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FACULTY WORKING
PAPER NO. 1208

On Some Neglected Topics in Development Economics

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November, 1985

On Some Neglected Topics in Development Economics

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This paper was delivered as the Quaid-E-Azam Lecture at the Second Meeting of the Pakistan Society of Development Economists held in Islamabad in May 1985.

Acknowledgements: I am primarily indebted to Professor Syed Nawab Haider Naqvi who gave me detailed comments on the first draft of this lecture and with whom I have had the pleasure of discussing development economics over several years. I am also indebted to colleagues at Illinois, Johns Hopkins, P.I.D.E., and elsewhere who read all or part of the manuscript and gave me the benefit of stimulating, and often conflicting, comments. I thank, in particular, Aké Blomqvist, Werner Baer, Suleiman Cohen, Peter Cornelisse, Hadi Esfahani, Freddy Gottheil, Earl Grinols, Bruce Hamilton, Tatsuo Hatta, M. Irfan, Mohsin Khan, Mahmood Hasan Khan, Faiz Mohammad, Khalid Naqvi, S. M. Naseem, Larry Neal, Sarfaraz Qureshi, Salim Rashid, Partha Sen, Akira Takayama, Paul Uselding, Rajiv Vohra, Paul Wells and Arshad Zaman. Errors are, of course, solely mine.


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ABSTRACT: This paper surveys work in development economics that emphasizes a general equilibrium point of view. In particular the following topics are considered from this viewpoint: public inputs, rural urban migration, educated unemployment, ethnic groups, apartheid, forced labor and North-South trade. The importance of economic theory as well as interdisciplinary studies is emphasized.

In this lecture I shall present to you a variety of topics which are typically not dealt with in textbooks of development economics and whose study, it seems to me, will advance the understanding of our subject. If there is any commonality in the topics that I choose, it lies more in the underlying method of investigation than in substance. What I hope to bring out is the importance and fruitfulness of economic theory--particularly neoclassical economic theory--in giving us insight not only into topical questions but also into the structure of the economic systems concerning which these questions are posed. In addition, I hope to emphasize what any theoretical result makes explicit; namely that it is based on assumptions and to the extent that it increases our understanding of a particular economic phenomenon, it also increases our lack of understanding of all those economic phenomena not covered by those assumptions.[1]

This lecture is then meant to be partly a review, partly a program of research, and partly a set of conjectural analogies. It is clearly not meant to be a "state of the art" summary of a particular area of development economics, as a Handbook Chapter,[2] or a detailed analysis of a particular model, or a justification and elaboration of a particular policy recommendation. I also want to make clear at the outset that by saying that a particular topic is neglected, I do not mean to assert its overriding importance in relation to other topics--simply that it also deserves study.

1. An Excursion into Methodology

Since this is a lecture on the application of neoclassical theory, it is incumbent on me to make clear my view of theory and of its strengths and its limitations.

To begin with, I subscribe to Popper's basic idea that theory precedes observation. He writes:[3]

> Science cannot start with observations, or with the collection of data. Before we can collect data, our interest in data of a certain kind must be aroused: the problem always comes first.

Or again:[4]

> Observation is always observation in the light of theories.

Or yet again:[5]

> Clearly the instruction, 'Observe' is absurd. Observation is always selective. It needs a chosen object, a definite task, an interest, a point of view, a problem.

Finally,[6]

> We are born with expectations; with 'knowledge' which is prior to all observational experience. One of the most important of these expectations is the expectation of finding a regularity. It is connected with an inborn propensity to look out for regularities or with a need to find regularities.

The second idea that I want to put before you relates to Hayek's distinction between simple and complex phenomena, that social sciences belong to the latter and that it is a misplaced hope that methods which have succeeded in the study of simple phenomena will necessarily succeed in the study of complex phenomena. Indeed, Hayek writes:[7]

> A simple theory of phenomena which are in their nature complex is probably merely of necessity false.

For complex phenomena,[8]

> We are interested not only in individual events (but) equally interested in the recurrence of abstract patterns as such; and the prediction that a pattern of a certain kind will appear in defined circumstances is a falsifiable (and therefore empirical) statement. Such a theory destined to remain algebraic because we are unable to substitute particular values for the variables, ceases then to be a mere tool and becomes the final result of our theoretical efforts.

Keynes, in his letter to Roy Harrod, goes somewhat further[9]

> It seems to me that economics is a branch of logic, a way of thinking; and that you do not repel sufficiently firmly attempts a la Schultz to turn it into a pseudo-natural science. The grave fault of the later classical school has been to overwork a too simple or out-of-date model, and in not seeing that progress lay in improving the model; whilst Marshall often confused his models by wanting to be realistic and by being unnecessarily ashamed of lean and abstract outlines. But it is of the essence of a model that one does not fill in real values for the variable functions. To do so would make it useless as a model. For as soon as this is done, the model loses its generality and its value as a mode of thought.

Finally, we have a denial of the existence of laws in the social sciences:[10]

> We may have an elaborate or useful theory about some kind of complex phenomena and yet have to admit that we do not know of a single law which this kind of phenonema obeys.

Thus, like the mathematician, an economic theorist is a discoverer of patterns. However, unlike a mathematician's patterns, ours are not judged primarily on the basis of their beauty, by which one may mean[11] "a very high degree of unexpectedness[12] combined with inevitability and economy," or even on the basis of their seriousness if by this one means[13] "a certain generality and a certain depth." The seriousness of our patterns is rather judged by how they help us to chart out, in

Hayek's phrase,[14] "the consequences of human action but not of human design" or in Merton's conception of the "unanticipated consequences of purposive social action."[15] Popper puts it thus:[16]

> The main task of theoretical social sciences is to trace the unintended social repercussions of intentional human actions.

Indeed, one may further quote Nagel:[17]

> Social phenomena are not generally the intended results of individual actions; nevertheless the central task of social science is the explanation of phenomena as the unintended outcome of springs of action.

Finally, in the words of Arrow:[18]

> The appreciation that the workings of institutions are very different from the intentions of the agents are among the lessons of economic theory.

From all of this, it is but one short step to Myrdal's 1929 plea:[19]

> It should be one of the main tasks of applied economics to examine and unravel the complex interplay of interests as they sometimes converge, sometimes conflict. This ought to be done by economists because the intricacies of the price system are such that interests often run along different lines than those suggested by a superficial examination. We could offer alternative solutions, each one corresponding to some special interests.

In 1972, Arrow rejected[20] "on both logical and historical grounds the widespread suspicion that neoclassical economics is simply an apology for the status quo." In this quotation I would only substitute the word "necessarily" for "simply." It all depends on the problems that are posed and the questions that are asked. I hope that this lecture will further underscore this.

2. An Excursion into Trade Theory

Next, I would like to present the principal features of three models which constitute, by and large, the essentials of the pure theory of international trade.[21] These models furnish, in my view, an indispensible tool-kit for tackling those problems in development economics in which agent interaction is an essential and complicating factor. Two of these models have already been presented in the, by now, famous lectures[22] delivered by Harry Johnson at the Pakistan Institute of Development Economics in 1956 and in 1958. I shall therefore emphasize more recent developments.

