Economic development

GROWTH STAGE THEORIES, DUAL ECONOMY MODELS AND AGRICULTURAL DEVELOPMENT POLICY

Vernon W. Ruttan

Department of Agricultural Economics
University of Minnesota

J.S. McLean Visiting Professor Lecture

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University of Guelph

Department of Agricultural Economics
University of Guelph

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1.0 Introduction

Economic doctrine with respect to the contribution of agricultural and industrial development to National economic growth has experienced a sharp transition during the last decade. Analysts who were emphasizing the critical contribution of urban-industrial growth to agricultural development a decade ago are now equally impressed with the importance of an agricultural surplus for economic development.[1/]

In part this change in emphasis is a product of the new range of development problems with which economists have begun to concern themselves. In western economies, characterized by rapid technological progress in agriculture, relatively modest rates of population growth and declining income elasticities of demand for farm products, rapid urban industrial development is clearly essential if the rural labor that has been made redundant by rapid gains in labor productivity in agriculture is to escape from low productivity employment in the rural sector and make an important contribution to national economic growth. This is particularly true in (a) the less industrialized regions of major national economies, such as Southeastern United States and (b) the less industrialized nations of multinational economic systems, such as the Southern European members or associate members of the EEC.

*The material in this paper draws very heavily on material from two earlier papers: (a) "Growth Stage Theories and Agricultural Development Policy", Australian Journal of Agricultural Economics, Vol. 9, No. 1, pp. 17-32 and (b) "Engineering and Agricultural Development", paper presented at Conference on Engineering and the Building of Nations, Estes Park, Colorado, August 27-September 1, 1967, (Praeger, forthcoming).

During the last decade the attention of economists has increasingly shifted to a concern with the conditions under which an agricultural surplus can occur and be sustained. This reflects the increasing involvement of western economists in the analysis of development problems in nations characterized by static agricultural technology, high income elasticity of demand for agricultural products, rapid population growth, and "pathological" growth of urban centers. It also represents a pragmatic response to the lack of success of much of the development efforts and development assistance, that has been attempted by both national and international agencies outside of the western economic system - in Asia, Africa and Latin America.

No clear-cut system of "new development economics" has emerged to dominate the field of economic development theory as completely as the "new economics" based on Keynes' work dominated income, employment and growth theory after 1936. Two approaches have established a substantial "claim", however, in the race to stake out the boundaries of a "new development economics." One of these approaches is the "growth stage" or leading sector approach which, in recent literature, has been closely identified with Rostow. 2/ The other is the two- (or multiple) sector approach which, in the recent literature, has been closely associated with the work of Jorgenson 3/ and of Ranis and Fei. 4/

It seems useful, therefore, to review the evolution of thought with respect to the relative contribution of industrial and agricultural development to the process of economic growth within the framework of these two systems.

2.0 Growth Stage Theories

Efforts to systematize the process of economic growth within a framework of sequential stages with general application across national and cultural boundaries represent a persistent tendency in economic thought. The earlier growth stage literature was primarily a product of nineteenth century German economic historians. 5/ With the rebirth of interest in economic growth during the last several decades English, American and Japanese economists and historians have joined in the effort to satisfy the demand for a general development theory by dividing economic history into neat linear segments. 6/

2.1 Industrial Fundamentalism (List)

There were three main patterns in the nineteenth century German literature: (a) classifications based on shifts in occupational distribution (List); (b) classifications based on the changes in the degree of economic integration (Hildebrand, Bucher, Schmoller); and (c) classifications based on changes in the system of property rights and associated changes in economic ideology (Sombart, Marx). Because of the emphasis which List placed on commercial policy as a tool in achieving a transition from an agricultural to an industrial economy, his work continues to be of interest for countries attempting to create modern economies. 7/

List distinguishes five development stages: (a) the savage; (b) the pastoral; (c) the agricultural; (d) the agricultural and manufacturing; and, finally, (e) the agricultural, manufacturing, and commercial. However, major attention is focused on "a description of the conditions under which a mature agricultural stage can exist, under which it may progress, and how an agricultural stage can be transformed into one on a higher level by the introduction of manufactures". List regarded the introduction of manufacturing as the dynamic element in the process of economic growth. This dynamic quality was attributed not only to the higher productivity of industrially based societies but to the favorable environment for cultural, social, technological and scientific progress generated in an industrialized society.

List was particularly concerned with demonstrating the positive role of industrial protectionism for countries (such as Germany or the United States in the nineteenth century) which were in transition from a high level of agricultural development to industrialization. At the same time, he argued that free trade was the appropriate economic policy for countries (a) which are "by nature" agricultural or which have not yet achieved a high level of agricultural development (mainly tropical) and (b) which have achieved an advanced level of industrial development (such as Great Britain).

List saw no role for agricultural protectionism at any stage of development. Progress in agriculture could only occur (a) under the stimulus of export demand or (b) through the impact of domestic industrial development. Of these two

sources he regarded domestic industrial development as the most important generator of agricultural progress because of the double impact resulting from (a) the increased demand for farm products from an expanding non-farm sector and (b) the development of more efficient methods of production resulting from the application of science and technology.

2.2 Structural Transformation (Fisher-Clark)

The "resemblance between List's three last stages and the concept of primary, secondary and tertiary production developed in the 1930's by A.G.B. Fisher and propogated further by Colin Clark" has been emphasized by Hoselitz.[8] Fisher emphasized the "steady shift of employment and investment from the essential 'primary' activities ... to secondary activities of all kinds, and even to a still greater extent into tertiary production" which accompanies economic progress.[9] In Clark's formulation the economic growth which accompanies this transformation is achieved first, by increases in output per worker in any sector and second, by the transfer of labor from sectors with low output per worker to sectors with higher output per worker.[10]

Fisher, as List, held that such a transition was closely associated with the advance of science and technology. But an intense empiricism inhibited Clark from attempting an adequate theoretical foundation for his transition generalization. Nor was he able to provide any significant policy guidance for the problem of how a predominantly agricultural society might proceed to achieve a successful transition to a modern industrial society.

