

Evaluating the impact of the Corporate Debt Restructuring scheme

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The context

- ▶ CDR allows out-of-court debt restructuring of financially viable firms through workouts, coordinated by the banking supervisor.
- ▶ A response to poor insolvency laws and times of crisis.
- ▶ Two beneficiaries:
 1. Debtors get immediate debt relief and an opportunity to turnaround the firm.
 2. Creditors get an opportunity to avoid debt write-offs.
- ▶ Most widely used: the “London Approach”, debt restructuring with regulatory guidelines. (Recession in 1970s in the UK, 1990s; Far East Asian Crisis, in 1997.)
- ▶ Literature on performance evaluation of debt restructuring schemes is scarce. (Iskander et al, 1999; Meyerman, 2000)
- ▶ No econometric evaluation of performance of this approach to debt restructuring to the best of our knowledge.

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The context in India

- ▶ Corporate Debt Restructuring (CDR) scheme was initiated by RBI in 2001.
- ▶ There is a CDR Forum which is a membership of large banks and financial institutions.
- ▶ The discussion about restructuring is organised and managed by the CDR Cell.
- ▶ Debtors can restructure their debt only if:
 1. They can convince their lead banker of their viability;
 2. Jointly with the lead banker, convince the CDR Cell of the same.
- ▶ This is before the final restructuring plan is negotiated. Acceptance of the plan means:
 - ▶ at least 75% of secured creditor participation by value and 60% by number to agree.
 - ▶ Terms of restructuring are binding on remaining creditors.

The question

▶ **Observation:**

- ▶ Since 2008, there have been an accumulation of cases accepted for restructuring through CDR.
- ▶ More cases have been withdrawn as failed than cases that successfully exit CDR between 2005 and 2013.
- ▶ Stressed, restructured and non-performing assets have increased from 10.7% to 11.1% of total advances between September 2014 and March 2015.

▶ Our question: **What is the impact of the restructuring on the performance of firms that obtain CDR?**

▶ Our hypothesis:

- ▶ If the firms find benefit from CDR, their post-CDR performance will be better than the performance of matched firms without CDR.
- ▶ If not, the beneficiaries are likely the creditors who have obtained the benefit of avoiding debt write-offs.

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Our approach

- ▶ Easy to do: an event study of performance of the firms that received CDR.
- ▶ More difficult: establish a control as a firm who was 'eligible for CDR' and who did not get it.
- ▶ Information about firms that applied to the bank for CDR is not available readily.
- ▶ We identify controls as follows:
 - ▶ Find a match for the CDR firm (treated) in the set of firms who have similar financial health before the CDR.
 - ▶ Compare each treated and control firm performance in (a) an event study and (b) difference-in-difference estimation

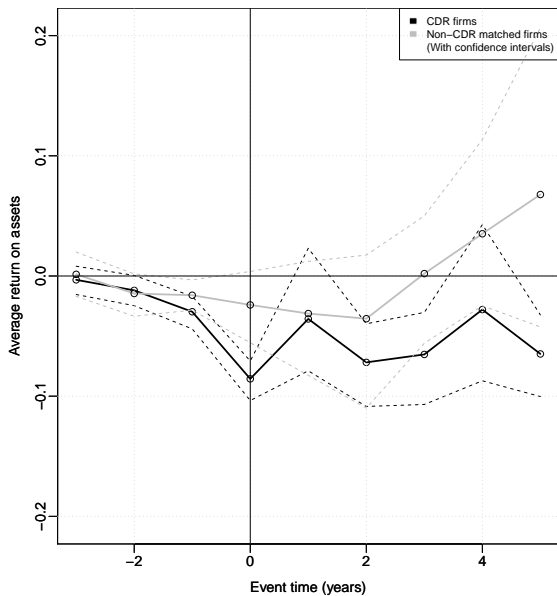
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The data

- ▶ **Source for identities of firms that received CDR:** IDBI CDR Cell data from CAFRAL.
- ▶ **Source for balance sheet and profitability information:** CMIE Prowess.
- ▶ **Scope:** all manufacturing firms restructured under CDR mechanism.
- ▶ **Sample period:** 2003 - 2012.
- ▶ **Data set analysed:**
 - ▶ CDR approvals during the sample period: 491.
 - ▶ 205 manufacturing firms found in Prowess were used in the analysis.

What we find



What we find

$$RoA_{i,t} \sim \alpha + \beta_1 \cdot D_{treated,i} + \beta_2 \cdot D_{postCDR,t} + \beta_3 \cdot D_{treated,i} \cdot D_{postCDR,t} + \epsilon$$

	β_1	β_2	β_3
Estimate	0.00	0.01	-0.06
Std. error	0.01	0.01	0.01
p-value	0.52	0.51	0.00

What we find

- ▶ On average, CDR appears to have no positive benefits for the firms that received it over matched firms without CDR.
- ▶ A closer examination of the period post approval reveals
 1. some benefit in the year immediately after CDR is obtained.
 2. no benefit at the fifth year after CDR.
 3. there is cross-sectional variation in performance: some firms do perform well after CDR, but many of them do not.