Certain features are common to all three models and can be easily summarized. In each, the technology is assumed to be such that two final outputs, say clothing and food, are produced under constant returns to scale, without joint production and using a certain number of primary inputs. The economy is considered too small to influence the international prices of its outputs, both of which are traded in international markets. The factor endowments are allocated between the two outputs on the basis of perfect competition, i.e., marginal productivity pricing. Thus, the parameters are factor endowments and output prices and the unknowns are the quantities of outputs produced, the allocation of the factors and the rates of return to these factors.

It is simply the variation in the number of primary factors that distinguishes the three prototypical models. If there is only one primary input, say labor, we obtain a model associated with the name of Ricardo. With two primary inputs, say labor and capital, each of which is intersectorally mobile, we obtain the Heckscher-Ohlin-Samuelson (HOS)

model. Finally, with three intersectorally mobile primary inputs, say labor, capital and land, we obtain the neoclassical model, a special case of which has been extensively studied recently. If the first two models can be abbreviated as 2x1 and 2x2, this special case termed the Ricardo-Viner (RV) model, is 2x3 but with the added condition that only labor is intersectorally mobile and the other two factors are sector-specific and non-shiftable.

In a Ricardian two-country world, each country specializes in the commodity in which the average productivity of labor is higher. The crucial insight here is that this comparison of labor productivities is made within a country and NOT across countries. This is, of course, the celebrated comparative costs theorem. Once the pattern of production is determined, the allocation of labor within each country is trivially determined. The wage is determined on the basis of average (and equivalently marginal) productivities of the sector which is producing positive output and the international prices, along with the proportions of imports and exports are determined by the individual country demand for food and clothing.

This outcome of complete international specialization no longer necessarily obtains in the HOS model. Under incomplete specialization, such a model exhibits what may be called a <u>decomposibility</u> property whereby some of the unknowns can be determined in isolation from the others and on the basis of only a subset of the parameters. I refer, of course, to the determination of factor returns, wages and rentals, on the sole basis of international prices. This is simply a consequence of the fact that under perfect competition prices are equated to unit

costs in each sector, and since these costs depend on factor returns, we obtain two equations in two unknowns. Obvious as this fact is, its economic consequences bear emphasis. It asserts that changes in the amount of labor or capital have no effect on their returns if the economy remains incompletely specialized.

The two equations, two unknowns subsystem allows us to chart out the effects of changes in international prices on wages and rentals and hence on the distribution of income between capital and labor. This, of course, leads us to the theorem of Stolper-Samuelson which asserts that a change in an international price, say as brought about by a tariff, leads to an unambiguous improvement in the income of one factor and to an unambiguous decline in that of the other. Which factor gains depends on the ranking of the ratio of factor-shares between the two sectors or, in the jargon, on the ranking of value intensities.

Once international prices fix domestic factor prices and hence the choice of technique, i.e., capital-labor ratios in each sector, we can determine the effect of changes in factor endowments on production levels. This, of course, leads us to the theorem of Rybczynski whereby an increase in, say labor, increases the production of one output and decreases that of the other. Which sector expands depends on the ranking of the capital-labor ratios between the two sectors, or again in the jargon, on the ranking of physical intensities.[23]

There are other results on the HOS model such as those pertaining to magnification or reciprocity which are equally pretty but for which I do not have time. However, it is worth underscoring that once we

embed the HOS model in a two country setting, we can locate factor endowments as the sole determinants of the pattern of trade. This is, of course, the celebrated Heckscher-Ohlin theorem of comparative advantage.

All of this was known to Harry Johnson when he lectured in 1956. Subsequent work focused on a situation in which an exogenous differential was postulated between the factor returns accruing in the two sectors. Such a differential was rationalized on the basis of a trade union,[24] or a tax[25] or, more generally, some unspecified factor market distortion.[26] Such a differential could lead to a situation when the ranking based on value intensities did not coincide with that based on physical intensities. This reversal of rankings led to a series of paradoxes, an important one of which is that the supply curves of the two outputs could be downward sloping. Once such perverse price-output responses are established, it became a simple exercise to overturn a variety of results of both a positive and a normative bent.

A contribution which straightens out the ensuing chaos is that of Neary.[27] He showed that under reasonable adjustment processes, be they Marshallian or Walrasian, the coincidence of the rankings of the two sectors is both a necessary and sufficient condition for (global asymptotic) stability of equilibrium. As such these paradoxes were of limited consequence.

Once we turn to the Ricardo-Viner model, the decomposibility property is the first that has to be jettisoned. This is simply on account of the fact that the two international prices are not sufficient to determine the three factor prices; namely wages and capital

and land rents. Once the decomposibility property goes, factor endowments have a say in the determination of factor returns and hence the distribution of income between labor, capital and land. An increase in the mobile factor, say labor, increases both outputs, depresses the wage and increases the returns to the sector-specific factors. An increase in the sector-specific factor on the other hand, increases the output in its own sector, decreases that in the other, depresses its own return and that of the mobile factor and increases the return to the other specific factor. All these are standard results and there are no surprises here. One need only underscore the neoclassical ambiguity as regards the effect of an increase in an output price on the distribution of income. This leads to an increase in the return to the mobile factor if this return is measured in terms of the good whose price has not increased, but a decrease in terms of the good whose price has risen. This result then argues that knowledge of the expenditure patterns of labor are of consequence in the effects of tariffs on their real income levels.

3. Public Inputs

With these preliminaries out of the way, I can now get to the substance of the lecture. The first topic that I want to present relates to inputs which can be used up fully by one sector and yet leave an identical amount available for the other. These are public inputs as formulated by Lindahl, Musgrave and Samuelson.[28] Obvious examples of such inputs are weather reports, flood control programs, provision of infrastructure, programs aimed at reducing salinity and water-logging and undoubtedly many others. It is well-known that the "free market"

cannot handle such commodities in the sense of providing an "optimal" supply. The basic problem has to do with incentives. Given that a particular producer can enjoy the benefits of reduced salinity or take the advantage of weather reports, it is obviously in his interest to understate his demand, and hence his willingness to pay, for such commodities. And, of course, what is in the interest of one producer is obviously in the interest of all producers and hence the public input is undersupplied.

Suppose, however, these incentive problems are overcome and we assume, along with Lindahl, that all agents truthfully reveal their demands for the public inputs. The question still remains as to which of the prototypical models of Section 2, if any, apply.

For concreteness, consider a situation in which food and clothing are produced with the help of intersectorally mobile labor and capital and a public input which is also produced by labor and capital. Let the public input be, in the terminology of Meade, of the unpaid-factor type, which means that there are constant returns to scale in each sector in terms of all the three inputs. Finally, let there be Lindahl pricing for the public input which is to say that each producer pays for the public input the value of its marginal revenue product. Given that the public input is non-traded internationally, we are formally in a 2x2 world of HOS. However, a moment's reflection will convince us that none of the HOS results apply.[29] Nevertheless the questions which we asked of the HOS model can also be asked of our public input model and are as deserving of answers.

