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THE POLITICAL ECONOMY OF TECHNOLOGICAL CHANGE IN LATIN AMERICAN AGRICULTURE: A DISCUSSION NOTE

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It is very clear from the papers presented yesterday and today and the related discussions that the role of technological change in economic development and social change is complex. The technology design and the economic and social consequences vary widely and are subject to influence and manipulation by a number of interest groups in an effort to capture the gains from technological change.

The farm papers discuss the technological change process with emphasis on the identification of the principal forces that guide the process and their relative importance under various circumstances. The theory of induced innovation emphasizes relative resource endowments as a principal determinant of the rate and direction of technical change to the extent that such endowments are expressed in factor and output markets. The case of the labor saving mechanization of tomato harvesting and processing in California presented by de Janvry and LeVeen is a typical case of technical change brought about by changes in relative factor prices. However, factor and output markets may be distorted and, thus, while reflecting market signals, the technical change path may not reflect actual relative resource endowments. A particular case in point is represented by a situation in which the power over research and technology is vested in a particular group which reflect resource endowments quite different from those generally existing in a particular country. In such a case, technological change is likely to reflect the relative factor and output prices which are valid for the group and not those valid for society at large.

While the institutional arrangements and special interest groups operating within such arrangements may influence the direction of technological change through deliberate distortions of factor and output markets

they may also exercise such influence directly through the political process or even more directly through various incentives such as grants to the research institutions. Of course, such influence or pressure is levelled not only on the technological change process but on the development process in general. Thus, under the assumption of an internally consistent set of policies, technological change would be designed in such a way as to reinforce other efforts to achieve general social and economic goals. This implies that technological change in societies with very skewed asset distribution and where the political power is security held by a small minority of large asset owners is unlikely to be designed for the benefit of the poor unless it is considered important for maintaining political stability. In most of Latin America the rural poor do not represent a serious threat to political stability except in the sense that deteriorating living conditions in rural areas tend to accelerate rural to urban migration. Once in the urban area their political power --expressed as the ability to destabilize the political situation-- increases.

The urban poor do exercise a significant power through such threats. Increasing food prices are particularly powerful in creating social unrest in urban areas and it is clear that food policies including policies related to technical change reflect this reality in many Latin American countries. But since political stability is one of the principal goals of the groups holding the political power, efforts to direct technical change towards commodities and production processes which permit at least some transfer of the economic surplus generated to poor consumers are not inconsistent with the thesis that the politically powerful direct the technical change path for their own benefit.

In a scenario such as the one outlined above we would expect technical change to reinforce existing economic and social inequalities. This is in fact what the empirical evidence shows for cases with a very skewed asset distribution prior to technical change.

Technical change alone cannot be expected to resolve such inequalities. However, together with the apropriate public policies and institutional

changes it can be very powerful in achieving a combined set of growth and equity goals. Unfortunately, together with another set of policies it may contribute to a worsening of an already very uneven income and asset distribution. Efforts to direct technological change towards the solution of equity problems in an environment where institutions and policies do not reflect the desires for such a solution are likely to fail although a large proportion of the economic benefits generated by the recent technological changes in wheat and rice has in fact been captured by low income consumers even in countries where other policies have not favored such benefit distribution.

Furthermore, technical change in agriculture may produce strong employment effects through expanded consumption of locally produced goods. Thus, first round effects of technical change are not sufficient to determine the income distribution effects. The strength and nature of these consumption-employment linkages and their effect on expanding incomes of the rural poor are currently being studied by IFPRI in various countries.

Up to this point it has been implied that the direction of technical change is determined exclusively by a combination of market forces and the political process. Let me now turn to some of the actors in the technology generation and adoption process. While the ultimate decision as to whether to adopt available production technology in a free market economy resides with the producer, it appears that efforts by the agricultural sector as a whole to directly influence the directions of the generation of technology, i.e. research and development, have been rather limited in Latin America. Instead, certain producer groups have exercised great pressures on the research system because they expected to be able to capture a large share of the economic benefits. In some cases, as shown by the PROTAAL research, these groups have in fact been able to capture such benefits. The rural poor, whether landed or landless, appear to have had little or no opportunities for influencing agricultural research.