The important impact of the Fisher-Clark generalizations on economic thought and on economic policy during the decade immediately following World War II must be attributed to three factors: (a) the weight of empirical evidence generated by Clark's massive scholarship; (b) a felicitous choice of a value loaded terminology; and (c) the equating of economic progress with industrialization by the planners and policy makers of countries which were attempting to emerge from economic and/or political colonization.

By the mid-1950's the analytical validity and statistical evidence as well as the policy implications of the Fisher-Clark

generalizations, were being questioned. 11/ Analytical criticisms were directed toward the arbitrariness of the distinctions and lack of uniformity of income elasticity of demand among products classed within each of the three categories. A number of critics pointed to the tendency of official statistics to conceal the high proportion of time spent by the rural population in secondary (handicraft etc.) and tertiary (transport, trading, personal service etc.) activities in economics in which occupational specialization is limited.

The implications of the Fisher-Clark structural transformation model for agricultural development have also been carefully explored. In 1951 Schultz outlined an industrial impact hypothesis: (1) Economic development occurs in a specific locational matrix..; (2) These locational matrices are primarily industrial-urban in composition..; (3) The existing economic organization works best at or near the center of a particular matrix of economic development and it also works best in those parts of agriculture which are situated favorably in relation to such a center. 12/

In formulating this hypothesis, Schultz was particularly concerned with the failure of agricultural production and price policy to remove the substantial regional disparities in the rate and level of development in American agriculture. Schultz presented a rationale for the industrial impact hypothesis in terms of more efficient functioning of factor and product markets in areas of rapid urban industrial development than in areas where the urban economy had not made a transition to the industrial stage.

Formulation of the industrial impact hypothesis generated a series of empirical studies designed to test both the validity of (a) the empirical generalizations and (b) the factor and product market rationale. 13/ Results of these studies have generally sustained the validity of Schultz's empirical generalizations with respect to the impact of urban-industrial growth on geographic differentials in per capita or per worker farm income. The tests of the factor and product market rationale, however, have been much less conclusive.

The policy implications of the Schultz industrial impact hypothesis appear to be most relevant for the less developed regions of the more highly industrialized countries. In these

areas, agricultural development can be accelerated by either increased industrial decentralization or migration of surplus agricultural workers to more distant urban-industrial centers. Such policies appear to have less scope in many of the less developed countries where (a) a major problem is that of achieving a satisfactory rate of economic growth in the non-farm economy rather than the geographic distribution of economic activity, (b) the technological prerequisites for rapid agricultural output growth in the face of a constant or expanding agricultural labor force are frequently not available or (c) the "pathological" growth of urban centers resulting from population pressure in rural areas frequently runs ahead of growth in the demand for non-farm workers.

2.3 Leading Sectors (Rostow)

The decline of professional interest in the Fisher-Clark stages during the last decade is due, at least in part, to the emergence of Rostow's "leading sector" growth stage approach.[14] Rostow identifies five stages in the transition from a primitive to a modern economy: (a) the traditional society; (b) the preconditions for take-off; (c) the take-off; (d) the drive to maturity; and (e) the age of high mass consumption. These stages are, except for the first and last, transition stages rather than a succession of equilibrium positions.

Rostow's objective in identifying "the five major stages-of-growth and ... the dynamic theory of production which is their bone-structure" was much more ambitious than the earlier growth stage approaches. Rostow is primarily concerned with the process by which a society moves from one stage to another, and his historical analysis is conducted with the objective of providing policy guidance to the leaders of the developing countries since "it is useful, as well as roughly accurate, to regard the process of development now going forward in Asia, the Middle East, Africa and Latin America as analogous to the stages of preconditions and take-off of other societies in the late eighteenth, nineteenth and early twentieth centures."[15]

Rostow's approach starts from the empirical premise that "deceleration is the normal optimum path of a sector, due to a variety of factors operating on it, from the side of both supply and demand".[16] The problem of transition, and hence

of growth, therefore, becomes how to offset the tendency for deceleration in individual sectors to achieve growth in the total economy.

On the supply side, Rostow introduces the concept of a sequence of leading sectors which succeed each other as the basic generators of growth. On the demand side, declining price and income elasticities of demand are introduced as technical factors dampening the growth rate of leading sectors and transforming them to sustaining or declining sectors. Technology plays an important role in both the emergence of new leading sectors and the dampening of growth or elimination of older sectors.

All three growth stage theories reviewed here treat the transition from an agricultural to an industrial society as the major problem of development policy. Rostow's system is, however, the only one which clearly specifies a dynamic role for the agricultural sector in the transition process. In an open economy, primary sector industries may act as leading sectors and, at a particular time, carry the burden of accelerating growth. In addition, agriculture must (a) provide food for a rapidly increasing population (b) provide a mass market for the products of the emerging industrial sectors and (c) generate the capital investment for new leading sectors outside of agriculture.

Rostow, as the other growth stage proponents, has not escaped criticism. Most of the papers presented at the 1960 conference of the International Economic Association on "The Economics of the Take-Off Into Sustained Growth" rejected either (a) Rostow's dating of the take-off for presently advance countries or (b) the concept of the take-off itself.[17] Cairncross and Kuznets have vigorously attacked (a) the analytical criteria employed to identify successive stages, (b) the leading sector hypothesis and (c) the historical validity of Rostow's empirical generalizations concerning the take-off stage for the presently developed countries.[18] Students from less developed countries have found even greater difficulty in identifying their experience with any particular stage. One article reached the rather startling conclusion that "after entering the 'take-off' stage in 1957 the (Philippine) economy immediately slipped back into the 'preconditions'...stage..."[19] Furthermore, the approach contains no mechanism

to explain why countries such as Argentina, Chile, Ceylon, Burma and India, all of which experienced very rapid growth during the latter years of the 19th century, failed to achieve a successful take-off.

