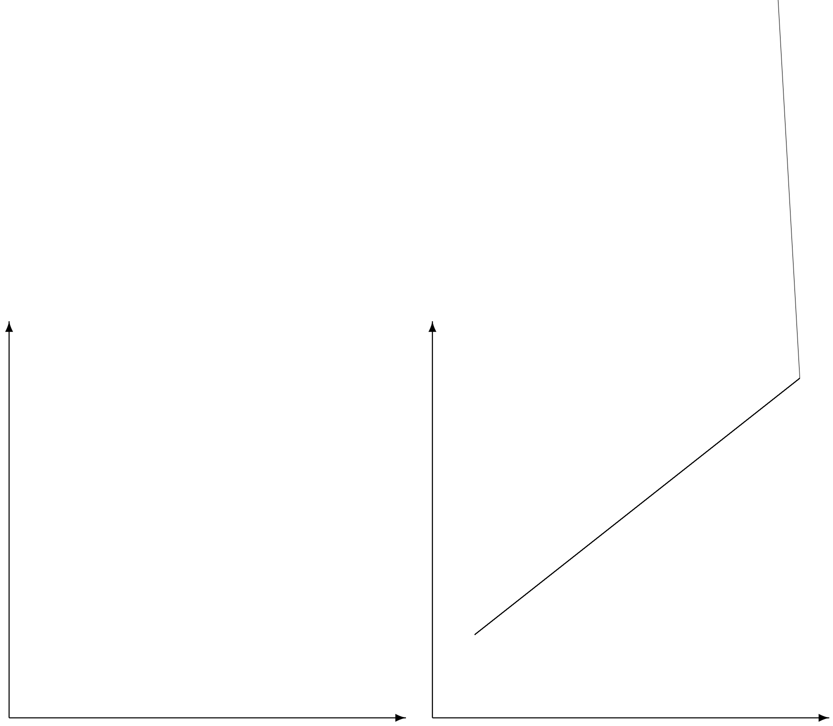
(b) If $W > \widehat{W}$, credit rises.

We now have a regressive redistribution of credit among the set of credit-constrained borrowers. The intuition underlying this result is depicted in Figure 2. On the right side of the figure, we see that aggregate demand increases which implies an increase in the equilibrium profit rate π^*. However, firms with different assets are differently affected, which is mirrored in the left side of Figure 2. The leftmost demand function corresponds to a firm with the smallest possible assets, i.e., $W = 0$. For a firm with zero assets, changing θ does not lead to a change in the demand for credit. Hence, the same function represents demand for credit, both before and after the reform.

In contrast to this, individual demand for firms with $W > 0$ shifts outward. The middle and rightward demand functions in the left side of figure 2 represent incentive compatible demand for the same firm with assets $W > 0$ both, before and after the change of θ. Demand prior to the change corresponds to the demand function in the middle of the left side of figure 2. This demand function is then shifted outward to the rightmost demand function in the left side of figure 2.

This asymmetric effect has the following implication for changes in equilibrium demand: The firm with $W = 0$ cannot benefit from the increase in θ and its demand curve is not shifted outward. At the same time, the firm now faces a higher profit rate. As a result, its demand for credit decreases from $\underline{\gamma}_1$ to $\underline{\gamma}_2$.

The firm with $W > 0$ does benefit from the increase in θ. As a consequence, its demand curve is shifted outward. It also faces a higher interest rate which potentially reduces demand. However, the outward shift of the demand curve dominates the profit rate effect and demand increases from $\bar{\gamma}_1$ to $\bar{\gamma}_2$. Hence, small firms receive less credit and large firms receive more credit due to the change in θ.



3 The Context: Debt Recovery Tribunals

We test our model's predictions by examining the effects of a judicial reform affecting credit contract enforcement, carried out in India in the 1990s. In the wake of the financial sector liberalization of the early 1990s, India's central bank introduced new rules requiring commercial banks to reduce their volume of non-performing loans and improve their financial health. Since it was widely agreed that the inefficient civil judicial system slowed down banks' recovery of bad loans, in 1993 the Government of India passed a national law establishing new specialized tribunals for debt recovery.

The law allowed the national government to establish new debt recovery tribunals (DRTs) across the country, where banks and financial institutions could file suits for claims larger than Rupees 1 million (currently 1$ is worth approximately Rs 50; in the early 1990s it was of the order of Rs 25). Before this law, civil courts were responsible for trying all debt recovery suits. In these courts, these cases were processed according to the Code for Civil Procedure, and it was common for cases to continue for extremely long. Nearly 40 percent of the pending debt recovery cases in civil courts in 1985-86 had been pending for longer than 8 years (Law Commission of India 1988). In contrast, DRTs follow a new streamlined procedure. Defendants are given less time to respond to summons, they must provided a written defense, and they can only make counter-claims against the bank at the first hearing. DRTs can also issue interim orders to prevent defendants from disposing off their assets before the case is closed, and in some circumstances may also issue a warrant for the defendant's arrest. Thus, the DRT law reflects a change in the procedure for processing debt recovery suits. However, substantive laws governing the cases did not change; lawyers use the same arguments and precedents to plead and defend their cases, in both civil courts and debt recovery tribunals.

There is some evidence to suggest that DRTs have been effective in lowering case processing times. Visaria (2009) analyzes data from a small random sample of debt recovery suits to show that cases that were processed in DRTs took significantly less time to pass through the various stages of the process, and were just as likely to be resolved in favor of the bank as civil court cases. See Table A4 for similar evidence. This suggests that DRTs increased the (present discounted) value of the amount recovered by banks from defaulting loans. Therefore, we interpret the introduction of a DRT in a state as an increase in the parameter θ in our model.

The DRT law allowed the national government to establish tribunals across the entire country and to determine their territorial jurisdiction; state governments were not given any authority to influence this process. In fact, DRTs began to be set up soon after the law was passed; five states received tribunals in 1994. However, as reported in Visaria (2009), this process was halted by a legal challenge to the law. In 1994, in response to a case filed by the Delhi Bar Association, the Delhi High Court ruled that the DRT law was not valid. It was only in 1996, after the country's Supreme Court issued an interim order in favor of the law, that DRT establishment was resumed. New DRTs were set up in quick succession starting in 1996. By 1999 most Indian states had received a DRT.

Table A1 lists the dates DRTs were passed in different states.

The events described above suggest that the timing of DRT establishment was driven by reasons plausibly exogenous to firms' borrowing behavior across different states. To assess if state-level factors also influenced this timing, Visaria (2009) examines the relationship between state-level economic, judicial and political variables and the pattern of DRT establishment. This is reproduced as Table A2. The regressors include level and growth rate of state-level GDP, cases pending and number of judges per capita in the state High Court, the nature of the dominant political party in the state government, and whether it was an ally of the party in power at the national level. The data cover 1993-2000 for 23 states. Only one of these variables was significant at 10% in one of the regression specifications. Hence the results cannot reject the hypothesis that the timing of DRT was unaffected by any of these variables. We therefore proceed on the basis of this hypothesis, which provides the identification necessary to estimate the effects of the reform. We also examine robustness of our results to controls for state-level varying trends in the volume and distribution of credit across different firm sizes.

4 Data

We use a firm-level panel data set drawn from the Prowess database constructed by the Centre for Monitoring the Indian Economy (CMIE). This contains firm-level information for all firms listed on Indiak

Descriptive statistics from our sample are reported in Tables 1a and 1b. All variables are adjusted for inflation, using an all-India wholesale price index.[15] Table 1a provides means, standard deviation and range of the main variables used in the analysis for the entire sample, while Table 1b breaks this down for different quartiles. The mean 1990 asset size was Rs 16.5 crores (expressed in 2002 prices).[16] Borrowings during 1991-2002 were approximately four and a half times 1990 assets for the average firm. Fixed assets grew substantially over the 1990s: on average they were seven times the 1990 level. This reflects the rapid pickup in growth in the Indian economy during the second half of the 1990s.

Table 1b shows that the 1990 size distribution was quite skewed, with quartiles of Rs crores 2.06, 5.11, 13.20, and a maximum of 841.80. Small firms grew the fastest, with an average asset size 20 times relative to 1990 for the first quartile, as against a growth factor of 10 and below for the upper quartiles. Profits (before depreciation and interest) were approximately 10% of fixed assets for the bottom two quartiles, 12% for the third quartile and 14% for the top quartile. Interest payments were 18% of total borrowing for the bottom quartile, 16% for the middle quartiles and 15% for the top quartiles. Small firms had a higher ratio of non-fixed assets to fixed assets, as well as a lower labor intensity (ratio of wage bill to fixed assets). They experienced greater indebtedness relative to their borrowing and fixed assets.

