

BOOK REVIEWS

Agrarian Impasse in Bengal: Institutional Constraints to Technological Change by James K. Boyce, Oxford, Oxford University Press, 1987, xviii + 308 pp.

I

The Bengal region consisting of West Bengal and Bangladesh has been largely bypassed by the success of the green revolution experienced since the mid-1960s in the islands of Southeast Asia and the northwestern part of the Indian Subcontinent. The book under review is an ambitious work investigating the cause for stagnation in Bengali agriculture. It is not only a well-balanced regional study that examines Bengali agriculture from various different viewpoints but also provides theoretical implications of the role played by population factors in the course of economic development and of the so-called hypotheses of induced technological and institutional change.

The book can be divided into two parts. The first is a quantitative study of agricultural performance (Chapters 3 and 4). For both West Bengal and Bangladesh, detailed examinations of official government statistics are made to provide the author's own revised data. Then these are used to compute agricultural growth rates from 1949 to 1980. These rates are broken down into factors of land area, yield, and cropping pattern. This section, I believe, gives valuable source materials. Using these basic data, the second section attempts to clarify the causes for stagnation in Bengali agriculture. Chapter 2 examines major theoretical hypotheses and provides an analytical framework. These hypotheses are then verified with discussions in demographic (Chapter 5), technological (Chapter 6), and institutional (Chapter 7) terms. Multiple regression analysis of macro-data on the district level is employed as a major analytical method.

The following summarizes the major points of the book.

The yield for rice, which is the staple food in Bengal, is extremely low (1.3–1.4 tonnes per hectare), and the agricultural growth rate between 1949–80 was lower than the growth rate of the rural population. One of the major questions is why has land productivity remained at such a low level despite increasing population pressure and the large possibilities for technological advancement. In other words, why has land-saving technological change induced by population pressure not adequately occurred?

First, Mr. Boyce denies the neo-Malthusian claim that the major reason is excessive population itself, by showing that population growth, in itself, affects agricultural growth positively. He shows that the leading input for agricultural growth in Bengal is water control, i.e., irrigation, drainage, and flood control. The question then is what factors impede water control? He points out that it is water control which necessitates collective actions beyond individual farm operators, but that the Bengali countryside lacks institutional mechanisms to promote such collective actions. A more fundamental problem is the divorce of land and labor, i.e., unequal land distribution (a distorted

This review is based on a review of mine published in Japanese in *Nōgyō sōgō kenkyū*, Vol. 42, No. 2 (April 1988).

agrarian structure). This makes collective actions more difficult and consequently impedes water control. At the same time it causes static inefficiency rooted in the incomplete use of the labor force.

These arguments require a certain qualification in the induced innovation theory. In addition to change in factor endowment and product demand, technological/institutional inducement may depend on such factors as conflicts between individuals, groups, and classes.

II

I would like to delineate and evaluate the main points of the book, omitting reference to those sections that examine agricultural growth quantitatively, and focus on the evidence given for factors of agricultural stagnation.

On the relationship between population and agricultural growth in Chapter 5. Mr. Boyce points out that "the view that population growth has a negative impact upon per capita agricultural growth, above and beyond the simple denominator effect, will here be termed the 'neo-Malthusian' position" (p.31). He contrasts this with the induced innovation theory, which says that population growth induces technological change and increases per capita agricultural production. Then he analyzes inter-district variations to show justifications for the induced innovation theory. However, what Mr. Boyce shows is only the fact that population growth has brought about positive agricultural growth though at a rate lower than that of population growth; nevertheless he argues that this indicates that induced technological change, though inadequate, does occur. Technical change definitely does not come within the purview of neo-Malthusian positions, but I do not believe that Mr. Boyce has actively argued in a way that would refute the neo-Malthusian view in which per capita production is one of the key concepts.

In Chapter 6, Mr. Boyce corroborates the strong complementarities between irrigation and chemical fertilizer (or high-yielding varieties) as well as the positive correlation between irrigation ratio and land productivity (or agricultural growth rate). Then he concludes that the leading input for agricultural growth is water control, i.e., irrigation, drainage, and flood control. This chapter contains the most convincing arguments in the book. A minor point I wish to point out is Mr. Boyce's astonishment to find that the irrigation ratio is not positively correlated with cropping intensity. This is probably not surprising, however, if one takes into consideration that the degree of cropping intensity in Bangladesh is mainly determined by whether or not additional rainfed *aus* rice is planted.

Chapter 7 is the book's central part, analyzing how agrarian structure affects agricultural performance. The problem is analyzed first from the viewpoint of static efficiency, then from dynamic efficiency, and finally from the point of institutional/organizational problems to the control of water collectively.

Mr. Boyce looks at the relation between farm size and the static efficiency of agricultural production and concludes that (1) small farms are statically more efficient, (2) this efficiency is due partly to the difference in land quality, but (3) the major reason is the inter-size difference in the marginal opportunity cost of family labor and/or in the supervision cost of hired labor, and (4) the inverse relationship between farm size and static efficiency has shown no signs of weakening since the green revolution.

I systematically analyzed the same 1977 Bangladesh Agricultural Census and came

up with almost the same conclusions so I would agree with what Mr. Boyce says.¹ I would add that the static efficiency of small farms is based on their intensive land use through large labor inputs especially in the additional cultivation of *aus* rice and nonirrigated *rabi* crops. As regards the fourth point mentioned above: with a generally greater ability to raise funds and bear risks, larger farms should be at an advantage in using modern inputs, but the inverse relation still prevails in the post-green revolution Bengal. Why is that? This problem not only relates to rural income distribution, but also may, I believe, help explain agricultural stagnation in Bengal. I would like Mr. Boyce to pursue this problem further.