Rostow's vigorous insistence on the critical importance of rapid growth in agricultural output during the early stages of economic development has lead to a rapid "diffusion" of the leading sector model among students of agricultural development. A sequence of three agricultural development stages which roughly parallel the precondition, take-off and drive to maturity stages in the Rostow model have been presented in papers by Perkins and Witt,[20] Johnston and Mellor,[21] and Hill and Mosher.[22] A synthesis of these approaches, constructed by Wharton, is presented in Table 1.

In the agricultural development stage models, major policy interest focuses on the program instrument and measures that are required to move rapidly from Stage I (Static) through Stage II (Transitional) to Stage III (Dynamic). Within the agricultural sector, emphasis is typically placed on (a) the importance of biological innovations and intensity of labor use to achieve a "yield take-off" during the transition from Stage I to Stage II with (b) higher inputs of power in the form of mechanization being reserved for the transition from Stage II to Stage III.[23] [24] Recommendation that public social overhead investments (education, research, extension) and institutional modifications (tenure, credit, and market structure reforms) should lead the more capital intensive public infrastructure investment (communications, roads, dams) is also frequently implied. The importance of positive population policy to dampen the birth rate is increasingly identified as essential for a rapid transition from Stage I to Stage III.

Perkins and Witt have followed Rostow in emphasizing the importance of leading commercial sectors within agriculture, in contrast to the more static subsistence sectors, in the adoption of technological innovations and as a source of much of the increase in the output of food and export commodities. Johnston and Mellor, using Japan and Taiwan as models, emphasize the possibilities of transforming the subsistence sector into a small scale commercial sector.

The issue that remains unresolved is (a) can growth be achieved most effectively by the commercial sector of agri-

Table 1. Summary of Ten Major Characteristics of Agricultural Development from Stage I through Stage II and into Stage III*

General Character	Stage I (Static)	Stage II (Transitional)	Stage III (Dynamic)
1. General values, attitudes, motivations	Negative or resistent		Positive or receptive
2. Goals of production	Family consumption and and survival		Income and net profit
3. Nature of decision-making process	A-rational or tradition-al		Rational or "choice-making"
4. Technology or state of arts	Static or traditional with no or slow innovation		Dynamic or rapid innovation
5. Degree of commercialization of farm production	Subsistence or semi-subsistence		Commercial
6. Degree of commercialization of farm inputs	Family labour and farm produced		Commercial
7. Factor proportions and rates of return	High labour/capital ratio; low labour return		Low labour/capital ratio; high labour return
8. Institutions affecting or serving agriculture and rural areas	Deficient and imperfect		Efficient and well developed
9. Availability of unused agricultural resources	Available		Unavailable
10. Share of agricultural sector in total economy	Large		Small

Source: C. R. Wharton, "Research on Agricultural Development in Southeast Asia", Journal of Farm Economics, Vol. 45, December 1963, p. 1162.

* This table is an attempt to synthesize the three methods of Perkins-Witt, Johnston-Mellor, and Hill-Mosher.

culture absorbing the land resources and releasing the labor resources of the subsistence sector for non-farm employment, or (b) can the subsistence sector be gradually transformed into a small scale commercial sector and eventually into a large scale commercial sector? The difficulty of resolving this issue, within the framework of growth stage analysis, is symptomatic of the difficulty faced by stage approaches in generating useful guides to agricultural development policy at any particular time in economic history. Hopper has made a similar point in his comment that, "every developing country ... fits each of the stages ..."[25]

3.0 Dual Economy Models

The dual economy approach emerged out of an attempt to understand the relationship (or lack of relationship) between a lagging traditional sector and a growing modern sector within non-western societies affected by the economic, political and military intrusions of western colonialism. The static dual economy models emphasized the limited interaction between the traditional and modern sectors. The newer dynamic dual economy models identify agriculture as the traditional sector and industry as the modern sector and attempt to trace the increasing interaction between the two sectors in the process of development.

3.1 Static Dualism

Two distinct variations of static dualism can be identified in the literature: (a) A "sociological dualism" which stresses cultural differences leading to distinct "western" and "non-western" concepts of economic organization and rationality; (b) An "enclave dualism" which emphasizes the perverse behavior of labor, capital and product markets through which the modern industrial nations of the west interact with traditional societies in other parts of the world.[26] Both variants are important to an understanding of the assumptions about the structure and economic behavior of developing economies that have been incorporated into modern dual economy models.

Sociological dualism was primarily the product of inquiry by the Dutch economist Boeke into the reasons for the failure of Dutch colonial policy in Indonesia.[27] The failure of the liberal economic policies adopted in 1870 to reverse the

"diminishing welfare" of the Indonesian masses, particularly in Java, lead to an intensive re-evaluation of Colonial policy. Beginning with his doctoral thesis in 1910 Boeke argued that western economic thought was not applicable to tropical-colonial conditions and posited the need for a separate theoretical approach to the problems of such economies. "Where ... there is a sharp, broad change dividing the society into two segments, many social and economic issues take on a quite different appearance and western economic theories lose their relation to reality - and hence their value." Boeke thus assumes, as a precondition for his dualism, the co-existence of two social systems which interact only marginally through very limited contact in the product and labor markets.