Note that the DRT law only applies to debt recovery claims larger than Rs 1 million. The mean borrowing of the first quartile was Rs 210 million at 2002 prices, well above this threshold. Hence most firms in the dataset were liable to DRT, presuming any given firm either defaults on its entire debt, or on none of it. More generally of course, it could default on part of its debt. We shall provide evidence later indicating that DRTs were effective among small firms, based on repayment rates for loans of a particular private bank in the database studied by Visaria (2009).[17]

5 Empirical specification

According to the law, a debt recovery case can be assigned to a DRT on the basis of the region where the defendant resides or where the cause of action arises. Accordingly, we assign firms to DRT jurisdictions on the basis of the firms' registered office address. The DRT variable is a categorical variable which takes value one in years that DRT in that jurisdiction is in place.

We now explain the regression specification used and how it relates to the theory developed in the previous Section. We presume that the key element of heterogeneity of firms is retained earnings or wealth (W) of their owners, which is unobserved. The entrepreneurial wealth distribution generates a size distribution of firms, with observed capital stocks, wage bills, borrowing and profits. We assume all firms were credit-constrained, i.e., the distribution of W has an upper end-point which falls below the level at which the first-best can be attained. We

[15] This data was downloaded from the Reserve Bank of India website.

[16] A crore equals 10 million. In 1990 Rs 1 crore was approximately equal to $400,000.

[17] Unfortunately, the Prowess data do not separate out regular interest payments from payment of past overdues.

also ignore issues of entry, since we are working on a database which excludes a number of very small firms and those in the informal sector. So we shall assume a given set of firms with varying W, all of whom are active but credit-constrained.

5.0.1 Borrowing and Capital Stock

In the baseline model developed in the previous section, capital is the sole factor of production. So firm size can be represented interchangeably by output $f(\gamma)$ or capital stock (γ). We focus on the latter. In a static setting this is proportional to borrowing, so we can use γ to represent either capital stock or borrowing of the firm.

Consider the simple case where $\nu = 0$. Given the restriction on the wealth distribution mentioned above, we obtain a simple linear equation for capital stock in terms of entrepreneurial wealth:

$$\gamma = \alpha(\theta) + \beta(\theta)W \tag{2}$$

where $\alpha(\theta) \equiv \frac{d}{I(1+\pi(\theta))}$, $\beta(\theta) \equiv \frac{\theta}{I(1+\pi(\theta))}$ and $\pi(\theta)$ denotes the equilibrium profit rate corresponding to DRT parameter θ. Owing to GE effects, we know that $\pi(\theta)$ is increasing. Hence $\alpha(\theta)$ is decreasing. Moreover $\beta(\theta)$ must be increasing, otherwise credit demand would go down for all firms, which is inconsistent with an upward-sloping supply of credit.

The problem with estimating (2) directly is that W is unobserved. We therefore proceed on the following assumptions which enable W to be proxied by historical (i.e., year 1990) assets: (i) entrepreneurs' wealth has not changed between 1990 and year $t > 1990$, or can be proxied by the latter; (ii) all states had the same pre-DRT θ, denoted by $\bar{\theta}$; (iii) once a state gets a DRT, its θ changes to $\bar{\theta} + \mu$ where $\mu > 0$.

Note that a more reasonable version of (i) is that 1990 wealth predict current wealth with error. Then we will have a classic source of measurement error, resulting in attenuation bias: estimated effects will be smaller than the true effects.

Using $\bar{\gamma}_j$ to denote firm j's fixed assets in 1990, we have

$$\bar{\gamma}_j = \alpha(\bar{\theta}) + \beta(\bar{\theta})W_j \tag{3}$$

which implies

$$W_j = \frac{\bar{\gamma}_j - \alpha(\bar{\theta})}{\beta(\bar{\theta})} \tag{4}$$

Hence if firm j is in a state which has not yet received a DRT in year t, we have $\gamma_{jt} = \bar{\gamma}_j$. And if it has received a DRT in year t:

$$\gamma_{jt} = \alpha(\bar{\theta} + \mu) + \beta(\bar{\theta} + \mu)W_j$$

implying (using (4)):

$$\gamma_{jt} = \bar{\gamma}_j + \phi.DRT_{jt} + \psi.DRT_{jt} * \bar{\gamma}_j \tag{5}$$

where

$$\phi \equiv \alpha(\bar{\theta}+\mu) - \alpha(\bar{\theta})[1+\frac{\beta(\bar{\theta}+\mu)}{\beta(\bar{\theta})}] < 0, \psi \equiv \frac{\beta(\bar{\theta}+\mu)-\beta(\bar{\theta})}{\beta(\bar{\theta})} > 0. \tag{6}$$

5.0.2 Interest Rates

Now turn to the interest rate. One way to interpret this is the 'nominal' rate that the firm is expected to pay in the successful state, which may differ from the amount actually paid (if the state was not successful). Using the fact that incentive constraints are binding in both states, and lenders have to be paid π in expectation, it is easily checked that the nominal interest rate can be expressed as

$$r = \pi + \theta\frac{\nu}{I}(y_s - \bar{y})\frac{f(\gamma)}{\gamma}. \tag{7}$$

If $\nu = 0$, the nominal interest rate does not vary across firms. Neither do interest payments vary with the state.[18] More realistically, with $\nu > 0$, firms with a higher average rate of return to capital assets $\frac{f(\gamma)}{\gamma}$ will pay a higher interest rate. In that case interest rates will vary across borrowers, and interest payments will vary across states for any given borrower.[19]

With a strong enough GE effect, passing a DRT will raise π, lower the scale γ for small firms and raise it for large firms. Hence (7) implies nominal interest rates will rise for the former, while for the latter is ambiguous. The theory places restrictions on the slope of nominal interest rates with respect to firm size, and how it changes as a result of DRT.

The empirical specification for the nominal interest rate corresponding to (7) is the following. Let $g(\gamma) \equiv \frac{f(\gamma)}{\gamma}$ denote the average rate of return to the firm's assets, and suppose it is a linear, decreasing function of γ: $g(\gamma) = \zeta_0 + \zeta_1.\gamma$, where $\zeta_0 > 0, \zeta_1 < 0$. Then

$$r_{jt} = r_0 + \rho.DRT_{jt} + [\bar{\theta} + \chi.DRT_{jt}] * g(\gamma_{jt}) \tag{8}$$

where $\rho, \chi > 0$. Substituting for γ_{jt} from (4), and using the fact that $DRT_{jt}^2 = DRT_{jt}$ since it is a $0-1$ variable:

$$r_{jt} = \rho_0 + \rho_1\bar{\gamma}_j + \rho_2 DRT_{jt} + \rho_3 DRT_{jt} * \bar{\gamma}_j \tag{9}$$

where $\rho_0 \equiv \bar{\theta}\zeta_0, \rho_1 \equiv \bar{\theta}\zeta_1 < 0, \rho_2 \equiv \rho + \chi\zeta_0 + \bar{\theta}\zeta_1\phi + \chi\zeta_1\phi > 0, \rho_3 \equiv \chi\zeta_1 + \bar{\theta}\zeta_1\psi + \chi\zeta_1\psi < 0$. While the effect on the nominal interest rate for large firms is ambiguous, the theory places restrictions on the intercept and slope effects of DRT: the intercept effect ρ_2 is positive and the effect on ρ_3, the slope with respect to 1990 asset size, is negative.

[18] The same is true if we extend the theory to suppose that lenders can recover part of the fixed assets financed. Lets suppose with $\nu = 0$, the lender can expect to extract $\theta.[W + (1-\delta)\gamma]$, where δ is a rate of depreciation (or stripping) of capital assets. Then the repayment amount will not vary with the state $T_s = T_f = T$, and the interest factor will equal $1 + r = \frac{T}{\gamma.I} = 1 + \pi$ for all firms.

[19] Intuitively, the borrower is supposed to pay back an average interest rate of π to lenders. In the successful state the borrower is able to pay back more than π. The excess paid back above π has to cover the shortfall below π expected in the unsuccessful state. In other words, the interest rate includes an allowance for 'default' risk, which is proportional to the average return to capital. If the production function is concave over the relevant range, larger firms will earn a lower average rate of return. We therefore expect to see them obtain loans with a lower interest rate.