Once we abandon Lindahl pricing and impose taxes based on some ad-hoc criterion, the questions become more interesting. If, for example, the cost of the public input are shared on some proportional basis, and laobr markets are perfect, one is obviously interfering in the market for the remaining input, capital. Thus, more realistic pricing rules for public inputs introduce distortions in other factor markets.

It is certainly not my intention to try and answer these questions here. My sole purpose in raising them is to bring out their importance for issues that are of interest to both development economists and trade theorists. For details as to some preliminary answers, I refer you to the work of Manning-McMillan,[30] Negishi,[31] Tawada-Okamoto,[32] Tawada-Abe,[33] Ishizawa[34] and my own.[35]

4. Urban Unemployment

Next, I would like to discuss urban unemployment. This is a pervasive problem for LDC's and it is natural to ask why such unemployment does not act as a sufficient deterrent for rural-urban migration. An idea which has proved fruitful in this context is to consider an alternative equilibrium condition in the labor market, one that substitutes equality of expected wages for the equality of nominal wages. A migrant leaves a secure rural wage and accepts the risk of urban unemployment because his expected urban wage is higher, with the rate of urban unemployment serving as an index for the probability of his finding a job. This idea has now come to be known in the literature as the Harris-Todaro hypothesis[36] but it was very much in the air around the late sixties as can be seen from the contemporaneous writings of

Akerlof-Stiglitz,[37] Blaug et. al.,[38] Harberger,[39] Knight[40] and undoubtedly others.

The Harris-Todaro hypothesis introduces a further unknown; namely the equilibrium rate of unemployment. Indeed, that is its raison d'etre. Thus, if it can be buttressed by a theory of urban wage determination, we have a well-articulated model which can be used to answer a variety of questions. The easiest hypothesis, one that was adopted by Harris-Todaro and by Bhagwati-Srinivasan,[41] is simply to assume a rigid urban wage and rationalize it, for example, as a consequence of government fiat. However, in the seventies, several theories of endogeneous urban wage determination have been proposed. Foremost among these is the work of Joseph Stiglitz[42] who provides a microfoundation for the urban wage in terms of labor-turnover,[43] or in terms of efficiency considerations.[44] One may also mention here the work of Calvo[45] who sees an urban wage as an outcome of trade union behavior.

A natural question arises as to whether all these various models can be sythesized into one. In 1980, I proposed such a generalized Harris-Todaro model[46] but the essential reason for such a synthesis appears to have been missed even in the trade literature. It does not require too much imagination to subsume several models into one, more general, model. Indeed, this is one of the more obvious advantages of the mathematical method. What is important is whether this general model allows us to see relationships and patterns which were obscured when we dealt with the individual special cases and more importantly, whether it allows us to ask, and answer, questions which did not suggest themselves before. Let me speak to these points in the context of the generalized Harris-Todaro model.

The essential idea is that the various theories of wage determination that have been proposed can be summarized in a simple function, for want of a better name, the omega function, relating the urban wage to the rural wage, unemployment rate and rentals.[47] Once such a function is considered, along with the Harris-Todaro hypothesis, as part of a two-sector model, we obtain a model in which the HOS and RV model live as special cases.[48] This observation then naturally suggests an investigation into the question as to whether the basic properties of these special models carry over to the generalized model.

Consider the generalized HT model patterned on the HOS setting. In such a model, capital and labor are the only two primary inputs, capital markets are perfect, urban wages are determined by the omega function and the Harris-Todaro hypothesis holds for the labor markets. Other features remain unchanged and are as discussed in Section 2.

A moment's reflection will now convince you that the decomposability property holds for the generalized HT model. This is a simple consequence of the fact that the two "price equals unit cost" equations, the Harris-Todaro equilibrium condition and the omega function are sufficient to determine the three factors returns and the urban unemployment rate.[49] Thus, not only are factor returns independent of the level of factor endowments as in the HOS set-up, but this independence also extends to the equilibrium rate of urban unemployment. It is now a routine matter to derive the analogues of the Stolper-Samuelson and the Rybczynski theorems. The only modification relates to the fact that they depend on rankings derived from rather more elaborate criteria. The effects of price changes on the distribution of income and

the equilibrium rate of unemployment depend on what I have elsewhere[50] termed the elasticity adjusted factor intensities. Similarly, the effects of changes in factor endowments on output levels depend on unemployment adjusted factor intensities. It is reassuring that in the case when the omega function simply equates the urban and rural wages, i.e., in the HOS setting, our modified factor intensities collapse to the value and physical intensities I mentioned in Section 2.

At this point, a natural question arises as to the existence of reasonable adjustment processes which converge to an equilibrium of the generalized HT model if and only if there is a coincidence of the rankings determined by the two factor intensity criteria. I have provided such an adjustment process in a PDR paper.[51] However, it is worth stating that there also exist adjustment processes of the Walrasian type, i.e., pertaining to price adjustments, for which the result does not hold.[52] It is also worth pointing out that in the special case of rigid urban wages, the elasticity adjusted rankings collapse to a positive constant and thus the result reduces solely to a requirement on the employment adjusted factor intensities as being both a necessary and a sufficient for stability equilibrium.[53] This result has also been shown by Neary[54] but he shows no awareness, even in his subsequent writing,[55] that the relevant guidepost for his stability result is his earlier stability theorem for the HOS, wage-differential, set-up.

Indeed, an additional question suggests itself. In a pioneering analysis of the generalized HT model but with rigid urban wages,[56] Corden-Findlay discovered, what can now be termed, the Corden-Findlay paradox.[57] This is the curious result that a subsidy to urban employment does not necessarily lead to a decrease in the amount of urban

unemployment. One can ask whether the Corden-Findlay paradox, as well as paradoxes pertaining to other policy changes, occurs if and only if the rankings under the two factor intensities do not coincide. I have pursued this question in detail in my quoted paper.[58]

There are several other questions on which the generalized Harris-Todaro model sheds light. These relate to immiserizing growth,[59] negative social opportunity costs,[60] the Brecher-Alejandro proposition,[61] taxes on capital,[62] and undoubtedly others to follow. In each instance the corresponding HOS or RV result is the relevant pointer but the richer setting of the generalized model offers additional consequences and qualifications. I certainly do not have any time for even a cursory discussion of these topics but I feel I must say a few words on the question of gains from trade in the presence of urban unemployment.