The central tenet of Boeke's thesis is a fundamental distinction between the objectives of economic activity in western and eastern society. He argued that while economic activity in the west, and in the western enclaves in the east, is based on the stimulus of economic need, the Indonesian is guided primarily by social needs. He is particularly critical of attempts to explain the allocation of resources or the distribution of income in terms of neo-classical marginal productivity theory, mainly because of the great immobility of resources in eastern society.

The major policy implication of the Boeke analysis is the futility of attempting to introduce western technology and western institutions into Indonesian, and by inference, other Asian economic systems. Where a traditional and a colonial or capitalist sector exist side by side, "one policy for the whole country is not possible ... what is beneficial for one section of the society may be harmful for the other." At best, such efforts are likely to be abortive and at worst, they may hasten retrogression and decay. The only effect of efforts to bring about technological change in traditional agriculture through the introduction of new inputs from outside the agricultural sector is an acceleration in the rate of population growth. His positive proposals call for restoration of the village economy. This amounts in fact, to increasing the rigidity and decreasing the economic and social interaction between the two sectors of the dual economy.

Boeke's static dualism has been strongly criticized by a number of Dutch economists almost from its first appear-

ance.[28] More recently Higgins has questioned the accuracy of his empirical observations and has suggested specific examples of the usefulness of western economic analysis to counter the examples presented by Boeke.[29] Indeed, he suggests that Boeke's criticisms of western thought stem in part from his unfamiliarity with western thought since Marshall and Schumpeter.

Academic criticism of the Boeke thesis has not prevented it from exerting a substantial impact on economic policy. In spite of its "colonialist" origin it has been widely accepted, either explicitly or implicitly, among members of the intellectual elite and the bureaucracy in the economic policy and planning agencies in many new nations. It provides an intellectual rationalization for an industrialization policy which avoids investment in fertilizer, agricultural chemicals and farm equipment industries in favor of other heavy industry and import substitutes. And the Boeke's "backward bending supply curve" provides a rationalization for failure to achieve rapid productivitiy gains in agriculture in spite of (a) failure to invest in agricultural research, education, irrigation and manufactured inputs and (b) the adoption of price policies which provide only minimal incentives to utilize available technology.

Enclave dualism, as a variant of static dualism, reflects very heavily the efforts of a number of trade theorists to explain "the spectacle of ... a high productivity sector producing for export co-existing with a low productivity sector producing for the domestic market".[30] Higgins, explicitly rejecting the sociological dualism of Boeke,[31] traces the origin of dualism to differences in technology between the modern and subsistence sectors.[32] In his view, the modern sector is concentrated heavily in the production of primary commodities in mining, plantations etc. It imports its technology from abroad. The imported technology employed in the modern sector is basically labor saving — with relatively high and fixed capital coefficients. This is in contrast to the technology employed in the traditional sector which is characterized by wide substitution possibilities between capital and labor and the use of labor intensive production methods. Expansion of the modern sector is primarily in response to demand in foreign markets. Its growth has relatively little impact on the local economy. Expansion of the traditional sector is limited by shortages of savings.

Myint goes beyond Higgins in emphasizing the significance of the capital market as a basis for enclave dualism.[33] In his system the access of the modern sector to modern financial markets makes capital available to it at a fraction of the cost of capital to the traditional sector thus leading to the adoption of more capital-intensive technology and high levels of labor productivity. He also suggests that the enclave financial sector tends to produce a net inflow of capital from the subsistence sector and a net outflow to international financial centres. The impact of the modern enclave on local economic development is thus limited by both its low demand for labor and its failure to channel investment into the local company.

3.2 Dynamic Dualism (Jorgenson and Ranis Fei)

Although recent interest in dynamic dualism focuses very heavily on the work of Jorgenson[34] and of Ranis and Fei [35] the now classical article by Lewis on "Economic Development with Unlimited Supplies of Labor"[36] represents the intellectual "take-off" for the Jorgenson, Ranis and Fei, and most other recent dual economy literature.[37] Indeed, Lewis's work can be regarded as the bridge between static and dynamic dualism.

The dynamic dual economy models accept the static typology of "sociological" and "enclave" dualism as essentially valid for a broad class of underdeveloped economies, particularly the post-colonial economies of South and Southeast Asia and Africa, and the Latin American economies with large indigenous populations. According to Fei and Ranis, these economies, " ... are characterized by the coexistence of two sectors: a relatively large and overwhelmingly stagnant subsistence agricultural sector in which institutional forces determine the wage rate, and a relatively small but growing commercialized industrial sector in which competitive conditions obtain in the input markets." [38]

The main thrust of the dynamic dual economy models has been to explore the formal relationships which would permit an escape (a) from the Malthusian trap which Boeke regards as the necessary consequence of attempting to introduce new technology into the native agriculture and (b) from the lack of effective labor and capital market relationships between the modern enclave and the traditional economy. Indeed, produc-

tivity increases in agriculture become, in the dynamic models, the mechanism which permits a continuous reallocation of labor from the agricultural to the industrial sector.

The main difference between the models proposed by Fei and Ranis and by Jorgenson is the extent to which the subsistence sector participates in the gains resulting from productivity growth in the subsistence sector. In the Ranis-Fei model (which Jorgenson terms classical) the subsistence sector is characterized by (a) disguised unemployment and underemployment; (b) zero marginal productivity of labor; (c) a positive "institutionally determined" wage rate for agricultural labor, which approximates its average productivity of labor in the subsistence sector; and (d) fixed land inputs. Under these conditions Ranis and Fei argue that it is possible to transfer labor from the subsistence sector to the commercial-industrial sector without reducing agricultural output and without increasing the supply price of labor to the industrial sector during the early stages of development. Indeed, the transfer of one worker from the subsistence to the non-subsistence sector results in an agricultural surplus which then becomes available as an investment fund for the development of the industrial sector. Ranis and Fei also envisage additional agricultural surpluses as a result of productivity increases resulting from labor intensive capital improvements.