In the Prowess data, nominal interest rates are not available: we can only observe actual interest payments. We can construct an average interest rate for a firm in any given year, equal to interest payments divided by total borrowing. If risks are idiosyncratic and firms in any given size class are *ex ante* identical, the average interest rate will simply equal $\pi(\theta)$. This will not vary across size classes of firms, and the theory predicts it will rise uniformly as a result of DRT. We can use the same specification as provided above for nominal interest rates, and expect the intercept effect ρ_2 to be significantly positive, while the slope effect ρ_3 should not differ from zero.

If there is macroeconomic risk borne partially by lenders, observed interest rates will be stochastic and not equal the expected profit rate π for all firms. In successful macro states, the observed interest payments will resemble more closely the behavior of the nominal interest rate. In that case we expect the specification (9) above to apply with the stated restrictions: a positive intercept effect and a negative slope effect. Since the Indian economy witnessed substantial growth from the early 1990s onwards which lasted well through till the early 2000s, it seems reasonable to depict this period as a successful macroeconomic state. In general, therefore, we expect a positive intercept effect of DRT, and a size-slope effect which is either zero or negative.

5.0.3 Profits and Wage Bill

In the model, the profit of the firm is stochastic as it depends on the state. With idiosyncratic risk, the average profit of firms of a given size (i.e., corresponding to a given wealth W of entrepreneurs) equals $\Pi(W;\theta) \equiv \bar{y}f(\gamma(W;\theta)) - \gamma(W;\theta)I(1+\pi(\theta))$, where $\gamma(W;\theta) \equiv \gamma^H(W,\pi(\theta);\theta)$ denotes the equilibrium capital stock of firm with wealth W with enforcement parameter θ. Hence

$$\frac{\partial \Pi}{\partial \theta} = [\bar{y}f'(\gamma(\theta;W) - I(1+\pi(\theta))]\frac{\partial \gamma(\theta;W)}{\partial \theta} - \gamma(\theta;W)I\frac{\partial \pi(\theta)}{\partial \theta} \tag{10}$$

For credit-constrained firms the term in square brackets on the right-hand-side of (10) is positive. Hence for small firms whose borrowing declines as a result of DRT, the effect on profit is unambiguously negative resulting from a tightening of credit and an increase in its cost. For large firms the effect is ambiguous. The specification of the profit regression will be analogous to those for borrowing and interest rates, since the effect of DRT will vary with the size of the firm. We expect the intercept effect to be negative. The effect on the slope with respect to firm size is theoretically ambiguous. But if the effect on borrowing size dominates we would expect to get a positive slope effect.

The effect on wage bill requires an extension of the model to a multi-factor context. The simplest setting involves a Leontief fixed coefficients technology with two factors: capital and labor. If labor employment can be varied flexibly, it will be adjusted to the amount of capital in the firm which will be set by the incentive constraints. Hence employment and the wage bill will move in the same direction as the level of borrowing or capital stock, with the latter being determined as specified above. So the wage bill will contract in small firms and expand in large firms, analogous to capital stock.

The same result obtains with a Cobb-Douglas specification of the production function:

$$\gamma = AK^{1-a}L^a = AK\kappa^{-a} \tag{11}$$

where $a \in (0,1)$. In this setting capital intensity κ is endogenous, and can vary across firms of differing size. We can phrase the firm's problem as choosing scale γ of operation and capital intensity κ, with factor inputs determined as follows: $K = \gamma\frac{\kappa^a}{A}, L = \gamma\frac{\kappa^{a-1}}{A}$. Hence the incentive-constrained Walrasian demand maximizes:

$$e[y_s f(\gamma) - T_s] + (1-e)[y_f(\gamma) - T_f] - w.\gamma\frac{\kappa^{a-1}}{A} \tag{12}$$

subject to

$$T_k \leq \theta[W + \nu.y_k f(\gamma) + (1-\delta)\gamma\frac{\kappa^a}{A}] + d \tag{13}$$

and the lenders participation constraint

$$eT_s + (1-e)T_f \geq (1+\pi)\gamma\frac{\kappa^a}{A}. \tag{14}$$

In (13) we now allow lenders to recover part of the fixed assets of the firm, in addition to a part of output and the entrepreneurs wealth. This can motivate firms to 'over-capitalize', in order to relax the credit constraint.

In order to obtain closed-form solutions, we assume $\nu = 0$, and also that $f(\gamma) = \gamma^\epsilon$ for $\epsilon \in (0,1)$. The key point to note is that the incentive constraint (13) involves only the amount of fixed capital assets, and is independent of the wage rate. In particular if the firm is credit constrained, this ties down the extent of capital assets as before:

$$K \equiv \gamma\frac{\kappa^a}{A} = \frac{\theta W + d}{1 + \pi - \theta(1-\delta)}. \tag{15}$$

This equation determines capital intensity as a function of the choice of scale:

$$\kappa = [\frac{A}{\gamma}]^{\frac{1}{a}}[\frac{\theta W + d}{1 + \pi - \theta(1-\delta)}]^{\frac{1}{a}} \tag{16}$$

and the scale γ is then chosen to maximize

$$\bar{y}f(\gamma) - \gamma\frac{\kappa^a}{A}[(1+\pi) - \frac{w}{\kappa}]. \tag{17}$$

Using (15, 16) this reduces to

$$\bar{y}f(\gamma) - \frac{\theta W + d}{1 + \pi - \theta(1-\delta)}(1+\pi) - [\frac{\theta W + d}{1 + \pi - \theta(1-\delta)}]^{1-\frac{1}{a}}[\frac{\gamma}{A}]^{\frac{1}{a}}w. \tag{18}$$

Since a lies between 0 and 1, this is a concave problem, and the optimal scale is determined by the corresponding first-order-condition. Using the constant-elasticity form of f, we obtain the following expressions for scale and capital intensity:

$$\gamma = [\bar{y}\{\frac{\theta W + d}{1 + \pi - \theta(1-\delta)}\}^{\frac{1}{a}-1}\frac{aA^{1/a}}{w}]^{\frac{a}{1-a\epsilon}} \tag{19}$$

$$\kappa = [\frac{\theta W + d}{1 + \pi - \theta(1-\delta)}]^{\frac{1-\epsilon}{1-a\epsilon}} w^{\frac{1}{1-a\epsilon}} (a\bar{y})^{-\frac{1}{1-a\epsilon}} A^{-\frac{\epsilon}{1-a\epsilon}} \quad (20)$$

It follows from these expressions that larger firms are more capital-intensive.[20]

The capital asset of the firm is given by

$$K = \alpha(\theta) + \beta(\theta) W \quad (21)$$

where now

$$\alpha(\theta) = \frac{d}{1 + \pi - \theta(1-\delta)}; \beta(\theta) = \frac{\theta}{1 + \pi - \theta(1-\delta)}$$

As θ rises owing to a DRT, the incentive-constrained demand for capital, hence credit, rises. This raises the profit rate π. What happens to $1 + \pi - \theta(1-\delta)$? If it falls, every borrower demands more loans. If the supply of loans is sufficiently inelastic, this cannot happen. With a strong enough GE effect, then, $1 + \pi - \theta(1-\delta)$ must rise. This implies that α is decreasing in θ. And β must be increasing, otherwise every borrower will demand less credit, which is inconsistent with market-clearing. It follows that we get the same equations for capital assets and borrowing as in the case where capital is the sole productive asset. The specification of the asset and borrowing regressions continue to be described by (5).

We finally obtain an expression for wage bill $WB \equiv w.L$:

$$WB_{jt} = C.[\alpha(\theta_{jt}) + \beta(\theta_{jt}) W_j]^{\frac{\epsilon(1-a)}{1-a\epsilon}} w_t^{-\frac{a\epsilon}{1-a\epsilon}} \quad (22)$$

Proxying W_j by 1990 size, we will end up with a nonlinear regression of wage-bill in DRT, size and interaction of DRT with size. However from (22) it is clear that the wage bill moves in the same direction as capital assets, if DRT does not exert GE effects on the wage rate. Hence the wage bill should contract in small firms and expand in large firms with strong GE effects in the credit market and no GE effects in the labor market.

6 Empirical Results

6.1 Baseline Specification

Tables 2a, 2b report firm-level regressions for borrowing, fixed assets (value of land, property, machines and other fixed assets), interest rate (interest payments divided by borrowing), and profits (before depreciation and taxes). All specifications include a DRT dummy for whether the state in which the firm is located has a DRT in operation that year. In each regression, we correct for spatially and serially correlated errors by clustering standard errors at the state-industry level. The first four columns report OLS estimates, with year dummies, state dummies and industry dummies included. The last four columns report firm fixed effect regressions, with year dummies.

