

Debt Contract Enforcement and Product Innovation: Evidence from a Legal Reform in India

Tanya Jain IIM Bangalore, tanya.jain18@iimb.ac.in

Rahul Singh Ahmedabad University, rahul.singh@ahduni.edu.in

Chetan Subramanian IIM Bangalore, chetan.s@iimb.ac.in

European Economic Association 2022 Meeting
Bocconi University, Milan

August 24, 2022

Motivation

- Legal Institutions → Financial and Economic Growth [[Levine, 1998](#), [La Porta et al., 1997](#)]
 - Mechanisms not well understood
 - Accumulating physical capital with the same technological knowhow?
 - Undertaking innovation activity?

Motivation

- Legal Institutions → Financial and Economic Growth [[Levine, 1998](#), [La Porta et al., 1997](#)]
 - Mechanisms not well understood
 - Accumulating physical capital with the same technological knowhow?
 - Undertaking innovation activity?
- Focus → Efficiency of debt contract enforcement

Motivation

- Legal Institutions → Financial and Economic Growth [[Levine, 1998](#), [La Porta et al., 1997](#)]
 - Mechanisms not well understood
 - Accumulating physical capital with the same technological knowhow?
 - Undertaking innovation activity?
- Focus → Efficiency of debt contract enforcement
- Developing Countries → Weak enforcement of debt contracts
- **Efficient debt enforcement → supply of credit ↑ → product innovation??**

Motivation

- Relationship between debt contract enforcement and product innovation
 - Recovery value of collateralizable assets $\uparrow \rightarrow$ bank lending \uparrow [[Ponticelli and Alencar, 2016](#), [Rampini and Viswanathan, 2013](#)]

Motivation

- Relationship between debt contract enforcement and product innovation
 - Recovery value of collateralizable assets $\uparrow \rightarrow$ bank lending \uparrow [[Ponticelli and Alencar, 2016](#), [Rampini and Viswanathan, 2013](#)]
 - Threat of premature liquidation $\uparrow \rightarrow$ discourage innovation [[Aghion et al., 1992](#), [Acharya and Subramanian, 2009](#)]

Motivation

Why product innovation?

[Introduction of new product lines]

- Interesting in itself!
 - Key to firm survival. Firms need to keep update their products to satisfy previously unmet demands. [[Klette and Kortum, 2004](#)]
 - Entry into new products by incumbents account for 54.5% of aggregate growth due to innovation in the US [[Akcigit and Kerr, 2018](#)]
- Alternatives: R&D and Patents
 - Non-patenting firms are responsible for the majority of new products in the market [[Argente et al., 2021](#)]
 - Only few (6%) firms use the patent system in the US [[Graham et al., 2018](#)] → Even lower for developing countries
- Product innovation is a complex process → More responsive to financial constraint than research activities.

This Paper

- Causal effect of Debt Contract Enforcement on Product Innovation and Firm Growth in a developing country
- Two Key Challenges
 - **Endogeneity Concerns** → Staggered implementation of Debt Recovery Tribunals (DRTs) due to a legal challenge
 - **Data availability** → Detailed Data on Product Lines manufactured by Indian firms → Prowess

DRTs

Debt Recovery Tribunals (DRTs) are specialised courts set up to expedite the loan recovery process.

- **Before DRTs**

- Before DRTs, all loan recovery cases were processed in civil courts.
- In 1985, more than 40% of the liquidation cases were pending for more than 8 years (GOI Report, 1988)
- A large proportion of bank funds were blocked in NPAs

- **After DRTs**

- Streamlined loan recovery process and improved efficiency
- Time for the issuance of summonses reduces from 449 days in the civil courts to 56 days in DRTs, times to first hearing, presentation of evidence and beginning of arguments reduce as well. [Visaria, 2009]

DRTs

State-time variation in the reform

- 1994 • 5 Tribunals were introduced
Supposed to be established across the country
- 1995 • The law was challenged in the court
- 1996 • Supreme court issued an interim order in favor of DRTs
- 1996-99 • All the remaining states received DRTs