Agriculture, in this system, contributes both workers and surplus production in the form of a "wages fund," for the expansion of the industrial sector. In such a system major functions of public policy are (a) to design institutions which transfer the ownership of such surpluses from the agricultural sector to the government or to entrepreneurs in the commercial-industrial sector and (b) to avoid dissipation of the potential surplus through higher consumption in the rural sector.

The first critical point in the development of the dual economy, within the context of the Ranis-Fei model, occurs at the time when the marginal value product of agricultural labor begins to rise above zero. At this point, the transfer of one worker from the subsistence to the commercial-industrial sector does not release a sufficiently large "wage fund" to support his consumption in the commercial-industrial sector. This results in a "worsening of the terms of trade" in the

industrial sector, which can only be offset by some combination of productivity growth and decline in the rate of population growth in the commercial-industrial sector.

A second critical point occurs when the marginal value product of labor exceeds the "institutionally determined" wage rate in the agricultural sector. At this point, a rise in the industrial wage rate is required if the industrial-commercial sector is to compete effectively with the subsistence sector for labor. If, at this stage, rapid productivity growth in the agricultural sector is achieved, the "dualistic" features of the economy atrophy and agriculture increasingly takes on the role of an appendage of the one sector economy taken as a whole.

In the Jorgenson dual economy model, the assumptions of (a) zero marginal productivity of labor and (b) an "institutionally determined wage rate" in the subsistence sector are dropped. Wage rates are determined in an inter-sector labor market even during the initial stages of development. As a result (a) labor is never available to the industrial sector without sacrificing agricultural output and (b) the terms of trade move against the industrial sector continuously throughout the development process rather than after substantial development in the commercial-industrial sector.

In Jorgenson's system, an economy's ability to generate an agricultural surplus depends only on three parameters: (1) the rate of technical progress in agriculture; (2) the rate of population growth (where population is not limited by food shortages); and (3) the elasticity of output in the agricultural sector with respect to changes in the agricultral labor force. For an economy caught in a low level equilibrium trap, an escape is possible through: (a) changes in the rate of introduction of new technology in agricultural production and (b) changes in medical knowledge and practices which lower the birth rate more rapidly than mortality. Note that in the Jorgenson model, technological change must be introduced into the agricultural sector from the very beginning of the growth process.

The Jorgenson model has moved at least two steps beyond the Ranis-Fei model toward the objective of operational relevance. The Ranis-Fei assumption of zero marginal produc-

tivity of labor and an "institutionally determined wage rate" in the subsistence sector, giving rise to a horizontal labor supply curve to the industrial sector which persists until agricultural employment begins to decline absolutely, is difficult to defend in view of recent work on labor productivity in subsistence agriculture. While zero marginal productivity may have represented a convenient assumption for analytical purposes, it appears to have no empirical grounding. 39/

Both the Ranis-Fei and Jorgenson two sector models have the very real strength of confirming, in formal terms, the intuitive judgment that (a) a shift in the domestic terms of trade toward agriculture signals a breakdown in the economic transformation leading to sustained growth and (b) that this can only be offset by some combination of more rapid rate of technological change in agriculture and/or dampening the rate of population growth. It would appear, however, that the simplicity of both models could lead to substantial underestimation of the difficulty of achieving such a transformation.

First, both models ignore the problem of resource use in the inter-sector commodity markets. 40/ The inter-sector commodity markets (and other markets as well) are treated as disembodied communication systems which absorb no real resource inputs. In most underdeveloped countries, substantial labor and capital resources are absorbed in the storage, transportation and trading activities involved in making the marketable surpluses produced by the agricultural sector available to urban consumers. Thus a shift of workers from a rural or village location to an urban location associated with growth in employment in the non-subsistence sector typically requires a substantial increase in the growth of labor and capital inputs in the marketing sector, thus reducing the resources available for capital formation in the industrial sector.

A second problem stems from the treatment of productivity gains in agriculture as a factor which shifts the production function without imposing any demand on resource inputs other than labor intensive capital improvements such as land reclamation and development. The production of technical change in agriculture is itself, however, a relatively capital intensive activity, particularly when one considers the human investment involved. Furthermore, it frequently requires a relatively long gestation period and has highly uncertain returns.

The short-run supply of new technical knowledge appears to be relatively inelastic with respect to increases in expenditure on research personnel in both developed and less developed countries. Technical change is one of the more difficult products for a country in the early stages of economic development to produce.[41] And when it does become available, it is typically channeled into the agricultural sector embodied in the form of inputs such as fertilizer and insecticides which are purchased from the non-agricultural sector.

A third problem in both the Ranis-Fei and the Jorgenson models stems from the assumption of a closed economy. This assumption clearly simplifies the problem of model construction. The great superiority of the dynamic dual economy models, relative to the static dual economy models, is that the dynamic interaction between the subsistence and the modern sectors, through the labor, capital and product markets leads to a transformation in which the subsistence sector is finally fully absorbed into the modern sector. This real gain in operational relevance is obtained, however, at the cost of closing the model to trade with the rest of the world and hence, ignoring the central problem of the enclave dualists — how to transform the gains in the value of the agricultural surplus which is obtained by trade into domestic capital formation.[42]

A fourth difficulty that limits the effectiveness of both the Jorgenson and the Ranis-Fei two sectors models in dealing with the growth problems of real economies stems from what Jorgenson considers "the fundamental characteristic of a dual economy" — asymmetry in the production functions of the subsistence and modern sectors.[43] The production function for the agricultural sector is defined to include only land and labor. Land inputs in the aggregate are considered to be fixed — to have a zero supply elasticity. The production function for the non-agricultural sector is defined to include only capital and labor. Land or, more broadly, resource inputs, are not represented in the production functions for the non-agricultural sector.