[20]The reason is that larger firms are owned by wealthier entrepreneurs, and are less credit-constrained. This result is not altogether trivial, as there is a countervailing force: smaller firms that are more credit-constrained are more under-capitalized so have a higher marginal rate of return on capital. One way of explaining the result is the following. The binding incentive constraints determine the total capital assets the firm can have. Wealthier entrepreneurs have more capital assets. Given the capital assets available, the entrepreneurs then decide on employment. Firms with smaller capital assets 'make up' by employing more workers per unit of capital.

Columns 1, 3, 5, 7 do not include an interaction of DRT with firm size measured using 1990 fixed assets. Hence the coefficient of DRT represents its average impact across all firms. This average impact is positive for all variables, but with the exception of interest payments all of these are statistically insignificant. The average effect on interest payments is statistically significant and positive, corresponding to a rise in approximately one percentage point (against an average interest rate of 15–16%). These results conform to the theoretical predictions corresponding to a sizeable GE effect of DRTs: a small positive effect on per firm borrowing and fixed assets, and a sizeable upward effect on interest rates.

Columns 2, 4, 6 and 8 add an interaction of DRT with firm size, measured using 1990 fixed assets, equal to value of land, property, machines and other fixed assets.[21] These columns correspond to the main equation specified by the theory ((5) for borrowing and capital stock, (8) for interest payments). OLS and fixed effect coefficient estimates are quite close and statistically significant for borrowing, capital assets and profits. They conform to the theoretical predictions: the intercept effect (i.e., the effect on small firms) is negative, while the slope with respect to firm size rises.

The results for interest payments also conform to the theoretical predictions: there is a rise in the intercept which is statistically significant in both OLS and fixed effect regressions. The slope effect is negative but this is statistically significant only in the OLS regression. The estimate of the slope effect is substantially smaller in the fixed effect regression. The latter estimates imply that interest payments rose for all firms.

Small firms thus experienced higher cost of borrowing as a result of DRT; their borrowing, capital stocks and profits shrank. The net effect was approximately zero for a firm with mean assets of Rs 16.5 crores, with respect to borrowing, capital stock and profits. This falls within the fourth quartile of the size distribution. Hence at least three quarters of all firms were left worse off as a result of DRTs.

One possible concern with the preceding results is that there was an increasing trend towards adoption of DRT in the 1990s, at a time when the economy was encountering major deregulation reforms and experiencing a transition from a sluggish to rapid growth. Hence the DRT variable may simply be proxying for other market-friendly reforms in the economy which allowed larger firms to grow faster than smaller firms. Tables 3a, 3b therefore explore robustness of the preceding fixed effect regression results to inclusion of size-specific time trends. Columns 1 and 5 add controls for year dummies interacted with size class dummies (with 20 size classes, each containing 5% of the firms in the sample). Comparing with corresponding results in Tables 2a,2b we find that the coefficient signs, magnitudes and significances for borrowing, capital assets and profits remain roughly the same. The positive intercept effect for interest payments is also similar, while the slope effect is now smaller and statistically insignificant.

Next, columns 2 and 6 replace the year dummy*size class interaction with year dummies interacted with

[21] Results were robust to alternative ways of measuring assets, such as total assets and net fixed assets. The results were weaker but qualitatively weaker when we used 1990 sales revenue.

size. This allows larger firms within any given size class to experience proportionately more growth (in absolute terms). However, the difference in year-to-year change between any pair of firms is proportional to the difference in their size: in this sense the specification restricts growth rates to be the same across different size classes. This specification significantly reduces the magnitudes of most coefficients. But the coefficients of the borrowing, capital and profit regressions retain their signs and statistical significance. The threshold size dividing growing and shrinking firms continues to be close to the mean asset size. The magnitude and sign of the intercept effect in the interest payment regression is roughly the same, but is now statistically significant only at 10%.

Columns 3 and 7 blend the two previous set of controls: adding interactions of year dummies both with size class and size. This allows different size classes to grow at different rates, as well as year-to-year changes within each class to be proportional to size. The intercept and slope effects become considerably smaller for borrowing and capital assets, and their statistical significance also wanes. However, the negative intercept effect for both remain statistically significant. So it is still the case that small firms shrink appreciably. In the case of profits, on the other hand, the coefficients become almost twice as large. The threshold size for a positive effect continues to be around the mean asset size. The estimates become stronger for interest payments, with an increase in magnitude and statistical significance of both intercept and slope effects.

Finally, columns 4 and 8 allow the factor of proportionality between size and year-to-year changes within each size class to be different for different classes. This effectively allows independent changes over time in year and year*size effects across different size classes. The results for borrowing, capital and interest remain unchanged; the profit results become weaker. In all regressions the intercept effects, representing the adverse effect for small firms owing to the GE effect, continue to remain statistically significant.

It is evident from these results that controls for size-specific time trends in the economy as a whole affect the magnitudes of the estimated coefficients considerably. Hence the DRT variable was correlated with other changes in the economy which were exercising similar distributional effects. Yet even after controlling for the latter, we continue to obtain significant effects of DRT which are consistent with the version of our model with a large GE effect.

The preceding Tables control for size-specific time trends at the national level, affecting all states in the same way. Table 4 explores robustness to state-cum-size-specific time trends. This is to capture possible concerns that the timing of adoption of DRTs across states was correlated with their embrace of market friendly reforms. More 'progressive' states which were more market-friendly may have adopted DRTs sooner. The DRT effects may thus be proxying for other reforms chosen by state governments which had adverse distributional consequences. We add a state-specific linear time trend, and allow this trend to vary proportionately with firm size. We include a common nationwide year dummy and the year dummy interacted with firm size. We see the results for borrowing, capital and profits remain robust, while for interest they become weaker. But the coefficient signs are all as predicted, and the intercept effect in the interest regressions is significant at 10%.

6.2 Average Effects for Different Quartiles

The preceding results were based on a linear specification of the effect of DRTs. It is evident from the theory that the linear functional form is correct only under restrictive conditions: e.g., for borrowing or capital stock we need to assume that lenders cannot recover any of the output or revenues of the firm in the event of loan default ($\nu = 0$). We also need to assume that DRTs were equally effective across firms of differing sizes (θ does not vary across size). Even under these conditions, the linear specification does not apply for profits when the production function displays diminishing returns to capital.

Tables 5a, 5b estimate the average effect on different quartiles, for two sets of time controls (one where year dummies vary across size classes, another where linear time trends for each size class can additionally vary across states). These average effects are not precisely estimated, possibly because the effect varies significantly with size within each quartile. The sign patterns are in conformity with our earlier results. Borrowing and capital assets fall for the first three quartiles, and expand for the fourth quartile. The negative effect is more pronounced for the third quartile than for the bottom two quartiles. This may partly owe to a censoring effect that the linear specification ignores: it is not possible for capital stock to fall below zero. Hence the absolute effect on small firms is likely to be smaller than for medium-sized firms. Columns 5 through 8 pool the first three quartiles and estimates the average effect for this group *vis-a-vis* the top quartile. Here we see a reduction in borrowing for the former group which is significant at 10%.

Table 5b shows a significant expansionary effect for profits in the 4th quartile (at the 10% level). We see a rise in interest rates for the bottom quartile which is significant at the 5% level. The estimated rise in their interest payments corresponded to three percentage points, a very large increase. Whereas for the top two quartiles there is no significant rise in interest payments.

In general the average effects on different quartiles are less precisely estimated than the intercept and slope effects in the linear specification. In other words, the effect on small firms, and the relative effect on firms of varying size is more precisely estimated, compared with the absolute effect on different size classes. Nevertheless we do see evidence of non-uniform effects with contrasting signs on borrowing, profits and interest payments across different size classes. These corroborate the view that DRTs exercised an adverse distributive impact.

6.3 Heterogeneity of Impact

So far we have assumed all firms to be homogenous except for their size. The Prowess database covers all major areas of manufacturing and services in the Indian economy, and includes all medium and large sized publicly listed firms. Firms are likely to vary significantly with respect to technology, profitability, past credit histories and tangibility of assets, all of which are likely to affect their access to credit. Accordingly, the impact of DRT is likely to vary with these characteristics.

Table 6a allows the DRT impact to vary with the following firm characteristics apart from 1990 asset size: 1990 profitability (ratio of profits to fixed assets), indebtedness (ratio of borrowing to sales) and labor intensity (ratio of wage bill to fixed assets). From the theory, we would expect higher profitability and labor intensity to correspond to a higher productivity of capital and lower likelihood (e) of default which raises $\bar{y}$. With $\nu > 0$ this raises the firm's credit ceiling γ^H, and the increase will be higher when θ is higher. So we expect a positive interaction between DRTs and both profitability and labor intensity.