There is by now a substantial literature on the question of gains from international trade and on the optimality of tariffs. The effect of trade on unemployment rates is an important policy question and the generalized HT model, in either its HOS or RV variants, is well suited to answering this. However, what needs to be underscored even more is that the generalized HT departs from the total symmetry of the trade theory constructions I discussed in Section 2. The fact that the clothing sector is the export or import sector is totally irrelevant to the results. In our examination of the question of gains from trade in the generalized HT model in a PDR paper,[63] Lin Po-Sheng and I found that the results are sensitive to the commodity being exported. Given the asymmetric nature of the distortion and the direction of migration, such a sensitivity is not at all surprising. However, to my knowledge,

it does not seem to have been emphasized, or even noticed, in the trade theory literature.[64]

5. Educated Unemployment

It is not an uncommon phenomenon in several Asian LDC's that a non-negligible proportion of their educated labor force is either unemployed or underemployed[65] in the sense that individuals are working in jobs for which they are grossly "overqualified." Nevertheless, this does not act as a sufficient deterrent to the demand for higher education. In more concrete terms, university enrollment in graduate programs in (say) English Literature or Theoretical Physics remains high despite the fact that graduates in these subjects make their living by driving taxicabs. There is, of course, a natural analogy to the problem of rural-urban migration and the resulting urban unemployment but in the educated unemployment setting, the problem has an intertemporal rather than a spatial dimension. Simply put, an economic agent has the option of obtaining an income stream with certainty as an unskilled laborer or another stream, the present value of which is presumably higher but uncertain, as a skilled worker. Just as in the Harris-Todaro hypothesis, the demand for education is generated by an equilibrium condition which equates the present value of these streams, with the expected rate of educated unemployment quantifying the probability of getting a job after graduation.

These ideas have been precisely formulated and articulated in the context of general equilibrium models by Bhagwati, Hamada and Srinivasan[66] but their full implications for a dynamic setting have yet to be derived. In the remainder of this section, I discuss some preliminary work in this connection.

In a PDR paper,[67] Datta Chaudhuri and I present an extension of a model due to Findlay-Rodriguez.[68] We consider a two-sector economy which produces a Solow-good which can be consumed or accumulated in the form of physical capital[69] and increments to the educated labor force. The Solow-good is produced by three inputs, capital and skilled and unskilled labor whereas the educated labor force is produced by capital and educated labor. The aggregate labor force grows at an exogenously given rate and a constant proportion of the GNP is invested in capital stock. We thus have a two sector, three input, two asset model in which portfolio choice is regulated by an equilibrium condition dictating that the expected rates of return from investment in capital or investment in education must be the same. This is an interesting model which permits the study of temporary equilibria, those in which capital stock and the size of the educated labor force is fixed, as well as equilibria which will obtain in the steady state. Moreover, one can ask as to the effects of educational subsidies or of changes in saving propensities, not only on the equilibrium values of the capital stock but also on the values of educated unemployment and the steady state size of the educated labor force. I refer you to the paper for details as well as possible extensions.

6. Ethnic Groups

Next, I would like to discuss a problem that is common to most LDC's. This is the presence of economically and socially disadvantaged groups whose advancement is a matter of official policy. Such policy typically takes the form of minimum wage legislation, employment quotas,

regional subsidies and specially targeted development expenditures, all aimed at specific groups. It is natural to ask whether such policies succeed in accomplishing what they are intended to do. Put differently, one can ask whether a particular employment quota increases the employment, and more generally welfare, of the group it is aimed at once all the economic repercussions are taken into account. I would like to present a model which can be used to answer such questions.[70]

Consider a economy with many ethnic groups, each of whom is easily identifiable, and each of whom is engaged in some economic activity, typically agriculture, in their own rural region. There is also a city in which all these ethnic groups can be employed in the production of some output, say manufacturing. There is migration between each region and the urban centre but not between the regions. Let us suppose that all outputs, rural or urban, can be internationally traded and that the economy is too small to influence these prices.

Rural urban migration is regulated according to the Harris-Todaro hypothesis but with the additional wrinkle that a member of the i-th ethnic group calculates his expected wage only on the basis of urban unemployment specific to his group. This is in part a reflection of the fact that information about employment possibilities in the city flows solely through members of the relevant ethnic group who are already in the city. In addition, this modification also takes account of the fact that during the period when he is unemployed and looking for a city job, a migrant has to fall back for support on the employed members of his tribe or region.

Finally, we postulate that the urban employer[71] takes advantage of the segmented nature of his labor force and sets different wages for different groups. In the jargon of the previous section, there is a different omega function for each ethnic group.

Now all the ingredients of our model are complete. Our unknowns are the allocation of the members of each ethnic group among the urban city, the relevant rural region and the unemployed pool; the urban and rural wage of each group; the return to the rural landlords and that to the urban capitalist. The parameters are the international prices and factor endowments.

As I have had occasion to emphasize elsewhere, the basic structure of this model is that of the RV model, and rather than dwell on the results,[72] let me indicate directions in which the model could be further extended.

One obvious extension relates to a land-surplus[73] as opposed to a labor-surplus economy. This would be the case when regional output is produced under constant returns to scale with the help of labor and capital and that this capital is intersectorally mobile. This furnishes a specific way of linking the rural regions among themselves in addition to the linkage through the city. I have not had the opportunity to examine this set-up in detail but it is clear that the relevant pointer is the HOS model and that the results for the sector-specific case will be overturned. Incidentally, this extension also suggests another disaggregated version of the HOS model, a topic that seems to be coming back in fashion.

Another extension relates to that arising from an attempt to apply the model to international migration. It suggests the individual rationality of a country paying different wages to incoming groups of workers who are identical in all respects except their nationality. The differential wages simply reflect differential supply prices.

Of course one can discuss other extensions. There is an obvious game theoretic aspect to our equilibrium notion since a particular ethnic group's union or lobby has its activities conditioned by and conditioning the activities of another group's lobby. Another extension is to have two urban centers rather than one. One could go on but I shall conclude this section by saying that the model can be easily extended to answer a variety of interesting questions that one sees posed in the more popular literature.

7. Models of the Economy of South Africa

Next, I would like to say something about an "ethnic group" problem par excellence, namely the economics underlying the system of Apartheid. It seems to me that simple stylized models which illustrate the structure of the economy of South Africa help us to understand the conflicts and tensions which are inherent in the process of economic development. Of course, in South Africa the solutions have taken a particularly extreme form, but surely the insights they offer also have some relevance for other contemporary economic systems as well as for the understanding of our own colonial past.

It is somewhat surprising that there exist only a handful of studies which attempt to model the South African economic system. Foremost

among these is the work of T. C. Bergstrom,[74] Mats Lundahl[75] and R. Porter.[76] Let me now discuss one of the simpler models that has been proposed by Lundahl and give you a flavor of the questions that can be asked and successfully answered.

For the period corresponding to the first Dutch Settlement in 1652 up to the discovery of gold and diamonds in 1886, Lundahl proposes a two sector model. Each sector produces the same commodity whose price is exogenously given in the international market but one of the sectors uses only native African labor whereas the other uses both African and European labor. The allocation of land is non-shiftable between the two sectors and African labor is allocated on the basis of marginal productivity pricing.

We are thus in the RV world described in Section 2. However, the questions which can be asked of this model introduce subtle variations. Lundahl focuses on two issues, namely:

1) the impact of increased European immigration, particularly on European incomes,

2) the impact of the "alienation of African land."