Unless we are prepared to ignore the non-subsistence resource sectors such as mining, forestry and plantation agriculture — activities that have been defined out of the agricultural sector in two sector models in order to maintain the

convention that the subsistence sector and the agricultural sector are identical—the production function for the non-subsistence sector should be expanded to include land and other natural resources. This is particularly important during the early stages of development when output of the non-subsistence resource sectors may be large relative to the output of the manufacturing sector.

It should be even more clear that any model which is expected to have operational relevance must permit an evaluation of the elasticity of output with respect to (a) capital investment in land, (b) capital equipment purchased from the non-farm sector, and (c) inputs of operating expense items such as fertilizer and insecticides purchased from the non-farm sector.

The classical distinction between land and capital, land being identified as the "original and indestructible powers of the soil" represents an untenable analytical distinction. Knight insisted over thirty years ago that the notion that land is not produced, in the same sense that other capital goods are produced, is false.[44] The only distinction between land and other inputs that is significant for economic policy is its relative elasticity of supply and the size of the coefficient which determines the elasticity of output with respect to land inputs.[45]

Failure to include a term in the subsistence sector production function which permits resource flows into the agricultural sector represents an unnecessary restriction on the use of technical changes embodied in inputs purchased from the modern sector.[46] It is entirely possible, in an open two sector model, that it would appear appropriate in some situations to have a net flow of savings into the agricultural sector.

The four limitations outlined above are common to both models. It would be possible to consider, in addition, some of the limitations that apply to only the Jorgenson or the Ranis-Fei models. Ramanathan points out, for example, that Jorgenson's assumption of constant (i.e. zero) income elasticity of demand for food in the agricultural sector (after limitations in per capita consumption imposed by food shortages are overcome) is unnecessarily restrictive.[47] In general these seem less important than their common limitations.

4.0 Growth Stage Generalizations, Dual Economy Models and Agricultural Development Policy

What conclusions can be drawn from this review of growth stage and dual economy models for economic thought and economic policy?

First, we are faced with a choice between (a) carefully documented empirical generalizations associated with rudimentary analytical equipment and (b) a carefully reasoned analytical system that has been subject to only the most casual of empirical tests. The promise of the dual economy models to replace the historical generalizations of the growth stage approaches with relevant, empirically testable, analytical relationships remains inadequately realized.

Second, the more recent versions of both the growth stage and dual economy approaches have helped focus attention on the critical role of agriculture in the development process. Both the historical generalizations and the analytical models are consistent with the proposition that failure to achieve a technically progressive agriculture can dampen the whole process of economic growth. Since neither approach is yet able to contribute specific policy guidance as to how to achieve rapid productivity growth, this must be classified as a positive contribution to economic "doctrine" rather than a new source of analytical power.

Third, with further development the two sector models clearly have greater promise of yielding real analytical power than the growth stage approaches. To realize this potential they will have to be elaborated to incorporate the detailed empirical knowledge regarding the magnitudes of variables and parameters for the specific economies for which the policy choices are relevant. The role of growth models is not to provide direct insight regarding policy decisions. Their appropriate role is to serve as an analytical framework for the empirical research needed to project the quantitative effects of the manipulation of alternative instrumental variables.

Fourth, while major emphasis must be placed on the development of more complete analytical systems one should not reject completely the possibility that a taxonomic scheme,

using growth stage labels in its filing system, may remain of potential value to efforts to understand agricultural and economic development processes. I would argue that a typology based on particular "ideal type" economic systems might have even greater value in attempts to understand the economic behavior of societies at different levels of technical and economic development. Such a typology could serve as a guide for the construction and application of appropriate analytical models for illustrating the consequences of specific policy sequences or alternatives for agricultural and general economic development within the historical context of a particular economy.

Fifth, it seems apparent that models which attempt to achieve operational relevance for development policy will have to place less reliance on asymmetry in the production function for a device for generating differential growth rates in the several sectors. As a very minimum it will be necessary to provide for formal interaction between the agricultural and non-agricultural sectors through agricultural product markets, the markets for the manufactured inputs used in agricultural production, labor markets, the land markets, capital markets, and consumer goods markets.

FOOTNOTES

1/ Compare, for example, T.W. Schultz, The Economic Organization of Agriculture, McGraw Hill, 1953, with T.W. Schultz, Transforming Traditional Agriculture, Yale University Press, New Haven, 1964. Also compare William H. Nicholls, "Industrialization, Factor Markets and Agricultural Development", Journal of Political Economy, Vol. 9, August 1961, pp. 319-340 with William H. Nicholls, "An Agricultural Surplus as a Factor in Economic Development", Journal of Political Economy, Vol. 71, February 1963, pp. 1-29. The 1963 Nicholls' paper was originally presented as a McLean lecture at the University of Guelph.

2/ W.W. Rostow, "The Take-Off Into Self-Sustained Growth", The Economic Journal, Vol. 56, March 1956, pp. 25-48. Idem., The Stages of Economic Growth, Cambridge University Press, London, 1960.

3/ D.W. Jorgenson, "The Development of a Dual Economy", The Economic Journal, Vol. 71, No. 282, June 1961, pp. 309-334; "Testing Alternative Theories of the Development of a Dual Economy" in Irma Adelman and Erik Thorbecke (ed.), The Theory and Design of Economic Development, Johns Hopkins, 1966, p. 45-60; "Surplus Agricultural Labor and the Development of a Dual Economy", Oxford Economic Papers, November 1967, pp. 288-312; "Subsistence Agriculture and Economic Growth" in C.W. Wharton, Jr. (ed.), Economic Development in Subsistence and Peasant Agriculture (forthcoming).