Identifying controls for the treated firms

Matching methodology

- ▶ Restructuring offered under CDR is a *non-observational* experiment without a clearly defined control set.
- ▶ To find control firms, we use *matching* methodology using the *propensity score (PS)* model as defined in Rubin and Rosenbaum (1983) and *genetic matching* as defined in Diamond and Sekhon (2013).
- ▶ Covariates which are indicative of *financial health* are used to estimate propensity scores (PS) from logistic regression.

Matching methodology (contd.)

- ▶ *Financial health* of each company is defined using following balance sheet measures:
 1. **Size measures:** Net sales (NS), total assets (TA), retained earnings (RE).
 2. **Profitability measures:** Profit before tax (PBT).
 3. **Short-term indicators:** current assets (CA), current liabilities (CL).
 4. **Long-term debt:** Secured borrowings from banks (SB) and total borrowings (B).

- ▶ Matching is done one year prior to CDR using one-to-one nearest neighbour caliper with replacement.

- ▶ Caliper of 0.25 is applied on propensity score and distance tolerance of 0.02 is used on PBT.

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Econometric evaluation: event study analysis

- ▶ Performance measure: **Return on assets (RoA)**
- ▶ Performance of treated and control samples are observed prior to and post the CDR event.
- ▶ *Event window*: Three years prior to CDR approval and five years post.
- ▶ For statistical accuracy, bootstrap confidence intervals are estimated to obtain range estimates along with point estimates.

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Econometric evaluation: difference-in-difference regression (DID)

- ▶ **Model 1:** performance of the two samples are compared prior to and post CDR.

$$ROA_{i,t} \sim \alpha + \beta_1 \cdot D_{treated,i} + \beta_2 \cdot D_{postCDR,t} + \beta_3 \cdot D_{treated,i} \cdot D_{postCDR,t} + \epsilon$$

- ▶ **Model 2:** performance of the two samples are compared prior to and post CDR and post CDR period is split in two sub periods.

$$ROA_{i,t} \sim \alpha + \beta_1 \cdot D_{treated,i} + \beta_2 \cdot D_{postCDR1,t} + \beta_3 \cdot D_{postCDR2,t} + \beta_4 \cdot D_{treated,i} \cdot D_{postCDR1,t} + \beta_5 \cdot D_{treated,i} \cdot D_{postCDR2,t} + \epsilon$$

$D_{treated,i} = 1$ for CDR firm, else 0

$D_{postCDR,t} = 1$ for years post CDR approval, else 0

$D_{postCDR1,t} = 1$ for immediate 2 years post approval, else 0

$D_{postCDR2,t} = 1$ from the 3rd year post approval, else 0

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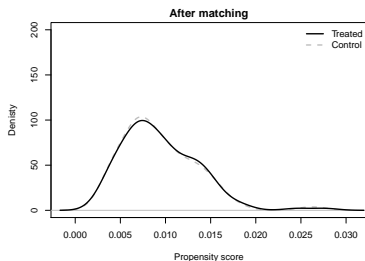
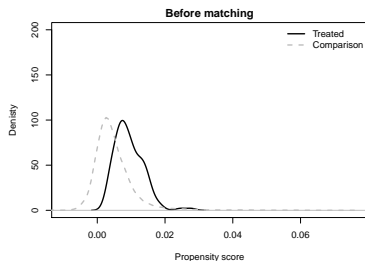
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Outcomes on matching

The matching exercise

- ▶ Out of 205 'treated' firms, control are found for 135 firms. 70 firms were dropped because of very low caliper in matching.
- ▶ The graphs below shows the distribution of propensity scores before and after matching.



Match balance

- ▶ Post matching, KS bootstrap p-values are significant for all covariates – indicative of similarity between the control and treated sets.

Covariate	No. of years prior to CDR	p-values	
		Before match	After match
Net Sales	1	0	0.96
Total Assets	1	0	0.95
Borrowings	1	0	0.82
Secured bank borrowings	1	0	0.55
Fixed assets	1	0	0.17
Net working capital	1	0	0.23
Retained earnings	1	0	0.28
Current assets	1	0	0.46
Current liabilities	1	0	0.43
Profit before tax	1	0	0.73
Profit before tax	2	0	0.26
Return on assets	1	0	0.22
Return on assets	2	0	0.86

Match validation

- ▶ Standardised bias is defined as the difference in means of each covariate, divided by the standard deviation of the full treated group:

$$(\bar{X}_t - \bar{X}_c) / \sigma_t$$

- ▶ The table below shows the standardised bias of covariates before and after matching. Absolute value less than 0.25 indicates 'good' balance.

Covariate	Standardised bias	
	Before matching	After matching
Profit before tax	1.46	0.05
Net sales	0.66	0.16
Borrowings	0.02	0.18
Secured bank borrowings	0.43	0.07
Current liabilities	0.22	0.25
Net worth	0.63	0.06
Fixed assets	0.23	0.09
Net working capital	0.20	0.05
Total assets	1.48	0.06
Current assets	0.23	0.16
Retained earnings	0.92	0.15

- ▶ The ratio of variances of propensity scores for the treated and control groups must lie between 0.5 and 2.
In our case, it is 1.01.

