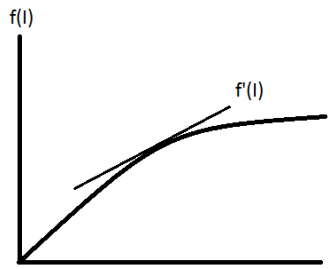


Appendix 1

In this section, we consider a simple theoretical model of a farmer and how his level of investment in his land will respond to the provisions of a tenancy reform such as Operation Barga. We will also consider what dilemma can arise when we take into account eviction threats. For simplification of this model, we remove all time subscripts and hence work under the assumption that all investment efforts get repaid in the same time period.

Assume that the market for the product that the farmer produces is perfectly competitive, such that the market price is fixed at P , and the farmer is a price-taker. Let us also assume that the production is a function of the investment level I , that is the production function is given as $f(I)$. The marginal return to investment effort is assumed to be positive throughout, such that $f'(I) > 0$, and also that investment effort shows diminishing marginal product, i.e. $f''(I) < 0$.



Also, let us assume that putting in a certain level of investment has a cost associated with it, with the per-unit cost of investment effort being c , such that the total cost of putting in effort equal to I is $c.I$.

Finally, let us consider a model wherein the tenant (i.e. the *bargadar*) gets a share θ of the product from the land that he cultivates. Hence, the profit that a bargadar gets from cultivating land is given by:

$$\pi = \theta \cdot P \cdot f(I) - c \cdot I$$

To find the optimal level of investment effort that the *bargadar* will make, we have to maximise this utility function. To simplify the model, we assume that it is a case of unconstrained optimisation, i.e. the tenant has unlimited wealth to invest.

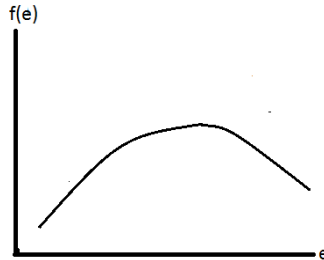
$$\begin{aligned} \frac{d\pi}{dI} = 0 &= \theta \cdot P \cdot f'(I) - c \\ \Rightarrow f'(I) &= \frac{c}{P \cdot \theta} * \end{aligned}$$

The second order condition for profit maximization is given by:

$$= \theta \cdot P \cdot f''(I)$$

Which, by the assumption of diminishing marginal product to investment effort, is negative. Hence, the level of investment derived by the first order condition is the profit-maximising level of investment effort. What Operation Barga did was to increase this share of the total farm output, θ that went to the farmer. Hence, the right hand side of equation * would decrease in value, which will enable the farmer to undertake a higher level of investment I .

Now let us also take into account the fact that eviction threat can actually be an incentive to produce more. Banerjee and Ghatak (2004) have constructed a model in which eviction threat can actually increase production. To this, we feel that the benefit of eviction threat is actually becomes negative after a point of time, such that the graph resembles the Laffer curve.



In our new model, output is a function of both, investment effort and eviction threat. Also, as has been widely established, investment effort is a negative function of the eviction threat, i.e.

$$I = f(e) \\ \Rightarrow e = f^{-1}(I) = g(I)$$

Such that $g'(I) < 0$.

First, we argue that it is economically unwise to operate on the declining portion of the output – eviction threat curve. Let us assume that the tenant is operating on this declining part of the curve at the eviction threat level e_1 . As we reduce the eviction threat level, the output rises, and in the output-investment space, the investment level increases and hence output rises here too. Hence, the farmer will not operate on the declining part of the output – eviction threat curve.

Next, let us now look at the new objective function facing the tenant:

$$\pi = \theta \cdot P \cdot f(e, I) - c \cdot I$$

Now we optimise this objective function with respect to level of investment effort I .

$$\frac{d\pi}{dI} = \theta \cdot P \cdot \left[\frac{\delta f}{\delta e} \cdot \frac{\delta e}{\delta I} + \frac{\delta f}{\delta I} \right] - c = 0 \\ \Rightarrow \left[\frac{\delta f}{\delta e} \cdot \frac{\delta e}{\delta I} + \frac{\delta f}{\delta I} \right] = \frac{c}{\theta \cdot P}$$

In this new case, the effect of increasing θ on the level of investment will be ambiguous because of the signs that these values take.

Hence, in cases where it can be shown that the output increases with the level of eviction threat, the effect of increasing the share of product that goes to the tenant (also, security of tenancy) can have theoretically ambiguous effects on the level of investment in the farm.