4/ Gustave Ranis and J.D.H. Fei, "A Theory of Economic Development", American Economic Review, Vol. 51, September 1961, pp. 533-565; Development of the Labor Surplus Economy: Theory and Policy, Irwin, 1964; "Agrarianism, Dualism and Economic Development", in Adelman and Thorbeck, op.cit., pp. 3-41.

5/ B.F. Hoselitz, "Theories of Stages of Economic Growth", in B.F. Hoselitz, et.al., Theories of Economic Growth, Free Press of Glencoe, Illinois 1960, pp. 193-238.

6/ Political scientists have also not been immune to the penchant for development "staging". See Robert T. Holt and John E. Turner, The Political Basis of Economic Development, Van Nostrand, 1966, pp. 39-50.

7/ The material in this section draws on Friedrich List, "National System of Political Economy", reprinted in S.H. Patterson (ed.), Readings in the History of Economic Thought, McGraw Hill, New York, 1932, pp. 381-413; K.W. Kapp, "Friedrich List's Contributions to the Theory of Economic Development" in K.W. Kapp, Hindu Culture, Economic Development and Economic Planning in India, Asia Publishing House, New York, 1963, pp. 165-170; and Hoselitz, op.cit.

8/ Hoselitz, op.cit., pp. 199, 200.

9/ A.G.B. Fisher, Economic Progress and Social Security, Macmillan, London, 1945, p. 6. For Fisher's earlier works, see The Clash of Progress and Security, Macmillan, London, 1935, pp. 25-43, and "Production, Primary, Secondary and Tertiary", Economic Record, Vol. 15, March 1939, pp. 24-38.

10/ The best exposition of Clark's approach is found in Colin Clark, "The Morphology of Economic Growth", Chapter X, The Conditions of Economic Progress, Macmillan, London, 1940, pp. 337-373. This chapter has been omitted in later editions.

11/ P.T. Bauer and B.S. Yamey, "Economic Progress and Occupational Distribution", Economic Journal, Vol. 61, December 1951, pp. 741-755, and "Further Notes on Economic Progress and Occupational Distribution", Economic Journal, Vol. 63, March 1954, pp. 98-196; S. Rottenberg, "Notes on Economic Progress and Occupational Distribution", Review of Economics and Statistics, Vol. 34, May 1953, pp. 168-170; S.G. Triantis, "Economic Progress, Occupational Redistribution and International Terms of Trade", Economic Journal, Vol. 63, No. 251, September 1953, pp. 627-637.

12/ T.W. Schultz, op.cit., 1953. See also Idem., "A Framework for Land Economics-The Long View", Journal of Farm Economics, Vol. 33 May 1951, pp. 204-215.

13/ V.W. Ruttan, "The Impact of Urban-Industrial Development on Agriculture in the Tennessee Valley and the Southeast", Journal of Farm Economics, Vol. 37, February 1955, pp. 38-56; D.G. Sisler, "Regional Differences in the Impact of Urban-Industrial Development on Farm and Non-Farm Incomes", Journal of Farm Economics, Vol. 41, December 1959, pp. 1100-1112; A.M. Tang, Economic Development in the Southern Piedmont, 1860-1950: Its Impact on Agriculture, University of North Carolina Press, Chapel Hill, 1954; W.H. Nicholls, "Industrialization, Factor Markets and Agricultural Development", Journal of Political Economy, Vol. 69, August 1961, pp. 319-340; Dale Hathaway, "Urban-Industrial Development and Income Differential Between Occupations", Journal of Farm Economics, Vol. 46, February 1964, pp. 56-66.

14/ W.W. Rostow, op.cit., 1956 and 1960.

15/ Ibid, 1960, p. 138.

16/ Ibid, p. 13.

17/ W.W. Rostow (ed.), The Economics of Take-Off Into Sustained Growth, Macmillan, London, 1963. See also the

review of the volume by W.P. Strassmann, American Economic Review, Vol. 54, No. 5, September 1964, pp. 785-790.

18/ A.K. Cairncross, "The Stages of Economic Growth", Economic History Review, Vol. 13, No. 3, April (second series), pp. 450-458; S. Kuznets, "Notes on the Take-Off", in W.W. Rostow (ed.), op.cit., 1963, pp. 22-43.

19/ G.Y. Itchon, "Philippines: Necessary Conditions for the Take-Off", Philippine Economic Journal, Vol. 1, First Semester, 1962, p. 30.

20/ M. Perkins and L. Witt, "Capital Formation: Past and Present", Journal of Farm Economics, Vol. 43, May 1961, pp. 333-343.

21/ B.F. Johnston and J.W. Mellor, "The Role of Agriculture in Economic Development", American Economic Review, Vol. 51, No. 4, September 1961, pp. 566-593. The Johnston-Mellor approach has been elaborated in a series of articles by J.W. Mellor: "Increasing Agricultural Productivity in Early Stages of Development: Relationships, Problems and Prospects", Indian Journal of Agricultural Economics, Vol. 27, No. 2 April-June, 1962, pp. 29-46, and "The Process of Agricultural Development in Low Income Countries", Journal of Farm Economics, Vol. 44, August 1962, pp. 700-716.

22/ F.F. Hill and A.T. Mosher, "Organizing for Agricultural Development" in Science, Technology and Development, Vol. 3, "Agriculture" United States Papers Prepared for the United Nations Conference on the Application of Science and Technology for the Benefit of Less Developed Areas, US GPO Washington, 1962, pp. 1-11.

23/ C.R. Wharton, "Research on Agricultural Development in Southeast Asia", Journal of Farm Economics, Vol. 45, December 1963, 1161-1174.