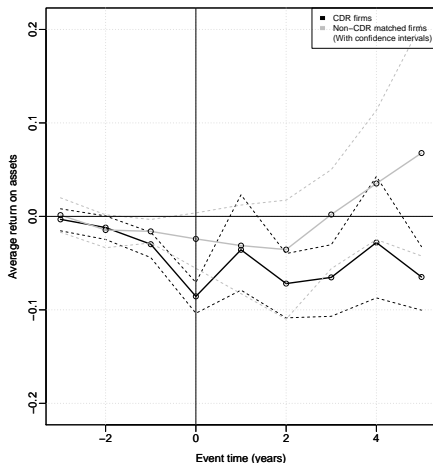
Summary stats of covariates

- ▶ The table below presents the median and median absolute deviation of covariates in comparison, treated and control sets.
- ▶ Matching improves the balance of covariates between treated and control sets.

Covariates	Comparison set		Treated set		Control set	
Profit before tax	1.00	10.23	-9.50	94.59	6.30	103.63
Net Sales	149.00	220.46	1315.90	1233.37	1662.10	1481.86
Borrowings	75.10	109.12	1222.40	982.82	1234.90	1200.02
Secured bank borrowings	64.50	92.22	712.00	728.70	599.70	686.15
Current liabilities	32.20	47.15	306.90	306.31	387.50	423.88
Fixed assets	1.00	1.48	24.00	35.58	29.50	43.74
Net working capital	0.70	31.13	-37.20	212.90	-15.20	338.03
Total assets	148.10	211.42	2261.50	2008.77	2220.30	2015.89
Current assets	41.10	60.49	643.80	610.09	793.00	723.36

Analysis: the impact of CDR on firm performance

Event study of firm performance around CDR



1. Before restructuring (through CDR): treated and control firms had similar levels of average RoA.
2. After restructuring: treated firms showed *lower* profitability than control firms.
3. The negative impact is significant especially in Year 1 and Year 2 after the restructuring under CDR. After this, the significance goes down. (Partly, this is because of the smaller sample available for comparison for greater than two years in the sample.)

DiD estimates

► Model 1:

$$RoA_{i,t} \sim \alpha + \beta_1 \cdot D_{treated,i} + \beta_2 \cdot D_{postCDR,t} + \beta_3 \cdot D_{treated,i} \cdot D_{postCDR,t} + \epsilon$$

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β_3 is *negative* and significant. Firms that restructured their loans under CDR performed *worse* than similar firms that did not receive restructuring benefits.

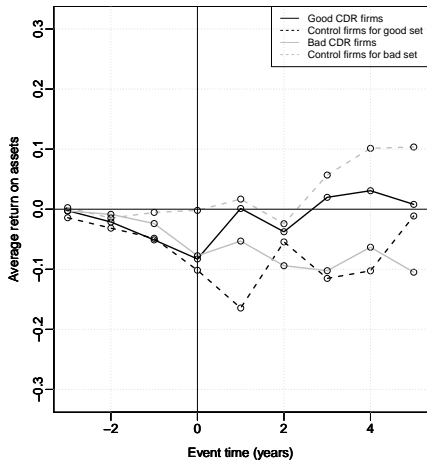
► Model 2: Where the post-CDR period is broken into two: the immediate two years, and the remaining five.

$$IRoA_{i,t} \sim \alpha + \beta_1 \cdot D_{treated,i} + \beta_2 \cdot D_{postCDR1,t} + \beta_3 \cdot D_{postCDR2,t} + \beta_4 \cdot D_{treated,i} \cdot D_{postCDR1,t} + \beta_5 \cdot D_{treated,i} \cdot D_{postCDR2,t} + \epsilon$$

	β_1	β_2	β_3	β_4	β_5
Estimate	0.00	-0.03	0.02	-0.03	-0.08
Std. error	0.01	0.01	0.01	0.02	0.01
p-value	0.52	0.05	0.04	0.05	0.00

Both β_4 and β_5 are *negative* and significant. The short-term as well as long-term performance of the firms that restructured their loans under CDR was *worse* than similar firms that did not receive restructuring benefits.

Heterogeneity of CDR impact



- ▶ To check for heterogeneity in impact of CDR, we divide CDR firms into 2 sets, based on comparative performance of these firms w.r.t control peers.
- ▶ **Observation:** A subset of 'CDR' firms (approximately 20%) do better than their control.
- ▶ **Observation:** Those 'CDR' firms that do worse than their controls, show a deterioration in performance **prior** to receiving CDR.

Future research

- ▶ If CDR does not benefit the debtor who receives it, then do the creditors benefit from the debt write-off?
- ▶ Possible channels of identification:
 - ▶ Heterogeneity in benefits for banks that participate in the CDR process?
 - ▶ Do changes in guidelines on the debt write-off affect the outcomes?
- ▶ The CDR mechanism involves guidelines on possible workouts. Is the observed outcome a reflection of the existing guidelines on the workouts?
- ▶ What are the factors that affect which firm benefits from the CDR and which firms do not?
Are these outcomes because of firm characteristics before receiving CDR (such as industry, size, type of borrowings) or
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Comments / Questions?