Establishment of DRTs

City of DRT	Date of establishment	Jurisdiction
Kolkata	April 27, 1994	West Bengal, Andaman and Nicobar Islands
Delhi	July 5, 1994	Delhi
Jaipur	August 30, 1994	Rajasthan, Himachal Pradesh, Haryana, Punjab, Chandigarh
Bangalore	November 30, 1994	Karnataka, Andhra Pradesh
Ahmedabad	December 21, 1994	Gujarat, Dadra & Nagar Haveli, Daman & Diu
Chennai	November 4, 1996	Tamil Nadu, Kerala, Pondicherry
Guwahati	January 7, 1996	Assam, Meghalaya, Manipur, Mizoram, Tripura, Arunachal Pradesh, Nagaland
Patna	January 24, 1997	Bihar, Orissa
Jabalpur	April 7, 1998	Madhya Pradesh, Uttar Pradesh
Mumbai	July 16, 1999	Maharashtra, Goa

Data Sources

Data on Product lines:

- Under Companies Act 1956, all firms have to report information on products.
- Prowess Database → Sales and Quantity for all product lines produced by each firm
- Granularity similar to HS-6 classification
- Approximately 2,800 distinct product codes that are linked to 117 NIC 4 digit industries in 22 manufacturing sectors

Prowess Product Classification

NIC 4-digit Industry : Manufacture of knitted and crocheted apparel

Product Code	Product Description
362404040000	Men's overcoats, etc. knitted or crocheted
362404080000	Women's overcoats, etc. knitted or crocheted
362404120000	Men's suits, trousers, etc. knitted or crocheted
362404160000	Women's suits, dresses, etc. knitted or crocheted
362404200000	Men's shirts, etc., knitted or crocheted
362404240000	Women's blouses, etc., knitted or crocheted
362404280000	Men's underpants, pyjamas, etc., knitted or crocheted
362404320000	Women's slips, petticoats, etc., knitted or crocheted
362404360000	T-shirts & other vests, knitted or crocheted
362404400000	Jerseys, pullovers, etc. knitted or crocheted
362404440000	Babies garments & clothing, knitted or crocheted
362404480000	Track suits, ski suits, swimwear, knitted or crocheted
362404520000	Other garments, knitted or crocheted
362404560000	Panty hose, tights, stockings, etc. knitted or crochet
362404600000	Gloves, mittens, etc. knitted or crocheted
362404990000	Other clothing accessories, knitted or crocheted

Data Sources

- Prowess → Firm level variables on sales, assets, expenditures, debt.
- FDI and Tariffs [[Harrison et al., 2013](#)]
- Delicensing [[Aghion et al., 2008](#)]
- Combined Dataset
 - 1991-2004
 - Non-missing observations for sales, product lines, and assets.

Empirical Strategy

Average effect of DRTs

- Average effect of DRT on firm outcomes

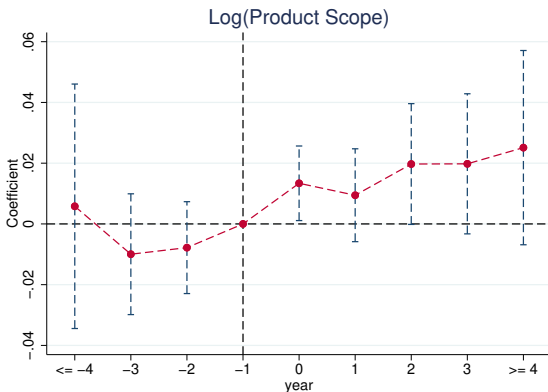
$$y_{isjt} = \alpha_0 + \beta_1 DRT_{st} + \alpha_i + \alpha_{jt} + \epsilon_{isjt}$$

- i, j, s, t denote firm, industry, state and year of observation, respectively
- $DRT \rightarrow$ Indicator variable equals 1 if DRT is implemented in state and 0 otherwise.
- Firm FE and Industry \times Year FE

Pre-Trends

Event study for the effect of DRT on the log(product scope)

$$y_{ijst} = \alpha_0 + \sum_{k=-4}^{-2} \beta_k DRT(k)_{st} + \sum_{k=0}^{+4} \beta_k DRT(k)_{st} + \alpha_i + \alpha_t + \epsilon_{ijst} \quad (1)$$