24/ L.R. Brown, Increasing World Food Output, U.S. Department of Agriculture, Foreign Agricultural Report No. 25, Washington, April 1965.

25/ W.D. Hopper, "Discussion: The Role of Agriculture in the World Economy", Journal of Farm Economics, Vol. 43, May 1961, p. 347.

26/ I am indebted to Richard Hooley, "The Concept of Dualism in the Theory of Development", Draft, December 1967, for clarification of this distinction.

27/ J.H. Boeke, Economics and Economic Policy of Dual Societies, New York, 1953. For an excellent summary of Boeke's work see Indonesian Economics: The Concept of Dualism in Theory and Policy, W. von Hoeve, The Hague, 1961. In addition to Dr. Boeke's classic article "Dualistic Economics", the book contains several of his other articles as well as a critical review of his work by other Dutch scholars.

28/ Ibid.

29/ Benjamin Higgins, "The 'Dualistic Theory' of Underdeveloped Areas", Economic Development and Cultural Change, Vol. 4, 1955-56, pp. 99-115.

30/ Hans W. Singer, "The Distribution of Gains Between Investing and Borrowing Countries", American Economic Review (Proceedings), Vol. 40, May 1950, pp. 473-485.

31/ Higgins, op.cit.

32/ Benjamin Higgins, Economic Development, Principles, Problems and Policies, Norton, New York, 1959, pp. 325-333, 424-431.

33/ H. Myint, "Financial Dualism and Monetary Dependence and Independence", Chapter 5 in The Economics of the Developing Countries, Hutchinson, London, 1964, pp. 69-84.

34/ D.W. Jorgenson, op.cit., 1961, 1966, 1967, 1968.

35/ G. Ranis and J.D.H. Fei, op.cit., 1961, 1964, 1967.

36/ W.A. Lewis, "Economic Development with Unlimited Supplies of Labor", Manchester School, Vol. 22, 1954, pp. 139-191; "Unlimited Labor Further Notes", Manchester School, Vol. 26, 1958, pp. 1-32.

37/ Two major contributions to the dual economy literature which appear to owe little intellectual debt to Lewis's earlier

work are Anne O. Krueger, "Interrelationships Between Industry and Agriculture in a Dual Economy", Indian Economic Journal, Vol. X, No. 1, July 1962, pp. 2-13, and G.S. Tolley and S. Smidt, "Agriculture and the Secular Position of the U.S. Economy", Econometrica, Vol. 32, October 1964, pp. 554-575. Krueger refers to previous work by Sayre P. Schatz, "A Dual-Economy Model of an Underdeveloped Country", Social Research, 1956, pp. 419-432, which discusses some of the features of an economy characterized by enclave dualism.

38/ G. Ranis and J.D.H. Fei, op.cit. (1964), p. 3.

39/ C.H.C. Kao, K.R. Anschell and C.K. Eicher, "Disguised Unemployment in Agriculture: A Survey", in C.K. Eicher and C.W. Witt, Agriculture in Economic Development, McGraw Hill, New York, 1964, pp. 129-141; T.W. Schultz, Transforming Traditional Agriculture, Yale University Press, New Haven, 1964; W. David Hopper, "Allocative Efficiency in Traditional Indian Agriculture", Journal of Farm Economics, Vol. 47, No. 3, August 1965, pp. 611-624. For a reaction to the criticism by Schultz and others see Fei and Ranis, op.cit., 1966, p. 9.

40/ V.W. Ruttan, "Notes on Agricultural Product and Factor Markets in Southeast Asia" in Kurt R. Anschell, et.al. (eds.), Agricultural Cooperatives and Markets, Praeger, New York (forthcoming). Robert D. Stevens, "The Influence of Industrialization on the Income Elasticity of Demand for Retail Food in Low Income Countries", Journal of Farm Economics, Vol. 45, No. 4, December 1963, pp. 1495-1499; Robert D. Stevens, Elasticity of Food Consumption Associated with changes in Income in Developing Countries, Development and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture, Foreign Agricultural Economic Report No. 33, March 1965.

41/ This section draws very heavily on S.C. Hsieh and V.W. Ruttan, "Environmental, Technical and Institutional Factors in the Growth of Rice Production: Philippines, Thailand and Taiwan", Food Research Institute Studies, (forthcoming).

42/ This point is made in H.T. Oshima, "The Ranis-Fei Model of Economic Development: Comment", American

Economic Review, Vol. 53, June 1963, pp. 448-452. Ranis and Fei do discuss the implications of an open economy in Development of the Labor Surplus Economy, op.cit., 1964, but these arguments are not developed formally. For a more recent attempt see J.C.H. Fei and D.S. Paaww, Analysis of the Open, Dualistic Economy: An Application to the Philippines, National Planning Association, Center for Development Planning, Field Work Report No. 9, 1967 (preliminary).

43/ For further elaboration of this point see my comments on the Jorgenson paper in C.R. Wharton, Jr. (ed.), op.cit., (forthcoming).

44/ F.H. Knight, "The Ricardian theory of Production and Distribution", Canadian Journal of Economics and Political Science, February and May 1935. (Reprinted in On the History and Method of Economics, University of Chicago Press (Pheonix Book), 1956, pp. 53, 54.

45/ A review of recent Asian experience impresses one with the extent to which increases in output continue to be accounted for by increases in land inputs even in the most densely populated countries of the region. See Hsieh and Ruttan, op.cit.

46/ Alvin L. Marty, "Professor Jorgenson's Model of a Dual Economy", Indian Economic Journal, Vol. 36, 1965, pp. 437-441.

47/ R. Ramanathan, "Jorgenson's Model of a Dual Economy - An Extension", The Economic Journal, Vol. 76, June 1966, pp. 321-327.