The effect of past indebtedness on credit access is ambiguous, as there are at least two conflicting effects. Higher indebtedness raises more senior claims of prior creditors over the firms assets and its future returns, which raises default risk and reduces profitability for new lenders. On the other hand, a more indebted borrower with a poorer credit history will be more willing to repay loans to improve its credit rating and future access to credit. It is difficult to assess the net impact of higher θ on the relative strength of these two effects, in the absence of an explicit dynamic model.

Table 6a shows higher profitability and labor intensity raise the DRT effect on borrowing significantly, as expected. There is also a significant positive interaction between DRT and labor intensity in the fixed asset regression. Past indebtedness strongly raise the effectiveness of DRT in raising borrowing and lowering interest cost. It is possible that high levels of past borrowing are positively correlated with the presence of favorable information available to lenders concerning future earning prospects, which would raise the effectiveness of DRT. This may be particularly true of fast growing firms in emerging new sectors such as software services.

Table 6b adds non-fixed assets (measured to total assets minus fixed assets) of the firm in 1990 to the list of firm characteristics that could possibly interact with DRT. One would expect the effectiveness of DRT to depend principally on fixed assets that the lender could hope to attach in the event of a loan default. Non-fixed assets such as inventories are more volatile and correlated with the success of the firm, which are also easier for entrepreneurs to hide from creditors. This is exactly what we find: while fixed assets significantly affect DRT's effectiveness, non-fixed assets do not.

7 Alternative Explanations

In this section we consider alternative explanations for the observed effect of DRTs. The adverse distributive impact of DRTs were explained in our theory by the GE effect resulting in the credit market owing to inelasticity in the supply of loans. We now consider three alternative explanations, and see if the data enables us to discriminate between them.

7.1 Lower DRT Effectiveness for Small Claims

One possibility is that DRT raised effectiveness of lenders claims *vis-a-vis* large firms far more than with respect to small firms. It may be that it is difficult or unprofitable for a bank to take a large number of small firms to court over relatively small claims. If going to a DRT involves large fixed costs, lenders may focus their efforts on taking large firms to court. Such firms may also be concerned for their future reputations, making them more susceptible to repaying under the threat of being taken to a DRT. It is also possible that borrowing of small firms were split among numerous lenders in such a way that their indebtedness with any given lender fell below the Rs 1 million threshold for DRTs.

If there were no GE effects, such a hypothesis may explain why access to credit increased disproportionately for large firms. But it cannot explain why credit access *decreased* or why it became more expensive for small firms.

Moreover the data available concerning repayments rates on loans made by a large private bank analysed by Visaria (2009) provides some insight into relative effectiveness of DRT proceedings with respect to borrowers of varying size. Table A4 analyzes a random sample of 49 debt recovery suits filed in the DRTs of the state of Maharashtra by this bank. 25 of these cases had been filed in civil courts before DRTs were established, and the remaining 24 had been filed in debt recovery tribunals. We run simple regressions to see if process of the cases varied by the venue where the case was filed, and whether the size of the claim had a further differential effect. The table shows results for the time taken (in days) from the date of case filing to when summons were issued, the time taken to the first hearing, first filing of evidence, file closure and when interim relief was granted (if granted). In addition it shows the probability that the court passed a verdict in the bank's favor, and the probability that interim relief was granted.

The results indicate that compared to civil courts, DRTs took substantially less time to process cases. However, the size of the claim had almost no effect on the time taken, except in column (2), where first hearings appeared to take longer if the claim was larger (not smaller). In addition, we see no effect of DRTs, or claim size, on the probability that the court granted interim relief to the bank (against the borrower's disposal of assets while the matter is sub-judice). We see a higher probability of the court deciding in favor of the bank, but this effect was not moderated by the size of the claim. This suggests that among the type of cases filed in DRTs, their effectiveness did not vary significantly by claim size.

7.2 GE Effects Through the Labor Market

Biais and Marriotti (2006) provide a theory where stronger credit enforcement have distributive consequences, owing to GE effects that operate through the labor market. Briefly, their model has the following features. Large firms owned by wealthier entrepreneurs are less credit-constrained. Stronger enforcement therefore expands credit access disproportionately more for small firms. Firms owned by poor entrepreneurs previously excluded from the credit market can now enter. This raises the demand for labor in the industry. With an upward sloping supply

of labor, the wage rate rises. At the same time, the supply of credit is assumed to be infinitely elastic, so there is no effect on the cost of capital. The rise in the wage rate reduces profits of incumbent large firms, as their credit access changes only slightly. Hence large firms put political pressure to prevent strengthening of contract enforcement institutions.

The Biais-Marriotti theory predicts that large firms shrink in size and profits, while small firms expand as a result of stronger enforcement of credit contracts. This is the opposite of what we observe the effects of DRT to have been.

Another way to test their theory is to look at the effect on the wage rate. Unfortunately, the Prowess data does not include wage rates or employment levels. Instead we have data on wage bill of firms. This is the product of the wage rate and employment. For any given firm inferring movements in wage rates from movements in wage bills requires assumptions on the elasticity of labor demand. If labor demand is inelastic, wage bills and wage rates will move in the same direction. The assumption of inelastic labor demand seems plausible in the context of medium and large firms operating primarily in the formal labor market, owing to strong labor market regulations in the Indian economy restricting the right of firms to dismiss workers (see Aghion et al (2005) and Besley and Burgess (2004)). If the wage rate rose, firms wage bills would then rise, and we expect to see a positive average impact of DRTs on wage bills.

Column 1 in Table 7 provides results of regressing firm wage bills on DRT, after controlling for firm fixed effects and a year dummies. We see a significant reduction in the average wage bill, which suggests that the wage rate fell as a result of DRTs, opposite to the prediction of the Biais-Marriotti theory.

To check whether the observed behavior of wage bills is consistent with our theory, subsequent columns in Table 7 represent wage bill regression results corresponding to the specification suggested by our model. The intercept effect of DRTs is negative and the slope effect is positive, consistent with the predictions of our theory. The statistical significance of these are however sensitive to the precise treatment of time trends.

Could an alternative version of our model based on GE effects in the labor rather than capital market be consistent with the data? We saw above that a firm's demand for labor is proportional to its capital assets, with the factor of proportionality decreasing in the wage rate:

$$L_{jt} = C_1.[\frac{\theta W + d}{1 + \pi - \theta(1-\delta)}]^{\frac{\epsilon(1-a)}{1-a\epsilon}} w^{-\frac{1}{1-a\epsilon}} \tag{23}$$

In the absence of GE effects in the credit market, a rise in θ will raise capital assets of all firms, and thus raise labor demand. Then the wage rate will rise. The net effect on firms output, employment or profits will depend on the trade-off between rising capital assets and rising wage rates.

Let $w(\theta)$ denote the equilibrium wage rate, a rising function of θ. Then

$$L(\theta; W) = C_1[\alpha(\theta) + \beta(\theta)W]^{\epsilon(1-a)} w(\theta)^{-1} \tag{24}$$

and

$$\gamma(\theta; W) = C_2\{[\alpha(\theta) + \beta(\theta)W]^{(1-a)/a} w(\theta)^{-1}\}\frac{1 - a\epsilon}{a} \tag{25}$$

Hence L is rising in θ if and only if

$$\epsilon(1-a)\frac{\alpha'(\theta) + \beta'(\theta)W}{\alpha(\theta) + \beta(\theta)W} > \frac{w'(\theta)}{w(\theta)} \tag{26}$$

It is easily checked that the LHS of (26) is rising in W.[22] Therefore larger firms are more likely to expand employment. If the supply of labor is fixed, or nearly inelastic, it follows that employment will expand in large firms and contract in small ones.

A similar argument establishes that output will expand in large firms and contract in small ones, though the exact threshold between expansion and contraction of output will be larger than for employment (since capital assets rise for all firms). The intuitive explanation is that small firms are more labor intensive, and so are harder hit by a rise in the wage rate.

A similar property can be derived for the wage bill. This model therefore predicts an adverse (favorable) effect on output, employment and wage bill for small (large) firms. In these respects the model is consistent with the facts.

Yet there are two key facts that are not consistent with this model. First, it predicts the wage rate rises, whereas the evidence concerning the average impact on firm wage bills suggests otherwise. Second, note that *there will be no feedback effect from wage rates to capital assets, as the latter are tied down entirely by the incentive constraints which are unaffected by the wage rate:*

$$K(\theta; W) = \frac{\theta W + d}{1 + \pi - \theta(1-\delta)} = \alpha(\theta) + \beta(\theta)W \tag{27}$$

where now $\alpha(\theta) \equiv \frac{d}{1+\pi-\theta(1-\delta)}$ and $\beta(\theta) \equiv \frac{\theta}{1+\pi-\theta(1-\delta)}$ are both increasing in θ. Hence, this model predicts that in the absence of GE effects within the credit market, capital assets will expand for all firms, and by more for larger firms. This runs against what we have observed earlier: capital assets contracted for small firms.