Looking at the relation between the sharecropping system and static efficiency, Mr. Boyce shows that the productivity of tenant-operated land is lower than that of owner-operated land. Though many empirical studies contend that the effects of sharecropping systems to efficiency are neutral or at least not very important, attention should be paid to the opposite conclusion from studies on Bengal, a point which was already made in my analyses. Mr. Boyce does not look into the causes, but this is an important task yet to be investigated in the actual landlord-tenant relationships in Bengal. Setting aside this problem, recent arguments agree that a sharecropping system is rather inefficient, and if the inefficiency of large farms and the inability of sharecroppers to bear risk are taken into account, the system has to be acknowledged as a second best solution. Mr. Boyce basically gives the same appraisal. He, however, takes a radical view that the problem of distorted agrarian structure lies in unequal distribution of owned land (not operated land), and that the problem must thus be seen as one of owner-operators vis-à-vis sharecroppers and wage laborers rather than one of either sharecroppers or wage laborers.

Turning to the effects of the agrarian structure on dynamic efficiency, Mr. Boyce's regression analyses of the relation between agricultural growth rate between 1949–80 and agrarian structure brings out two major results: (1) there is no evidence that dynamic inefficiency causes a loss in the static efficiency of the small farms, rather the districts with smaller average-size farms achieve a higher agricultural growth rate; (2) no evidence exists that sharecropping causes dynamic inefficiency, rather the districts with higher tenanted land ratio have a higher growth rate. Considering these findings as well as the fact that average tenanted land ratio in Bengal is less than 25 per cent, Mr. Boyce argues that the sharecropping system is not the "major" obstacle to agricultural growth (p. 228). In addition to this, I would point out that due to the overall small scale nature of operations, the inefficiency attributable to large farms is also not the main barrier.

What then do the problems in agrarian structure mean? "In so far as indivisibilities or scale economies in water control exist above the level of the individual farm, the impact of agrarian structure upon agricultural performance cannot be completely revealed by farm-level or district-level analyses. That is, the agrarian structure could have effects upon agricultural performance in the region as a whole which cannot be detected by comparisons of relative performance in its parts" (p. 229).

Mr. Boyce concludes that the fundamental obstacles are the difficulties in providing water control which is characterized as public goods (conflict between individual and social rationality), and the agrarian structure that augments these difficulties. In other

¹ K. Fujita, "Banguradesshu ni okeru nōgyō hatten—nōgyō kōzō to gijutsu henka no kanren o chūshin ni" [Agricultural growth in Bangladesh with special reference to institutional factors], *Ajia keizai*, Vol. 27, No. 12 (December 1986).

words, even small-scale irrigation through low lift pumps or tubewells has scale economies to say nothing of drainage and flood control. In providing public goods, there are problems known as "tragedy of commons," which are worsened because (1) a large number of farms have to cooperate under the conditions of small average size and extreme fragmentation, and (2) the class relations based upon unequal land distribution impede collective actions.

In the abstract, this means a failure of induced institutional change. In short, it is the landlord and rich-farmer class at the top of the rural power structure that suppresses institutional change. Thus, Mr. Boyce's prescription for Bengali agriculture is "a redistribution of property rights in land so as to remove the barriers posed by the vested interests of the rural élite, and the creation of institutions to achieve collective action in water control" (p. 255).

There are definite institutional problems in supplying special inputs like water control, but this is not peculiar to the Bengal region. (One of the special features of irrigation in Bangladesh is, and Mr. Boyce does not touch upon this point, that rather than being a product of public investment it is provided by private investment of small groups of farmers with substantial subsidies. That would make adjustments of interests between individuals, groups, and classes more difficult.)

I believe that the technical traits of water control in the Bengal region, especially in Bangladesh, become crucial. In other words, I think the failure of induced technological change to be more important than that of induced institutional change, a view which contrasts with Mr. Boyce's.

Mr. Boyce neatly deals with agricultural development in Bengal by a simple judgement of technological theory: "There is no inherent technological reason why substantially higher agricultural output in the region could not be realized" (p. 16). The logic is that the rice yield level realized at agricultural experiment stations or in other Asian countries can easily be achieved only if institutional innovation is made. This is almost the same as hypothesizing that Bengali agriculture can smoothly move along the so-called meta-production function in which endogenously determined technological change is included. Mr. Boyce of course agrees that water control is the key input to technological change in agriculture, but says that the obstacles to it are not technological but institutional.

As Mr. Boyce writes, there is still great scope for increased irrigation development (pp. 12-16). However, the geomorphology of delta formation apparently poses technical or economic obstacles to drainage and flood control during the rainy season which greatly affect overall agricultural growth. Although Mr. Boyce recognizes that "[the] realization [of drainage and flood control in the deltas] can be seen to require a combination of public sector initiative, labour mobilization, and sophisticated civil engineering" (p. 12), he is naive in his calculations to "assume that the average yield of *aman* rice in the region could be doubled to 2.7 tonnes per hectare, comparable to rice yields in Sri Lanka and Malaysia, and still [be] only 60 per cent of the experiment station levels" (p. 16). The fact that green revolution technology can be adapted only to those environments where water control is easily achieved, seems to me to imply that the development of the technology has occurred *independently* of the population explosion generally seen in the postwar developing countries. In other words, technological change was not induced but only a product of accident peculiar to region. Regardless of irrigation development in the dry season, in the huge deltas like Bengal, it would be unrealistic to maintain that institutional innovation will move rainy season water control far forward. (Kōichi Fujita)