DRTs and Product Scope

	<i>Log(Product scope)</i>			
	(1)	(2)	(3)	(4)
DRT	0.021** (0.008)	0.021*** (0.006)	0.024*** (0.006)	0.020*** (0.007)
Observations	33859	33859	33746	24514
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	No
Initial product scope quartiles × Year FE	No	Yes	Yes	Yes
Industry×Year FE	No	No	Yes	Yes
State level time trend	Yes	Yes	Yes	Yes

DRTs and Product Scope

Table: Robustness Checks

	Coefficients	Observations
(1) Two-way clustered SE (State and Industry)	0.024*** (0.007)	33746
(2) Time varying firm controls	0.025*** (0.006)	33684
(3) Initial tangible assets quartiles \times time trend	0.020*** (0.006)	16895
(4) Initial sales quartiles \times time trend	0.021*** (0.006)	16912
(5) Initial TFP quartiles \times time trend	0.026*** (0.006)	11989
(6) Initial profitability quartiles \times time trend	0.021*** (0.006)	16912
(7) Initial R&D dummy \times time trend	0.021*** (0.006)	16912
(8) Balanced panel	0.025** (0.012)	7140

Results

- 1 Results driven by high tangible asset firms
 - DRTs account for 55% increase in product scope [► Tangibility](#)

Results

- 1 Results driven by high tangible asset firms
 - DRTs account for 55% increase in product scope [▶ Tangibility](#)
- 2 Firms introduce product lines in new as well as same industries [▶ Entry](#)
 - Introducing product lines in industries outside of their current production suggests bolder innovation moves

Results

- ① Results driven by high tangible asset firms
 - DRTs account for 55% increase in product scope ▸ Tangibility
- ② Firms introduce product lines in new as well as same industries ▸ Entry
 - Introducing product lines in industries outside of their current production suggests bolder innovation moves
- ③ Mechanism → Increase in debt of high tangible asset firms ▸ Debt
 - Increase in product scope of financially constrained firms.

Results

- ① Results driven by high tangible asset firms
 - DRTs account for 55% increase in product scope ▶ Tangibility
- ② Firms introduce product lines in new as well as same industries ▶ Entry
 - Introducing product lines in industries outside of their current production suggests bolder innovation moves
- ③ Mechanism → Increase in debt of high tangible asset firms ▶ Debt
 - Increase in product scope of financially constrained firms.
- ④ Increase in investments that firms need to undertake to introduce new products ▶ Investments

Results

- ① Results driven by high tangible asset firms
 - DRTs account for 55% increase in product scope ▶ Tangibility
- ② Firms introduce product lines in new as well as same industries ▶ Entry
 - Introducing product lines in industries outside of their current production suggests bolder innovation moves
- ③ Mechanism → Increase in debt of high tangible asset firms ▶ Debt
 - Increase in product scope of financially constrained firms.
- ④ Increase in investments that firms need to undertake to introduce new products ▶ Investments
- ⑤ Significant increase in ROA and Operating margins of high tangible asset firms ▶ Firm performance

DRTs and Productivity

	<i>Within Firm</i>			<i>Between Firm</i>			
	<i>Log(TFP)</i>			<i>Log(Capital stock)</i>		<i>Log(Compensation)</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DRT	0.009*** (0.003)	0.003 (0.003)		-0.114*** (0.031)		-0.057** (0.021)	
DRT × HIGH TANG		0.023** (0.011)	0.024** (0.011)				
DRT × HIGH TFP				0.150** (0.060)	0.145** (0.060)	0.101** (0.042)	0.102** (0.040)
Observations	10234	10234	10199	10616	10582	10614	10580
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial DV quartiles×Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State×Year FE	No	No	Yes	No	Yes	No	Yes
State level time linear trend	Yes	Yes	No	Yes	No	Yes	No

Conclusion

What we do:

- (i) Use DRTs as an exogenous variation in the cost of Debt Contract Enforcement
- (ii) Construct product innovation measures
- (iii) Analyze the effect of Debt Contract Enforcement on product innovation (*First Paper!*)

Conclusion

What we find:

- (i) Efficient enforcement of debt contracts increases product scope (DRTs account for 15% increase in product scope)
 - Driven by high tangible asset firms (55%)
- (ii) Products introduced in the new industries
- (iii) Increase in profitability, within firm TFP, and reallocation of inputs towards high TFP firms
- (iv) Mechanism: Bank borrowings

Provides a new channel (introduction of new products) driving the relationship between the efficiency of debt enforcement and firm growth.