The first issue, under neoclassical assumptions, reduces to the investigation of an increase in labor supply and one obtains the standard RV results here. The wage rate for Africans falls, the return to African land increases and European incomes increase. As can be expected even from our cursory discussion of the RV model, no factor intensity assumptions are needed.

This is not quite true when European land is exogenously increased. This follows from the assumption that the quantity of land is finite

and, if not in European control, it is being used by Africans. Thus an investigation of (ii) involves taking two comparative-static investigations together, i.e., an increase in European land together with an identical decrease in the land available for Africans. We thus obtain the result that European incomes increase with land alienation if the land-labor ratio is higher in the European sector than in the African sector. Such a result is reminiscent of the HOS model.

Lundahl presents modifications of this model and applies them to more recent periods of South African history. A particularly interesting question relates to the impact of various policy changes on the incomes and welfare of the unskilled European labor--what Lundahl terms the "poor white problem." This is an important issue on account of the conflict that arises between European demands for cheap labor and the political pressures for a "civilized labor policy" that emanate from the European section of the labor force. Even with a resolution of this problem, we continue to have, in the words of Porter,[77]

> the dilemma of white policy. While white policy seeks separation of the races, white living standards depend (to some extent at least) on their ability to extract gains from integration of the races.[78]

Before I move on to my next topic, let me underscore the fact that the type of modeling that I have briefly described is particularly well suited towards answering a question of great topical interest; namely, the impact of trade restrictions on native African welfare and on white attitudes towards change. This question can be dispassionately studied in the context of simple theoretical models which would not only give us a deeper understanding but also indicate what empirical questions need to be formulated and answered.

8. Forced Labor

My discussion of the South African economy and of the concept of 'land alienation' leads me directly to a variety of institutional arrangements that can all be grouped under the rubric of "forced labor." Such arrangements have not yet been incorporated into well-articulated, general equilibrium models but, in my view, such studies are overdue. In any case, they deserve more prominence than is typically accorded to them in standard textbooks.

The primary contribution here is that due to Neiboer[79] and his hypothesis has been given a modern rendering by Domar.[80] The essential idea is as simple as it is tantalizing. Consider a world where land and labor are the only factors of production. In such a set-up, the strength of non-economic institutional constraints on labor are directly related to the land-labor ratio. Consider, for example, an economy which is labor-scarce and land-abundant. For such an economy, the principal constraint is on the availability of labor, and property rights to land are simply not worth very much on account of the fact that there is so much land to go around. In such a situation, the landowners, if they are to survive as a group, must impose noneconomic constraints which bind labor to their land. Slavery, of course, is one such constraint, but as Kloosterboer argues,[81] this is just one possible solution. Indeed, land alienation and the separate homelands option of South Africa is another solution. However, there have been several others and I would like to present a brief listing of some of these.

A solution that was particularly popular during the first fifty years of colonization in Latin America was the encomienda system.[82]

Here the Indian natives kept access to their own land but were "allocated" to the encomendero to whom they were bound till the rest of his life. The latter provided[83] "instruction in the Christian religion and the application of the basic elements of European culture" while the 30-300 Indians provided labor, provision of food, clothing etc. Payment for this work was antithetical to the system since by living in close contact with the Europeans, they were already receiving free instruction in Christian doctrine and on how to avoid indolence and lead an industrious way of life.

A variant of the encomienda system goes under the name of repartimiento or mita.[84] Under this system, Indian labor was drafted and paid wages determined by the state. Labor was assigned to projects which were imperative for the welfare of the state and these included, in addition to public works and labor for monastries, private agricultural, animal husbandry and mining enterprises. The essential point, of course, is that the state was preventing the free play of market forces and assigning a wage lower than the equilibrium one.

As we move into more recent times, forced labor acquires less crude forms. There is the system of debt-bondage or debt peonage whereby a laborer is led into debt which is then transmuted into labor services. Debt peonage occurs, for example, in the American South after the abolition of slavery.[85]

A variant of debt-bondage is the Hacienda system.[86] Here the labor of a particular plantation is obliged to buy all of its provisions from and only from, the plantation shop. Needless to say, the shop extends credit and this credit can be repayed in terms labor services. In the

context of the Hacienda system, we see emerging, what in modern jargon, is termed interlinked markets.[87] An identical agent is both landlord and merchant and uses his role in one market to influence his role in another.

One can discuss other arrangements which make their appearance in the modern colonial period. There are the vagrancy laws which render unemployment legal offense whose punishment, not surprisingly, is a certain amount of labor service. There are "head" taxes which are payable not in "kind" but only in money. These ensure that labor cannot retreat into a subsistence sector but has to become part of the labor force.[88]

One could go on but let me conclude my discussion of this set of issues by a brief mention of interlinked markets in some of the agriculture systems in our subcontinent. Here, the interlinkage takes the form of the identity of the landlord and the moneylender. As analyzed by Bhaduri[89] in the context of Bengal, this gives rise to several interesting consequences, foremost among them being the fact that it may be in the landlord's interest to retard technical progress. However, a natural question arises as to the reason for high rates of interest and consequent debt-bondage in a labor-surplus economy. In such an economy, the landlord does not need invoke extra-economic considerations to ensure a plentiful supply of labor. In an imaginative PDR paper,[90] Datta-Chaudhuri has given an answer to this question in terms of rural-urban migration. If I had the time, I would show you how his model can also be seen as a variant of the HOS and RV models discussed earlier. Instead, I shall simply refer you to his work.

9. North-South Trade

My final topic for this lecture relates to modeling international economic relations between the developing and developed countries, both conceived as aggregated groups. Since the Brandt report,[91] this has been popularized under the term North-South trade.

As I had occasion to remark earlier, even in my brief discussion of the standard trade models, one is impressed by their symmetrical structure. In particular, there is no recognition given to the fact that a commodity which can be produced in a particular country can simply not be produced in another. Note that by this I mean not produced as a consequence of geography and not as an equilibrium outcome a la Ricardo. It would be fair to say that asymmetries relating to both product and factor markets lie at the very essence of North-South trade.

There is by now a small but increasing number[92] of studies devoted towards the formalization of North-South trade. I would like to discuss, in the remaining time allocated to me, two of these models.

The first is a pioneering contribution of Kemp-Ohyama.[93] In their model, North produces manufactures using capital and a primary resource which is only available from the South. The South is also specialized and produces the primary resource with capital as the only input. Both capital and the primary resource are allocated on the basis of marginal productivity pricing. In this simple model, the unknowns are the production levels of manufactures and the primary resource, the international allocation and rental of capital and the returns to the fixed factors in both countries.

In this setting Kemp-Ohyama investigate a variety of policy measures. It is clear that the South can interfere with the price at which its resource is sold to the North and impose a tax which is optimal from its point of view. This is the familiar optimal tariff argument of Beckerdike-Graaff[94] but it is now applied to an intermediate commodity. What is at first surprising is that there is no optimal tax which the North can impose on the South. To put the same observation another way, Northern welfare keeps increasing as North keeps on increasing the price of manufactures that it charges the South. Kemp-Ohyama conclude from this that there is no limit to which the North can exploit the South. This result, of course, is simply a consequence of the fact that as far as the South is concerned, it has no substitute for Northern manufactures and the North is simply exploiting the fact that the South must buy manufactures until it is totally impoverished. This same observation can perhaps be more succinctly summarized by the statement that Northern manufactures in the Kemp-Ohyama world also serve as food.