Exactly what the criteria have been for assigning research priorities in public agricultural research is not all that clear. It appears that external assistance agencies have played a significant role through research

advise, training and financing. Furthermore, the international agricultural research institutes (IARIs) have undoubtedly played a significant role in the commodities they cover. Technical change in irrigated rice in Colombia is a case in point. Although rice producers in the irrigated areas exercised considerable influence over agricultural research in Colombia, the high yielding varieties which resulted in large increases in rice productivity and production were developed at the initiative of CIAT on the basis of genetic materials developed at IRRI. The reason that these varieties were only suited for irrigated rice and not for rainfed rice was not that irrigated rice farmers in Colombia were politically more powerful but rather that a decision was made at IRRI a number of years earlier to focus on irrigated rice.

The effect of the IARIs on technical change and the distribution of the related costs and benefits as well as the effect on national research capacities are interesting questions. However, since the role of the IARIs will be treated in more detail later in the seminar I shall not dwell further on this here except to say that the effects have been significant and that I believe the IARIs have a great advantage over many national research institutions in establishing research priorities because they are not bound by narrow political interests. Thus, they can duly consider the interests of the otherwise voiceless low-income farmer in establishing research priorities.

Researchers and research managers form another set of actors who appear to have had considerable influence over the direction of technology generation in Latin America. My hypothesis is that the large freedom they have enjoyed to pursue their research interests is due primarily to a lack of awareness among politicians of the potentially powerful tool for economic growth and social change provided by research and technological change. As they become more aware of this matter, the politicians are likely to exercise stronger control over research planning, although the interest of politicians in research planning is constraints by the large time gap frequently occuring between research initiation and results compared to the relative short time horizon of most politicians.

In a time where research planning enjoys considerable attention, one should not underestimate the ability of scientific curiosity to guide research in a direction of high pay-off. Many scientific breakthroughs originated from such curiosity. I hypothesize that such curiosity was responsible for the initiation of research to develop the hard tomato which 20 years later was adopted by California farmers as part of mechanizing tomato harvesting.

The general direction of the interest of many agricultural scientists has been towards higher yields per unit area under growing conditions as close to optimal conditions as possible. This, of course, is not unique to Latin America. The large majority of agricultural experiment stations around the world are located in ecological conditions most suited for the particular crops. The results have been that new varieties have benefited farmers controlling the most suited ecological conditions. In Latin America those are usually the largest and most prosperous farmers. In other parts of the world this is not necessarily the case.

The difference between farm size bias and ecological bias of new biological technology is important for policy prescription and technology design and has been poorly understood in much of the literature on the Green Revolution. There is now ample evidence to show that the ecological bias is much more important than the farm size bias within a given ecological zone. Again, the case of rice in Colombia serves as an illustration. In Colombia, rice was produced under rainfed condition on two distinct types of farms: large mechanized and small semi-subsistance farms. The new varieties did not discriminate against small farms, it discriminated against farmers which did not have access to irrigation while benefitting those having such access irrespective of farm size.

One additional comment on the role of the researcher. Since he is frequently trained outside Latin America his perception of the relative resource endowment and asset ownership may reflect the situation in the country where he was trained rather than the country to which he returned. A close interaction with the agricultural sector should alleviate this problem.

What are the lessons learned from the work which we have discussed yesterday and today? In my opinion two messages come through loud and clear:

1. There is a need to improve the relative power of the campesinos in decision-making on design of new technology and related policies and institutional changes. As part of such increasing power, institutions must be established to effectively communicate the production constraints and the constraints to improving the standard of living. The most appropriate approach may be to use the extension service to facilitate a flow of information from the campesino to the research institution. Work under way by some of the IARIs to facilitate such flows either directly or through extension services look very promissing indeed.

   However, merely making the research manager and policy maker aware of the research needs among campesinos need not result in more research and policy attention given to those needs although it may. In the case of research managers and policy makers who either lack the desire to focus on the needs of the campesinos or are under strong political pressures from other interest groups, the information regarding these research needs must be backed by political power. This leads me to the second message namely that,

2. The relative power structure in society must be explicitly considered in research and advise regarding agricultural research and technical change. In much past work these relationship have been ingnored. The work by PROTAAL has clearly illustrated the need for its incorporation. The next step in my opinion is to improve the utility of research related to the power structure for use in the design of policies and technology. For this purpose, we need --as suggested by William Saint yesterday--

to refine the indicators we are using in monitoring and evaluating changes in this structure. We need to make the effort more precise and useful for design and formulation of public policy. I understand that this next step will be discussed during the rest of the seminar.