Thank You!

Questions and comments are welcome

Empirical Strategy

Heterogeneity based on Asset Tangibility

- Differential effect of DRT on firm outcomes based on asset tangibility

$$y_{isjt} = \alpha_0 + \beta_1 DRT_{st} \times AT_i + \alpha_i + \alpha_{st} + \alpha_{jt} + \epsilon_{isjt} \quad (2)$$

- AT_i is either a continuous measure of tangible assets of a firm in the prereform years (average of 1990-92) or an indicator variable equal to 1 if the firm belongs to the top quartile of tangible asset distribution in the pre-reform years (average of 1990-92)
- Firm FE and State \times Year, Industry \times Year FE

DRTs and Product Scope

	Coefficients	Observations
(1) Delicense dummy \times HIGH TANG	0.049*** (0.016)	10227
(2) FDI dummy \times HIGH TANG	0.039** (0.018)	10227
(3) Output tariff \times HIGH TANG	0.047* (0.020)	10227
(4) State \times Industry \times Year FE	0.056** (0.019)	8095
(5) Two-way clustered SE (State and Industry)	0.052*** (0.013)	10869
(6) Time varying firm controls	0.041** (0.015)	10865
(7) Initial tangible assets quartiles \times time trend	0.051** (0.018)	10869
(8) Initial sales quartiles \times time trend	0.038** (0.018)	10869
(9) Initial TFP quartiles \times time trend	0.045** (0.017)	10548
(10) Initial profitability quartiles \times time trend	0.035** (0.012)	10869
(11) Initial R & D dummy \times time trend	0.049*** (0.015)	10869
(12) Sales Quartile4 \times DRT	0.061** (0.023)	10869
(13) Cash Quartile4 \times DRT	0.080*** (0.017)	10869
(14) Profitability Quartile4 \times DRT	0.039*** (0.012)	10869
(15) Age Quartile4 \times DRT	0.055*** (0.016)	10869
(16) Balanced panel	0.028** (0.012)	6356
(17) Alternative measure of Tangibility	0.054* (0.026)	10869

DRTs and Product Scope: Entry and Exit

	<i>Entry</i>		<i>Exit</i>		<i>Entry rate</i>		<i>Entry in New Industry</i>		<i>Entry in Same Industry</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DRT	0.007 (0.009)		0.013 (0.01)		-0.009 (0.009)		0.018** (0.008)		-0.011 (0.009)	
DRT × HIGH TANG	0.044*** (0.012)	0.050*** (0.012)	0.018 (0.014)	0.021 (0.015)	0.019** (0.008)	0.024** (0.008)	0.026** (0.010)	0.030*** (0.010)	0.013** (0.005)	0.015** (0.005)

DRTs and Borrowings

	<u><i>Long-term debt</i></u> <u><i>Total Assets</i></u>		<u><i>Total Debt</i></u> <u><i>Total Assets</i></u>		<u><i>Log(Total Debt)</i></u>	
	(1)	(2)	(3)	(4)	(5)	(6)
DRT	-0.013** (0.004)		-0.014** (0.005)		-0.067*** (0.021)	
DRT × HIGH TANG	0.022** (0.010)	0.020* (0.011)	0.032*** (0.011)	0.030** (0.012)	0.168** (0.073)	0.164** (0.073)

DRTs and Product Scope: Heterogeneity

Table: Role of Financial Constraints

	<i>RZ index</i>		<i>Firm age</i>	
	<i>Below median</i>	<i>Above median</i>	<i>Below median</i>	<i>Above median</i>
	(1)	(2)	(3)	(4)
DRT × HIGH TANG	0.022 (0.033)	0.107*** (0.017)	0.132*** (0.033)	0.037* (0.019)

DRTs and Investments

	<i>Total investment</i>		<i>Plant & machinery investment</i>		<i>Land & building investment</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
DRT	-0.115** (0.046)		-0.101* (0.050)		-0.121*** (0.038)	
DRT × HIGH TANG	0.460*** (0.102)	0.448*** (0.093)	0.429*** (0.078)	0.411*** (0.076)	0.419*** (0.144)	0.420*** (0.139)