As one would expect, these conclusions can be overturned in more disaggregated models. In a recent PDR paper,[95] I have introduced a food sector for the South. This not only allows an unspecialized equilibrium for the South but also introduces the problems for the allocation of labor. One interesting result in such a set-up is that the first-best policy for the South prompts an interference in Southern labor markets;[96] specifically a tax on Southern labor working in the primary resource sector. This result can be seen as dual to the Kemp-Negishi[97] argument on tariffs being optimal (2nd best optimal) in the presence of labor market distortions.

In my work with Datta Chaudhuri[98] and Po-Sheng Lin,[99] I have also introduced surplus labor in the South a la Arthur Lewis. The results are interesting and indicate the need for more systematic study.

10. Concluding Remarks

I would like to conclude this talk with three observations.

My first observation relates to the use of mathematics in development economics. Whereas it is certainly true that a more mathematically sophisticated model does not by itself lead to more economic insight, it is equally true, it seems to me, that it does not necessarily offer less. To put the matter another way, rigor may at times also lead to content and the final judgment must be on the basis of the economics and not on the language.

My second observation relates to the lack of robustness in the conclusions derived from simple two-sector models. As I had occasion to illustrate, the results change dramatically with changes in the number of outputs and primary inputs. But this, it seems to me, illustrates the strength and diversity of the subject matter rather than a weakness. Why should we expect one model to be robust in terms of the conclusions it yields and yet apply to a variety of economic systems at various historical periods? Our subject of development economics is a difficult one and the reasons for this are clearly expressed by Keynes.[100]

> Economics is a science of thinking in terms of models joined to the art of choosing models which are relevant to the contemporary world. It is compelled to be this, because, unlike the typical natural science, the material to which it is applied is, in too many

> respects, not homogeneous through time. Good economists are scarce because the gift for using vigilant observation to choose good models, although it does not require a highly specialized intellectual technique, appears to be a very rare one.[101]

In addition, I may add that such a lack of robustness[102] leads to the particular problem being kept in focus and leads to an altogether useful discouragement to the investigation of "grand" models and "grand" ideas.

I began this lecture by emphasizing the importance and fruitfulness of neoclassical economic theory. Let me conclude by a remark emphasizing the importance of interdisciplinary studies. As development economists we simply cannot be constrained by the artificial boundaries[103] of different disciplines and must read widely. Let me illustrate this remark by mentioning an analogy which I have not had the time to develop and which properly belongs in my discussion on North-South models. This is the analogy of the economic problems of the current South with those of the American South. The relevance of the study of the American South for political thought and for world affairs has been brilliantly argued by historians such as Potter[104] and Woodward.[105] I would also like to emphasize the economic dimension. The antebellum and the postbellum South was primarily an agricultural region specialized, by and large, to a single agricultural commodity, cotton, and because of which it was heavily dependent on international markets. It had "backward" labor market structures and, both before and after the War, struggled to achieve equality with the per capita incomes of the dynamic, industrialized regions of the country. To the extent that it has or has not succeeded, may have some useful lessons for us today.

Footnotes

1. This sentence proved to be a source of confusion. Since the idea is Popper's, the following passage may offer some clarification. "Every solution of a problem raises new unsolved problems; the more so the deeper the original problem and the bolder its solution. The more we learn about the world, and the deeper our learning, the more conscious, specific, and articulate will be our knowledge of what we do not know, our knowledge of our ignorance. For this, indeed, is the main source of our ignorance." See page 28 in K. R. Popper, Conjectures and Refutations, 2nd edition, Routledge and Kegan Paul, London, 1965.

2. See, for example, the chapters by W. M. Corden, R. Findlay, R. W. Jones and J. P. Neary in Handbook of International Economics, Vol. 1, R. W. Jones and P. B. Kenen (eds.), Elsevier Science Publishers, New York, 1984.

3. See K. R. Popper, The Poverty of Historicism, London, 1957, p. 121. See also Popper's discussion of the "Searchlight theory of science" in Conjectures and Refutations, pp. 127-128 and Chapters I and II in his Realism and the Aim of Science, Rowman and Littlefield, Totowa, New Jersey, 1983.

4. See K. R. Popper, The Logic of Scientific Discovery, London 1959, p. 59. Also, Conjectures and Refutations, p. 23, footnote 3 on p. 38 and p. 191.

5. See K. R. Popper, Conjectures and Refutations, p. 46.

6. Ibid., p. 47.

7. See F. A. Hayek, Studies in Philosophy, Politics and Economics, Chicago, 1957, p. 28. Henceforth Studies.

8. Ibid., p. 28.

9. See page 296, Vol. XIV, in The Collected Writings of John Maynard Keynes, D. Moggridge, ed., Macmillan, 1973.

10. Page 42 in Studies.

11. See G. H. Hardy, A Mathematician's Apology, Cambridge, 1967, p. 113.

12. Of course, this presumes that one has had sufficiently "schooling" to appreciate the unexpectedness. Thus, for example, Mas-Colell's proof (1974, Journal of Math. Econ.) of the existence of competitive equilibrium in economies without ordered preferences is an unexpected achievement for those (only those?) who have a clear appreciation of the role of the convexity hypothesis of the excess

demand correspondence. To others, it is presumably yet another existence proof!

13. See G. H. Hardy, ibid., p. 103.

14. See Hayek's essay, "The Results of Human Action but Not of Human Design," Chapter Six in Studies.

15. See his article under the same title in American Sociological Review, 1936. Also pp. 61-62 in his Social Theory and Social Structure, Glencoe, Illinois, 1957.

16. In Conjectures and Refutations, p. 342. Also see ibid., p. 124.

17. In Science, Language and Human Rights, American Philosophical Association, Philadelphia, 1952, p. 54.

18. Page 83 in "Models of Job Discrimination," in Anthony H. Pascal (ed.) Racial Discrimination in Economic Life, D. C. Heath, Lexington, Massachusetts, 1972.

19. See page 193 in his The Political Element in the Development of Economic Theory, Routledge and Kegan-Paul, 1953. Originally published in Swedish in 1929.

20. See Arrow, ibid., p. 83.

21. For details into these models, the reader can see, for example, textbooks by Bhagwati-Srinivasan or Caves-Jones or Takayama. The exact references are, respectively, Lectures in International Trade, M.I.T. Press (1984); World Trade and Payments, Little Brown and Co. (1985); International Trade, Holt, Rinehart and Winston (1972).

22. See, in particular, Chapters II and IV, of his Money, Trade and Economic Growth, George Allen and Unwin, 1952.

23. It should be noted that the ranking of physical intensities is identical to that provided by the value intensities. Our distinction between the two is dictated by the discussion to follow.