It could be counter-argued that the preceding argument is based on the assumption that firms do not have to borrow in order to pay workers. A rise in the wage rate will raise working capital needs, which may have crowded out borrowing for fixed capital. This would again require wage bills to rise. But we have seen that wage bills, borrowing and fixed capital moved in the same downward direction for small firms. So the shrinkage in their capital assets cannot be explained by an expansion in their wage bills.

It therefore appears difficult to find a model based on GE effects operating through the labor market rather than the credit market which can fit all the observed facts.

[22] This requires $[\alpha + \beta W]\beta' - [\alpha' + \beta' W]\beta > 0$, or $\frac{\beta'}{\beta} > \frac{\alpha'}{\alpha}$. This is verified from the expressions for $\alpha(\theta)$ and $\beta(\theta)$ above.

7.3 Insurance and Incomplete Contracts

An alternative explanation based on incomplete contracting may potentially also explain adverse distributional effects on borrowing and capital assets. The incomplete contract channel is used in Gropp et al (1997) and Bolton and Rosenthal (2002), who stress the insurance value of weak enforcement.[23]

The main idea is the following. If the debt contract is not state-contingent, interest obligations cannot be mutually adjusted in times of distress when the borrower cannot pay the nominal interest obligation. Subsequent transfers are dictated by the courts. If the court protects borrowers in these states, the latter obtain a measure of insurance against bad times. The likelihood of such distress is greater for smaller firms. Strengthening enforcement of credit contracts increases the burden of default costs they have to bear, and reduces the insurance value of loans. As a result, smaller firms decide to borrow less.

Large firms on the other hand may decide to borrow more for a number of reasons: they are less risk-averse than small firms, they are less likely to default, and they are able to obtain credit on cheaper terms as lenders risk is reduced.

This theory can therefore explain redistribution of credit when enforcement becomes stronger. But it predicts a decrease in interest rates because of two effects. First, borrowers optimally choose to default less often as liquidation is more costly with stricter bankruptcy laws. This reduces the risk for lenders. Secondly, lenders can expropriate a larger fraction of firms assets in case of default which also makes lending more profitable. Since the required rate of return does not change in the absence of GE effects, the interest rate ought to go down owing to competition among lenders. In general, it cannot explain why it went up.

8 Conclusion

We have documented a contraction of credit, fixed assets and profits for small firms, following an Indian reform which strengthened banks' ability to enforce credit contracts. We explained this by GE effects in the credit markets arising due to inelastic supply of loans. We argued the empirical findings are not easily explained by alternative channels, such as GE effects operating through labor or other factor markets, or the reduced insurance value of loan defaults that would arise in an incomplete contracting setup. This provides a basis for popularly held views among non-economists concerning the adverse effect of strong protection of lender rights on smaller, poorer borrowers.

The empirical and theoretical results cast doubt on the general presumption that strengthening lender collection rights or expanded scope for collateral will relax credit market imperfections for most borrowers, or that

[23] Several other contributions emphasize this aspect of bankruptcy law, e.g. Livshits et al. (2007) and Chatterjee et al.(2007) and also Vig (2007). See also Perri (2007) for a discussion of limited enforcement constraints and the interaction with contingent vs. non-contingent claims. Non-contingent claims is essentially the same as incomplete contracts and the following discussion also applies to models with limited enforcement and non-contingent claims.

aggregate efficiency and output will necessarily rise. If small firms have higher marginal returns to capital, this redistribution of credit may result in an adverse macroeconomic impact. However our analysis did not attempt to measure the macro impact and focused instead on the distributive impacts. While lenders are generally better off due to an increase in credit enforcement, a large fraction of borrowers were adversely impacted. Our results also suggest an adverse impact on workers, but a detailed analysis of this must await further research based on different data.

Another topic that we could not address owing to limitations of the data-set concerns effects on entry of new firms. In India the informal sector in manufacturing is very large, and the Prowess data-set does not include a large fraction of this sector.

In future research, we plan to investigate if capital flows across states can be explained by institutional reforms in credit enforcement by examining cross-state spillovers in credit caused by the DRT reform. This would provide some insight into the extent to which private capital flows across regions and divergence in growth rates can be explained by differences in contract enforcement institutions.

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Table 1a: Summary Statistics all firms.

	All years		Years with DRT changes		1990	
	mean/sd	min/max	mean/sd	min/max	mean/sd	min/max
1990assets	16.5	0/841.8	16.5	0/841.8	16.5	0/841.8
	(42.5)		(42.5)		(42.5)	
Borrowings	76.1	0/18928.5	75.9	0/10148.6	12.0	0/493.4
	(346.8)		(282.1)		(29.5)	
Fix.ass.	121.9	0/45659.8	111.8	0/16246.4	16.5	0/841.8
	(669.4)		(423.9)		(42.5)	
profits	16.5	-1045.0/7251	16.3	-225.4/2259	2.64	-14.4/99
	(122.1)		(77.6)		(7.34)	
interest	0.16	0/4.3	0.17	0/4.3	0.15	0/4.7
	(0.15)		(0.15)		(0.16)	
nonfixa	10.4	-71.2/286.9	10.4	-71.2/286.9	10.4	-71.2/286.9
	(26.6)		(26.6)		(26.7)	
laborintens	0.12	0/2.1	0.12	0/2.1	0.12	0/2.1
	(0.15)		(0.15)		(0.15)	
Indebtn.	1.26	0/483.3	1.26	0/483.3	1.26	0/483.3
	(15.9)		(15.9)		(15.9)	
wagebill	9.81	0/591.7	8.90	0/400.1	1.12	0/19.7
	(25.6)		(18.8)		(2.17)	
years	1996.5	1991/2002	1996.5	1994/1999	1990	1990/1990
	(3.45)		(1.71)		(0)	
Observations	12216		6108		1018	

Standard deviation in brackets.

Table 1b: Summary Statistics by quartile.

	Quart 1		Quart 2		Quart 3		Quart 4	
	mean/sd	min/max	mean/sd	min/max	mean/sd	min/max	mean/sd	min/max
1990assets	0.96	0/2.1	3.49	2.06/5.1	8.36	5.11/13.2	52.9	13.2/841.8
	(0.61)		(0.83)		(2.42)		(73.1)	
Borrowings	16.6	0/1126.2	27.7	0/1895.4	47.9	0/1321.0	202.5	0/18928.5
	(62.7)		(92.7)		(107.4)		(642.5)	
Fix.ass.	21.0	0/1932.7	34.1	0/2283.8	69.4	0/2304.9	346.5	0/45659.8
	(86.6)		(111.9)		(142.2)		(1263.7)	
profits	2.10	-224.3/192	3.13	-275.8/253	8.76	-1045.0/547	49.7	-607.1/7251
	(11.1)		(17.1)		(32.8)		(231.9)	
interest	0.18	0/4.3	0.16	0/3.1	0.16	0/2.8	0.15	0/3.2
	(0.21)		(0.15)		(0.13)		(0.12)	
nonfixa	5.27	-0.23/278.2	4.75	-2.28/155.9	7.26	-7.18/60.5	23.0	-71.2/286.9
	(23.7)		(12.5)		(9.97)		(41.7)	
laborintens	0.20	0/2.1	0.11	0.00074/0.7	0.096	0.0056/0.5	0.080	0.00018/0.6
	(0.24)		(0.10)		(0.090)		(0.079)	
Indebtn.	2.56	0/483.3	0.48	0/13.3	0.49	0/5.1	1.54	0/117.7
	(30.9)		(0.96)		(0.56)		(8.74)	
wagebill	2.22	0/116.6	3.16	0/79.0	7.34	0/121.0	25.3	0/591.7
	(6.73)		(4.95)		(10.4)		(44.5)	
years	1996.5	1991/2002	1996.5	1991/2002	1996.5	1991/2002	1996.5	1991/2002
	(3.45)		(3.45)		(3.45)		(3.45)	
Observations	3060		3048		3024		3084	

Standard deviation in brackets.

Table 2a: DRT Effects on Borrowing and Assets: Baseline Specification.