DRTs and R&D

	<i>Total R&D</i>		<i>Current R&D</i>		<i>Capital R&D</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
DRT	-0.119*** (0.026)		-0.133*** (0.022)		-0.007 (0.025)	
DRT × HIGH TANG	0.350*** (0.072)	0.352*** (0.073)	0.341*** (0.066)	0.345*** (0.068)	0.159** (0.075)	0.160** (0.076)

DRTs and Selling and Distribution Expenses

	<i>Selling & dist. expenses</i>		<i>Advertising & marketing expenses</i>		<i>Distribution expenses</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
DRT	-0.093*** (0.029)		-0.135*** (0.033)		-0.035 (0.042)	
DRT × HIGH TANG	0.439*** (0.056)	0.437*** (0.054)	0.410*** (0.069)	0.404*** (0.067)	0.496*** (0.067)	0.493*** (0.066)

DRTs and Firm Performance: Sales

	<i>Sales</i>		<i>Entrant sales</i>		<i>Incumbent sales</i>		<i>Sales per Product</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DRT	-0.058** (0.026)		-0.013 (0.039)		-0.053** (0.021)		-0.072*** (0.025)	
DRT × HIGH TANG	0.194*** (0.055)	0.199*** (0.057)	0.200*** (0.052)	0.222*** (0.053)	0.193*** (0.042)	0.188*** (0.043)	0.176*** (0.041)	0.180*** (0.042)

DRTs and Firm Performance: Profitability

	$ROA = \frac{EBIT}{Assets}$		$Operating\ margin = \frac{EBITDA}{Sales}$	
	(1)	(2)	(3)	(4)
DRT	-0.007* (0.004)		-0.018*** (0.006)	
DRT × HIGH TANG	0.023*** (0.007)	0.024*** (0.007)	0.037*** (0.008)	0.037*** (0.008)

Viral V Acharya and Krishnamurthy V Subramanian.

Bankruptcy codes and innovation. *The Review of Financial Studies*, 22(12):4949–4988, 2009.

Philippe Aghion, Oliver Hart, and John Moore. The economics of bankruptcy reform. *JL Econ. & Org.*, 8:523, 1992.

Philippe Aghion, Robin Burgess, Stephen J Redding, and Fabrizio Zilibotti. The unequal effects of liberalization: Evidence from dismantling the license raj in india. *American Economic Review*, 98(4):1397–1412, 2008.

Ufuk Akcigit and William R Kerr. Growth through heterogeneous innovations. *Journal of Political Economy*, 126(4):1374–1443, 2018.

David Argente, Doireann Fitzgerald, Sara Moreira, and Anthony Priolo. How do firms build market share? *Available at SSRN 3831706*, 2021.

Stuart JH Graham, Cheryl Grim, Tariqul Islam, Alan C Marco, and Javier Miranda. Business dynamics of innovating firms:

Linking us patents with administrative data on workers and firms. *Journal of Economics & Management Strategy*, 27(3):372–402, 2018.

Ann E Harrison, Leslie A Martin, and Shanthi Nataraj.

Learning versus stealing: How important are market-share reallocations to india's productivity growth? *World Bank Economic Review*, 27(2), 2013.

Tor Jakob Klette and Samuel Kortum. Innovating firms and aggregate innovation. *Journal of political economy*, 112(5): 986–1018, 2004.

Rafael La Porta, Florencio Lopez-de Silanes, Andrei Shleifer, and Robert W Vishny. Legal determinants of external finance. *The journal of finance*, 52(3):1131–1150, 1997.

Ross Levine. The legal environment, banks, and long-run economic growth. *Journal of money, credit and banking*, pages 596–613, 1998.

Jacopo Ponticelli and Leonardo S Alencar. Court enforcement, bank loans, and firm investment: evidence from a bankruptcy reform in brazil. *The Quarterly Journal of Economics*, 131(3):1365–1413, 2016.

Adriano A Rampini and S Viswanathan. Collateral and capital structure. *Journal of Financial Economics*, 109(2):466–492, 2013.

Sujata Visaria. Legal reform and loan repayment: The microeconomic impact of debt recovery tribunals in india. *American Economic Journal: Applied Economics*, 1(3): 59–81, 2009.