24. See H. G. Johnson and P. Mieszkowski (1970), "The effects of unionization on the distribution of income: A general equilibrium approach," Quarterly Journal of Economics, 84 (1970), 539-561.

25. As in A. C. Harberger, "The incidence of the corporation income tax," Journal of Political Economy, 70 (1962), 215-240.

26. For details, see S. P. Magee, International Trade and Distortions in Factor Markets, Marcel-Dekker Inc., New York (1976). The reader may also consult R. N. Batra, Studies in the Pure Theory of International Trade, Macmillan, London (1973); or B. R.

Hazari, The Pure Theory of International Trade and Distortions, John Wiley and Sons, New York (1978).

27. J. P. Neary, "Dynamic stability and the theory of factor market distortions," American Economic Review, 68 (1978), 672-682.

28. One must also mention here the names of Kaizuka, Meade and Sandmo. For detailed references, see, for example, my "Public inputs and the pure theory of trade," Zeitschrift für Nationalokonomie, 43 (1983), 131-156.

29. This is primarily because of the presence of the public input which ensures that the factor price equalization theorem no longer holds.

30. See "Public intermediate goods, production possibilities and international trade," Canadian Journal of Economics, 12 (1979), 243-257.

31. See "The excess of public expenditures on industries," Journal of Public Economics, 2 (1973), 231-240, and other references therein.

32. See "International trade with a public intermediate good," Journal of International Economics, 15 (1983), 101-115.

33. See "Production possibilities and international trade with a public intermediate good," Canadian Journal of Economics, forthcoming.

34. See his unpublished Johns Hopkins Ph.D. dissertation, Public Inputs, Increasing Returns and International Trade, 1985.

35. In addition to my paper cited in footnote 28, see my "A factor price and public input equalization theorem," Economics Letters, 5 (1980), 1-5.

36. See M. P. Todaro, "An analysis of industrialization: Employment and unemployment in LDC's," Yale Economic Essays, 8 (1968), 329-492; and "A model of labor migration and urban unemployment in less developed countries," American Economic Review, 59 (1969), 138-148. Also see, J. R. Harris and M. P. Todaro, "Migration, unemployment and development: A two-sector analysis," American Economic Review, LX (1970), 126-142.

37. See "Capital, wages and structural unemployment," Economic Journal, 79 (1969), 269-81.

38. M. Blaug, P. R. G. Layard and M. Woodhall, The Causes of Graduate Unemployment in India, Allen Lane Press, 1969.

39. A. C. Harberger, "On measuring the social opportunity cost of labour," International Labour Review, 103 (1971), 559-579.

40. J. B. Knight, "Labour allocation and unemployment in South Africa," Oxford Bulletin of Economics and Statistics, 40 (1978), 93-129.

41. See "The ranking of policy interventions under factor market imperfections: The case of sector-specific sticky wages and unemployment," Sankhya, (1973) Series B; and "On reanalyzing the Harris-Todaro model: Policy rankings in the case of sector-specific sticky wages," American Economic Review (1974), 502-508. Also see T. N. Srinivasan and J. N. Bhagwati, "Alternative policy rankings in a large, open economy with sector-specific minimum wages," Journal of Economic Theory, 11 (1975), 356-371.

42. For a survey of his work, see "The structure of labor markets and shadow prices in LDC's," in Migration and the Labor Market in Developing Countries, R. H. Sabot (ed.), Westview Press, Boulder, Colorado, 1982. Also see, "Some further remarks on cost-benefit analysis," Project Evaluation, Hugh Schwartz and Richard Berney (eds.), Inter-American Development Bank, 1977.

43. "Alternative theories of the determination of wages and unemployment in LDC's - I. The labor turnover model," Quarterly Journal of Economics, 88 (1974), 194-227.

44. "The efficiency wage model," Cowles Foundation Discussion Paper, 1973. Also see, "The efficiency wage hypothesis, surplus labor and the distribution of income in LDC's," Oxford Economic Papers, 28 (1976).

45. Guillermo A. Calvo, "Urban unemployment and wage determination in LDC's: Trade unions in the Harris-Todaro model," International Economic Review, 19 (1978), 65-81.

46. See "The Harris-Todaro hypothesis and the Heckscher-Ohlin-Samuelson trade model: A synthesis," Journal of International Economics, 10 (1980), 527-547.

47. See, ibid., equation (4).

48. See ibid. and also my "A multisectoral model of a small, open economy with non-shiftable capital and imperfect labor mobility," Economics Letters, II (1979), 369-375.

49. See page 536 in the paper cited in footnote 46.

50. See my "Dynamic stability, wage subsidies and the generalized Harris-Todaro model," The Pakistan Development Review, XIX (Spring 1980), 1-24.

51. Ibid., Section 5.

52. Ibid., page 18. This dynamic process may have some relevance for the Herberg-Kemp-Neary exchange in H. Herberg and M. C. Kemp, "In

defense of some paradoxes of trade theory," American Economic Review, 70 (1980), 812-814; and J. P. Neary, "This side of Paradox, or, in defense of the correspondence principle: A reply to Herberg and Kemp," American Economic Review, 70 (1980), 815-818.

53. Ibid., Section 4.1.

54. See J. P. Neary, "On the Harris-Todaro model with intersectoral capital mobility," Economica, 48 (1981), 219-234.

55. See, for example, the discussion of the Harris-Todaro model in the Jones-Neary paper quoted in footnote 2.

56. See their, "Urban unemployment, intersectoral capital mobility and development policy," Economica, XLII (1975), 59-78.

57. See also Neary's paper cited in footnote 54.

58. See the citation in footnote 50.

59. See my "Social opportunity costs and immiserizing growth: Some observations on the long run versus the short," Quarterly Journal of Economics, 1982, 353-362.

60. Ibid. Also Stiglitz' work cited in footnotes 42, 43 and 44.

61. See my "Tariffs, foreign capital and immiserizing growth with urban unemployment and specific factors of production," Journal of Development Economics, 10 (1982), 245-256.

62. See my paper with S. N. H. Naqvi on "Capital markets and urban unemployment," Journal of International Economics (1984).

63. See "Sub-optimal tariff policy and gains from trade for LDC's with urban unemployment," Pakistan Development Review, XXI (Summer 1982), 105-126.

64. See, for example, Corden's Handbook chapter cited in footnote 2.

65. See, for example, the book by Blaug et. al. cited in footnote 38 as well as their references.

66. See Bhagwati-Srinivasan, "Education in a 'job ladder' model and the fairness-in-hiring rule," Journal of Public Economics, 7 (1977), 1-22. Also see Bhagwati-Hamada, "The brain drain, international integration of markets for professionals and unemployment: A theoretical analysis," Journal of Development Economics, 1 (1974), 19-42; and "Domestic distortions, imperfect information and the brain drain," in The Brain Drain and Taxation Vol. II, J. N. Bhagwati (ed.), North Holland, Amsterdam (1976).

67. See our "Educated unemployment, educational subsidies and growth," The Pakistan Development Review, XXIII (Summer 1984), 395-409.