Appendix 2

Data

Production of Rice : 1990-91 to 2009-10

('000 tonnes)		WB	UP	TN	Punjab	Orissa	Assam	A.P
1990-91	1991	10436	10260	5782	6535	5275	3270	9654
1991-92	1992	11954	9411	6596	6755	6659	3197	9249
1992-93	1993	11445	9709	6805	7002	5387	3299	8792
1993-94	1994	12110	10210	6749	7642	6616	3361	9562
1994-95	1995	12235	10365	7562	7703	6353	3309	9276
1995-96	1996	11887	10363	5290	6768	6226	3390	9014
1996-97	1997	12636	11770	5805	7334	4438	3328	10686
1997-98	1998	13236	12165	6893	7904	6204	3382	8510
1998-99	1999	13316	11386	8141	7940	5391	3254	11878
1999-00	2000	13759	13231	7532	8716	5187	3861	10637
2000-01	2001	12428	11679	7366	9154	4614	3998	12458
2001-02	2002	15256	12856	6584	8816	7148	3854	11389
2002-03	2003	14389	9594	3577	8880	3276	3738	7327
2003-04	2004	14661	13018	3222	9656	6733	3880	8953
2004-05	2005	14884	9555	5062	10437	6466	3470	9601
2005-06	2006	14510	11133	5220	10193	6859	3552	11704
2006-07	2007	14745	11124	6610	10138	6824	2916	11872
2007-08	2008	14719	11780	5040	10489	7540	3319	13324
2008-09	2009	15037	13097	5182	11000	6812	4008	14241
2009-10	2010	14806	10784	5916	11236	6960	3815	11010

Results – West Bengal Legislative Assembly Elections

	Vote Share	Seat Share
1991	47.39	85.77
1996	48.59	70.63
2001	47.36	68.33
2006	48.39	82.26

East India (EI) and All India (AI) Indices

	AI Index	EI Index
1991	0.26	1.22
1992	0.29	1.21
1993	0.28	1.32
1994	0.27	1.21
1995	0.27	1.27
1996	0.29	1.24
1997	0.29	1.63
1998	0.29	1.38
1999	0.28	1.54
2000	0.28	1.52
2001	0.25	1.44
2002	0.3	1.39
2003	0.4	2.05
2004	0.32	1.38
2005	0.33	1.5
2006	0.3	1.39
2007	0.3	1.51
2008	0.29	1.36
2009	0.28	1.39
2010	0.3	1.37

Appendix 3

The West Bengal Land Revenue Act 1955

Highlights of Chapter III (Bargadars)

- (1) The right of cultivation of land by *bargadar* shall be heritable and shall not be transferable.
- (2) The produce of any land cultivated by a *bargadar* shall be divided as between the *bargadar* and the person whose land he cultivates -
 - (a) In the proportion of 50:50 in a case where plough, cattle, manure and seeds necessary for cultivation are supplied by the person owning the land.
 - (b) In the proportion of 75:25 in all other cases.
- (3) Provided that where the quantity of the produce deposited by the *bargadar* is lesser than the quantity of the produce due to the person whose land he cultivates, the obligation of the *bargadar* with regard to the delivery of the deficiency in relation to the produce shall continue.
- (4) No person shall be entitled to terminate cultivation of his land by a *bargadar* except in execution of an order, made by such officer or authority as the State Government may appoint, one or more of the following grounds
 - (a) that the *bargadar* has without any reasonable cause failed to cultivate the land, or has used it for any purpose other than agriculture
 - (b) that the land is not cultivated by the *bargadar* personally
 - (c) that the *bargadar* has failed to tender or deposit to the full extent the share of the produce
 - (d) that the person owning the land requires it *bonafide* for bringing it under personal cultivation
- (5) No *bargadar* shall be entitled to cultivate more than 4.00 hectares of land.
- (6) No order for the ejectment of a *bargadar* shall be executed except during the months of the Bengali year specified below-
 - (a) in such portions of the district of Darjeeling as may be declared by notification by the State Government to be hilly portions, the month of *Paus* or *Magh*
 - (b) elsewhere, the month of *Chaitra* or *Baisakh*:Provided that proper compensation is paid, in such manner as may be prescribed, by the owner to the *bargadar* for his share of the standing crops, if any.

References

Research for this project has been done from the following sources. Data has been mainly obtained from these papers, or from the Reserve Bank of India (RBI) and Election Commission of India (ECI) sites. We are especially grateful to the writers of the first three papers, since this effort draws a lot from their work, while the other papers were used as background reading.

- (1) From Sharecroppers to Landowners: Paving the Way for West Bengal's Bargadars
RDI Report #121 (June 2004)
- Robin Nielsen, Tim Hanstad
- (2) Empowerment and Efficiency: Tenancy Reform in West Bengal (2004)
- Abhijit Banerjee, Paul Gertler, Maitreesh Ghatak
- (3) Eviction Threats and Investment Incentives
Journal of Development Economics (2006)
- Abhijit Banerjee, Maitreesh Ghatak
- (4) Insights into Land Acquisition Experiences of Indian Businesses
XLRI Jamshedpur, Working Paper: 08-11 (November 2008)
- Ram Kumar Kakani, T L Raghu Ram, Nutan Shashi Tigga
- (5) Land Reform and Agricultural Productivity in India: A Review of the Evidence
Oxford University Press (2007)
- Maitreesh Ghatak, Sanchari Roy
- (6) Tenancy Reforms in India
- Jayant Bhatt
- (7) Did Operation Barga Save Bengal Farmers?
- *Financial Times*, 17th August 2006
- (8) Land Reforms in India
- Patralekha Chatterjee