	OLS regressions				Fixed effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Borr.	Borr.	Fix.ass.	Fix.ass.	Borrow.	Borrow.	Fix.ass.	Fix.ass.
DRT	4.117	-129.2***	9.656	-265.0***	3.388	-103.0***	8.218	-232.8***
	(0.87)	(-3.24)	(0.83)	(-2.99)	(0.71)	(-2.83)	(0.72)	(-2.72)
DRT*Assets		7.624***		15.71***				

Table 3a: Robustness wrt Size-Specific Time Trends.

	(1) Borrow.	(2) Borrow.	(3) Borrow.	(4) Borrow.	(5) Fix.ass.	(6) Fix.ass.	(7) Fix.ass.	(8) Fix.ass.
DRT	-128.3***	-17.10***	-10.69**	-10.77**	-289.9***	-39.82**	-18.02**	-18.09**
	(-2.81)	(-2.88)	(-2.33)	(-2.32)	(-2.63)	(-2.53)	(-2.26)	(-2.24)
DRT*Assets	7.451***	1.234**	0.519	0.519	17.05***	2.830**	0.716	0.717
	(3.10)	(2.47)	(1.29)	(1.28)	(2.81)	(2.24)	(0.98)	(0.98)
YearDummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YDum*Size	No	Yes	Yes	No	No	Yes	Yes	No
YDum*SizeClass	Yes	No	Yes	Yes	Yes	No	Yes	Yes
YDum*SizeCl.*Size	No	No	No	Yes	No	No	No	Yes
number of classes	20		20	20	20		20	20
number of firms	1016	1016	1016	1016	1016	1016	1016	1016
r2	0.423	0.515	0.662	0.662	0.464	0.598	0.772	0.772
N	11265	11265	11265	11265	11265	11265	11265	11265
F	68991.4	12.34	3734.7	1760.1	3714.4	21.84	497.2	5180.4

t statistics in parentheses

Standard errors are clustered at the state-industry level. All regressions use borrower fixed effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3b: Robustness wrt Size-Specific Time Trends.

	(1) Profits	(2) Profits	(3) Profits	(4) Profits	(5) Interest	(6) Interest	(7) Interest	(8) Interest
DRT	-40.22**	-3.780**	-7.309**	-3.726**	0.0115**	0.0110*	0.0135**	0.0126**
	(-2.11)	(-2.31)	(-2.18)	(-2.25)	(2.05)	(1.88)	(2.23)	(2.18)
DRT*Assets	2.496**	0.309**	0.640**	0.309**	-0.0000400	-0.0000702	-0.000181**	-0.000172**
	(2.34)	(2.00)	(2.44)	(1.99)	(-1.01)	(-0.88)	(-2.16)	(-2.08)
YearDummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YDum*Size	No	Yes	Yes	No	No	Yes	Yes	No
YDum*SizeClass	Yes	Yes	No	Yes	Yes	No	Yes	Yes
YDum*SizeCl.*Size	No	No	No	Yes	No	No	No	Yes
number of classes	20	20		20	20		20	20
number of firms	1016	1016	1016	1016	1011	1011	1011	1011
r2	0.282	0.483	0.364	0.483	0.0313	0.00887	0.0318	0.0422
N	11265	11265	11265	11265	10955	10955	10955	10955
F	840.0	951.0	35.05	1658.1	266.7	8.491	2305.0	834.1

t statistics in parentheses

Standard errors are clustered at the state-industry level. All regressions use borrower fixed effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Robustness wrt State-cum-Size-Specific Time Trends

	(1)	(2)	(3)	(4)
	Borrow.	Fix.ass.	Profits	Interest
DRT	-21.38***	-52.09**	-9.536**	0.0113*
	(-2.77)	(-2.58)	(-2.32)	(1.82)
DRT*Assets	1.429**	3.580**	0.815***	-0.0000695
	(2.50)	(2.45)	(2.74)	(-0.86)
YearDummy	Yes	Yes	Yes	Yes
YD*Size	Yes	Yes	Yes	Yes
State Trend	Yes	Yes	Yes	Yes
StateTrend*Size	Yes	Yes	Yes	Yes
number of firms	1016	1016	1016	1011
r2	0.587	0.706	0.513	0.0167
N	11265	11265	11265	10955
F	218.7	171.5	76.62	97.98

t statistics in parentheses

Standard errors are clustered at the state-industry level. All regressions use borrower fixed effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5a: Average effects by quartile.

	Quartiles				First 3 quartiles vs. quartile 4.			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Borrow.	Borrow.	Fix.ass.	Fix.ass.	Borrow.	Borrow.	Fix.ass.	Fix.ass.
DRT	-0.620	-0.761	0.452	-0.257	-2.357*	-2.388*	-2.694	-2.174
	(-0.30)	(-0.50)	(0.30)	(-0.13)	(-1.78)	(-1.87)	(-1.31)	(-1.13)
DRT*class=2	-0.257	-2.127	-1.467	-3.274	21.71	24.25	48.28	62.39
	(-0.09)	(-0.77)	(-0.66)	(-1.14)	(1.26)	(1.36)	(1.08)	(1.19)
DRT*class=3	-4.512	-2.163	-5.703	-0.0187				
	(-1.22)	(-0.71)	(-0.98)	(-0.00)				
DRT*class=4	19.98	22.62	45.14	60.47				
	(1.14)	(1.25)	(1.00)	(1.14)				
YearDummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YearDum*SizeClass	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Statetrend*SizeClass	No	Yes	No	Yes	No	Yes	No	Yes
DRT effect on class 1.	-0.620	-0.761	0.452	-0.257	-2.357*	-2.388*	-2.694	-2.174
P-value class 1 effect.	(0.762)	(0.621)	(0.765)	(0.894)	(0.0772)	(0.0630)	(0.191)	(0.258)
DRT effect on class 2.	-0.878	-2.888	-1.015	-3.530	19.36	21.86	45.59	60.21
P-value class 2 effect.	(0.646)	(0.205)	(0.556)	(0.103)	(0.268)	(0.227)	(0.315)	(0.255)
DRT effect on class 3.	-5.132*	-2.924	-5.251	-0.275				
P-value class 3 effect.	(0.0835)	(0.276)	(0.338)	(0.950)				
DRT effect on class 4.	19.36	21.86	45.59	60.21				
P-value class 4 effect.	(0.269)	(0.228)	(0.315)	(0.256)				
number of firms								
numberofgroups	1016	1016	1016	1016	1016	1016	1016	1016
r2	0.0759	0.0876	0.0662	0.0751	0.0749	0.0855	0.0655	0.0738
N	11265	11265	11265	11265	11265	11265	11265	11265
F	13.21	14.91	19.24	27.15	13.93	15.46	16.37	37.01

t statistics in parentheses

Standard errors are clustered at the state-industry level. All regressions use borrower fixed effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5b: Average effects by quartile.

	Quartiles				First 3 quartiles vs. quartile 4.			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Profits	Profits	Interest	Interest	Profits	Profits	Interest	Interest
DRT	-0.916	-0.679	0.0300**	0.0309**	0.238	0.353	0.0148**	0.0143**
	(-1.44)	(-1.25)	(2.02)	(1.98)	(0.38)	(0.61)	(2.38)	(2.18)
DRT*class=2	1.383	1.388	-0.0165	-0.0194	13.29	17.89*	-0.0173	-0.0150
	(1.20)	(1.23)	(-0.97)	(-1.09)	(1.48)	(1.79)	(-1.57)	(-1.25)
DRT*class=3	1.982	1.577	-0.0247	-0.0258				
	(1.21)	(1.04)	(-1.45)	(-1.47)				
DRT*class=4	14.44	18.92*	-0.0326*	-0.0315*				
	(1.60)	(1.89)	(-1.82)	(-1.66)				
YearDummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YearDum*SizeClass	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Statetrend*SizeClass	No	Yes	No	Yes	No	Yes	No	Yes
DRT effect on class 1.	-0.916	-0.679	0.0300**	0.0309**	0.238	0.353	0.0148**	0.0143**
P-value class 1 effect.	(0.152)	(0.213)	(0.0446)	(0.0486)	(0.702)	(0.545)	(0.0181)	(0.0308)
DRT effect on class 2.	0.468	0.709	0.0136	0.0114	13.52	18.24*	-0.00257	-0.000652
P-value class 2 effect.	(0.620)	(0.467)	(0.0858)	(0.160)	(0.135)	(0.0691)	(0.788)	(0.950)
DRT effect on class 3.	1.066	0.898	0.00539	0.00503				
P-value class 3 effect.	(0.497)	(0.537)	(0.544)	(0.586)				
DRT effect on class 4.	13.52	18.24*	-0.00257	-0.000652				
P-value class 4 effect.	(0.135)	(0.0696)	(0.789)	(0.950)				
number of firms								
numberofgroups	1016	1016	1011	1011	1016	1016	1011	1011
r2	0.0323	0.0530	0.0127	0.0218	0.0321	0.0523	0.0103	0.0174
N	11265	11265	10955	10955	11265	11265	10955	10955
F	9.215	8.951	8.728	12.33	9.030	10.41	8.526	8.375

t statistics in parentheses

Standard errors are clustered at the state-industry level. All regressions use borrower fixed effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6a: Heterogenous impact of DRT.