68. See their "A model of economic growth with investment in human capital," in Research in Human Capital and Development, Vol. II, M. Ali Khan and I. Sirageldin (eds.), JAI Press, Greenwich, Connecticut, 1981.

69. The reference, for those needing it, is R. M. Solow, "A contribution to the theory of growth," Quarterly Journal of Economics, 1956.

70. This model is taken from my Economics Letters paper cited in footnote 48 and from my joint paper with T. Datta Chaudhuri, "Development policies in LDC's with several ethnic groups--a theoretical analysis," Zeitschrift für Nationalökonomie, 45 (1985), 1-19.

71. As Tatsuo Hatta pointed out to me, the fact that there is a single employer bears emphasis.

72. The interested reader is referred to the citations in footnote 70.

73. For a land-surplus model of a different genre, see Bent Hansen, "Colonial economic development with unlimited supply of land: A Ricardian case," Economic Development and Cultural Change, 27 (1979), 611-627.

74. See "On the existence and optimality of competitive equilibrium for a slave economy," Review of Economic Studies, 38 (1971), 23-36.

75. See his "The rationale of apartheid," American Economic Review, 72 (1982), 1169-79; and "Economic effects of a trade and investment boycott against South Africa," Scandinavian Journal of Economics, 86 (1984), 68-83.

76. See his "A model of the Southern African-type economy," American Economic Review, 68 (1978), 743-55. Also his "International trade and investment sanctions: Potential impact on the South African economy," Journal of Conflict Resolution, 23 (1979), 579-612.

77. Page 34 in Porter, "A model of the Southern African type economy," Discussion Paper No. 60, The University of Michigan, Ann Arbor, 1976.

78. Larry Neal pointed out to me that Robert Higgs' work on Southern labor markets in the late nineteenth century also points up this kind of dilemma very well even though Higgs limits himself to wage labor in manufacturing. See Robert Higgs, Competition and Coercion: Blacks in the American Economy 1865-1914, Cambridge University Press, 1977. Also his The Transformation of the American Economy 1865-1914: An Essay in Interpretation, John Wiley and Sons, New York, 1971.

79. See H. J. Nieboer, Slavery as an Industrial System, Martinus Nijhoff, The Hague, 1900.

80. See E. D. Domar, "The causes of slavery or serfdom: A hypothesis," Journal of Economic History, 30 (1970), 18-32.

81. See W. Kloosterboer, Involuntary Labour since the Abolition of Slavery, Greenwood Press, Westport, Connecticut, 1960.

82. See, ibid., Chapter 7.

83. Ibid., p. 80.

84. Ibid., Chapter 7.

85. See Roger L. Ransom and Richard Sutch, "Debt peonage in the cotton South after the civil war," Journal of Economic History, 32 (1972), 641-669 and the references therein. Also see their book One Kind of Freedom, Cambridge University Press, London, 1977.

86. See E. R. Wolf, "The Hacienda system and agricultural labor in San José," Puerto Rico," in Social Inequality, A. Béteille (ed.), Penguin Books, Middlesex, England, 1969. Also see Richard B. Lindley, Haciendas and Economic Development: Guadalajara, Mexico at Independence, University of Texas Press, Austin, 1983.

87. There is by now a substantial literature on this topic. See, in particular, P. K. Bardhan, "Interlocking factor markets and agrarian development: A review of issues," Oxford Economic Papers, March 1980; and A. Braverman and J. E. Stiglitz, "Sharecropping and the interlinking of agrarian markets," American Economic Review, September 1982.

88. See, in particular, Chapters 5 and 6 in Richard D. Wolff, The Economics of Colonialism: Britain and Kenya, 1870-1930. Also see, Chapter 4 in M. Mamdani, Politics and Class Formalion in Uganda, Monthly Review Press, New York, 1976.

89. See A. Bhaduri, "A study in agricultural backwardness under semi-feudalism," Economic Journal, 1973 (120-137). Also see his "On the formation of usurious interest rates in backward agriculture," Cambridge Journal of Economics, 1 (1977), 341-352; and T. N. Srinivasan, "Agricultural backwardness under semi-feudalism," Economic Journal, June 1979.

90. See his "The role of institutions in rural-urban migration and urban unemployment in LDCs: With and without changing level of indebtedness of the peasantry," The Pakistan Development Review, XXI (1982), 127-147.

91. North-South: A Program for Survival, The MIT Press, Cambridge, Massachusetts, 1980.

92. See Findlay's chapter in the Handbook cited in footnote 2. Also see G. Chichilnisky, "Terms of trade and domestic distribution: Export-led growth with abundant labour," Journal of Development Economics, 8 (1981), 163-192 and the symposium on her work in Journal of Development Economics, 15 (1984), 89-184.

93. M. Kemp and M. Ohyama, "On the sharing of trade gains by resource-poor and resource-rich countries," Journal of International Economics, 8 (1978), 93-115. Also see R. Findlay, "Economic development and the theory of international trade," American Economic Review, 69 (1979), 186-190.

94. See, for example, Chapter 11 in R. E. Caves and R. W. Jones, World Trade and Payments, Little Brown and Co., 4th edition, 1985.

95. See my "International trade and foreign investment: A model with asymmetric production," The Pakistan Development Review, XXIII (1984), 509-530.

96. Ibid., page 525.

97. In their, "Domestic distortions, tariffs and the theory of the optimum subsidy," Journal of Political Economy, 77 (1969), 1011-1013. Also see J. N. Bhagwati, V. K. Ramaswami and T. N. Srinivasan, "Domestic distortions, tariffs and the theory of the optimum subsidy: Some further results," Journal of Political Economy, 77 (1969), 1005-1010.

98. See our "Sector-specific capital, interconnectedness in production and multinationals," Canadian Journal of Economics, 17 (1984), 489-507. Also see corrections of this paper by Leslie Young, "International investment in a labour-surplus country," University of Texas at Austin, November 1984; and T. D. Chaudhuri and M. Ali Khan, "Commercial policy in an asymmetric world economy," BEBR Faculty Working Paper No. 1106, January 1985.

99. See our "Two-way capital flows in an asymmetric world economy," Manchester School of Social and Economic Studies, forthcoming.

100. See p. 297-298 in the reference cited in footnote 9.

101. On this, also see R. W. Fogel, "The specification problem in economic history," Journal of Economic History, XXVII (1967), 283-308.

102. In this connection, I may add for what it is worth, that we are in the company of great mathematical disciplines such as differential geometry and differential topology where, for example, results which are true for dimensions not equal to four are false in four dimensions.

103. On this see the Preface in Popper's Realism and the Aim of Science cited in footnote 3.

104. See his "The Civil War in the history of the modern world," Chapter XI in David M. Potter, The South and the Sectional Conflict, Louisiana State University Press, Baton Rouge, 1968.'

105. See his "The irony of Southern history," The Journal of Southern History, XIX (1953), 3-19. Also see, C. Vann Woodward, The Burden of Southern History, Louisiana State University Press, Baton Rouge, 1960.

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