	(1) Borrow.	(2) Borrow.	(3) Fix.ass.	(4) Fix.ass.	(5) Profits	(6) Profits	(7) Interest	(8) Interest
DRT	-20.18***	-26.77***	-47.43**	-58.30**	-9.112**	-10.45**	0.0174**	0.0186**
	(-2.81)	(-3.03)	(-2.43)	(-2.47)	(-2.29)	(-2.16)	(2.08)	(2.02)
DRT*Size	1.244**	1.261**	2.852**	2.885**	0.645**	0.648**	-0.000101	-0.000110
	(2.48)	(2.51)	(2.25)	(2.27)	(2.45)	(2.46)	(-1.24)	(-1.36)
DRT*Profitab.	7.213*	6.130*	16.74	12.86	4.228	3.829*	-0.0154	-0.0118
	(1.73)	(1.83)	(1.32)	(1.29)	(1.62)	(1.70)	(-0.88)	(-0.65)
DRT*Indebt		0.607***		-0.343		-0.185		-0.000984***
		(4.24)		(-0.81)		(-1.45)		(-2.71)
DRT*Laborint.		46.84**		92.88**		11.27		-0.0156
		(2.26)		(1.97)		(1.17)		(-0.32)
YearDummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YDum*SlopePar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YDum*Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11156	11027	11156	11027	11156	11027	10877	10748

t statistics in parentheses

Standard errors are clustered at the state-industry level. All regressions use borrower fixed effects.

Size is fixed assets measured in 1990. Non-Fixed assets is defined as total assets minus fixed assets (in 1990).

YDum*SlopePar are YD*Profitab, YD*Indebt, and YD*Laborint and used whenever the slope parameter is used in the regressions.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6b: Heterogeneity: Including Non-Fixed Assets.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Borrow.	Borrow.	Fix.ass.	Fix.ass.	Profits	Profits	Interest	Interest
DRT	-24.81***	-33.71***	-55.67**	-68.81***	-11.43**	-12.92**	0.00820	0.00195
	(-2.81)	(-3.32)	(-2.46)	(-2.69)	(-2.21)	(-2.28)	(1.36)	(0.27)
DRT*Size	1.264***	1.289***	2.571**	2.623**	0.509**	0.512**	-0.000133*	-0.0000769
	(2.73)	(2.74)	(2.16)	(2.18)	(2.25)	(2.24)	(-1.79)	(-1.00)
DRT*Non-Fixed Ass.	0.484	0.459	0.978	0.918	0.491	0.480	0.0000602	0.0000139
	(0.53)	(0.49)	(0.53)	(0.49)	(1.02)	(0.98)	(0.30)	(0.07)
DRT*Profitab.	4.826	4.513	10.59	7.279	1.482	1.173	0.00257	0.00256
	(1.05)	(1.20)	(0.84)	(0.74)	(0.79)	(0.84)	(0.27)	(0.26)
DRT*Indebt		2.675***		3.010***		0.665*		-0.00202*
		(2.91)		(3.78)		(1.77)		(-1.68)
DRT*Laborint.		55.48*		99.35*		9.161		0.0685
		(1.72)		(1.76)		(0.80)		(1.56)
YearDummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YDum*SlopePar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YDum*Size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9093	8976	9093	8976	9093	8976	8962	8845

t statistics in parentheses

Standard errors are clustered at the state-industry level. All regressions use borrower fixed effects.

Size is fixed assets measured in 1990. Non-Fixed assets is defined as total assets minus fixed assets (in 1990).

YDum*SlopePar are YD*Profitab, YD*Indebt, and YD*Laborint and used whenever the slope parameter is used in the regressions.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Effects on Wage Bill.

	(1) Wagebill	(2) Wagebill	(3) Wagebill	(4) Wagebill	(5) Wagebill	(6) Wagebill
DRT	-0.787**	-7.327***	-4.576***	-0.413	-0.419	-0.698**
	(-2.00)	(-9.80)	(-3.72)	(-1.37)	(-1.37)	(-2.07)
DRT*Size		0.377***	0.230***	-0.0196	-0.0195	0.0178
		(11.31)	(3.77)	(-0.79)	(-0.78)	(1.04)
YearDummy	Yes	Yes	Yes	Yes	Yes	Yes
YDum*Size	No	No	No	Yes	No	Yes
YDum*SizeClass	No	No	Yes	Yes	Yes	No
YDum*SizeCl.*Size	No	No	No	No	Yes	No
State Trend	No	No	No	No	No	Yes
number of classes			20	20	20	
number of firms	1016	1016	1016	1016	1016	1016
r2	0.156	0.376	0.451	0.491	0.491	0.493
N	11265	11265	11265	11265	11265	11265
F	22.84	29.46	5100.9	3224.5	487.9	4173.3

t statistics in parentheses

Standard errors are clustered at the state-industry level. All regressions use borrower fixed effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A1 : Dates of DRT Establishment

City of DRT (1)	Date of est. (2)	Jurisdiction (3)
Group 1 States		
Kolkata	Apr 27 1994	West Bengal, Andaman & Nicobar Islands
Delhi	Jul 5 1994	Delhi
Jaipur	Aug 30 1994	Rajasthan, Himachal Pradesh, Haryana, Punjab, Chandigarh
Bangalore	Nov 30 1994	Karnataka, Andhra Pradesh
Ahmedabad	Dec 21 1994	Gujarat, Dadra & Nagar Haveli, Daman & Diu
Group 2 States		
Chennai	Nov 4 1996	Tamil Nadu, Kerala, Pondicherry[a]
Guwahati	Jan 7 1997	Assam, Meghalaya, Manipur, Mizoram, Tripura, Arunachal Pradesh, Nagaland[b]
Patna	Jan 24 1997	Bihar, Orissa
Jabalpur	Apr 7 1998	Madhya Pradesh, Uttar Pradesh
Mumbai	Jul 16 1999	Maharashtra, Goa

[a] The Chennai DRT's jurisdiction was expanded to include Lakshadweep on Dec 5 1997.
[b] The Guwahati DRT's jurisdiction was expanded to include Sikkim on Dec 5 1997.

Table A2: Predicting the pattern of DRT incidence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita	0.07							
	(0.05)							
GDP per capita growth rate		0.00				0.00	0.05	-0.00
		(0.00)				(0.00)	(0.04)	(0.00)
Cases pending per capita			0.00			0.01	0.15	-0.01
			(0.00)			(0.01)	(0.11)	(0.03)
Number of judges per capita				-0.15		3.22	27.18	-0.42
				(4.14)		(7.38)	(62.35)	(5.65)
S a e g e e								
Congress & allies					0.05	0.05	0.54	0.04
					(0.11)	(0.13)	(0.91)	(0.13)
Janata & allies					0.08	0.13	1.67	0.06
					(0.12)	(0.14)	(0.86)*	(0.16)
Communist party					0.09	0.10	0.97	0.04
					(0.12)	(0.13)	(0.85)	(0.15)
Regional party					0.08	0.10	1.01	-0.05
					(0.11)	(0.13)	(0.82)	(0.17)
Center's ally					-0.05	-0.05	-0.53	-0.10
					(0.06)	(0.08)	(0.61)	(0.07)
Regression	OLS	OLS	OLS	OLS	OLS	OLS	Probit	Region FE
Ob e a	*184*	*161*	*184*	*184*	*184*	*161*	*69*	*161*
R- a ed	*0.77*	*0.73*	*0.77*	*0.77*	*0.77*	*0.74*	*0.32*@	*0.81*

Notes: The dependent variable takes value 1 if state had a functional DRT in year t, and 0 otherwise. Year dummies in all columns not reported. Observations correspond to 8 years of data (1993-2000) for 23 states. Union territories are excluded. GDP growth rates are not available for 1993. In column (8), the group variable is DRT region. Standard errors in parentheses are clustered by DRT region. * significant at 10%; ** significant at 5%; *** significant at 1%. @ Psuedo R-squared.

Table A4: Effect of DRTs on Processing of Legal Suits, by Claim Size

	Time to	Probability of