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A NOTE ON DUALISTIC MODELS

By

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PREFACE

This note was prepared as background for two major papers entitled, "A Labor Supply Theory of Economic Development," and "The Political Economy of Employment Oriented Development," which present respectively a dualistic growth model relating technological change in agriculture to the growth in potential for new agricultural employment and a set of policy implications which follow from that model.

The growth model paper entitled, "A Labor Supply Theory of Economic Development," presents a general equilibrium system for a dualistic economy in terms of the food and the labor markets. It examines the effects of change in: (A) agricultural output and factor shares induced by technological change, (B) population, and (C) growth of capital stock in the nonagricultural sector on (1) the supply of marketable agricultural surplus, (2) the equilibrium level of nonagricultural employment, (3) the equilibrium terms of trade between agriculture and industry, and (4) the equilibrium real wage. The model also examines (a) the rate of growth of nonagricultural employment and its relationship with the growth of capital stock over time, and (b) changes in terms of trade over time between agriculture and nonagricultural sectors. The presentation, like any mathematical model involves a number of complex simplifying assumptions. The model, in particular, emphasizes the role of technological change in agriculture on the rate of growth of agricultural marketings and the potentials for nonagricultural employment. Another model is now being prepared based on this first model which incorporates a third market, the capital market, into the formulation.

The policy paper entitled, "The Political Economy of Employment Oriented Development," discusses the implications of the growth model to policy for agricultural development and to various aspects of employment policy - including the choice of industrial structure, the choice of production technique, the domestic savings rate, the scale of industrial organization and the level and composition of trade.

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June 1, 1971

A NOTE ON DUALISTIC MODELS

Uma J. Lele

Recent breakthroughs in agricultural production in many low income countries should return interest to dualistic models of the labor surplus type. In these models agricultural output and its transfer to the non-agricultural sector is a major determinant of capital accumulation and labor transfer which are in turn seen as synonymous with economic growth. Labor surplus models should thus have a special relevance in the context of accelerating agricultural production. Surprisingly, however, an increase in the agricultural surplus has been often dismissed as less likely than a decrease and hence not given the attention in short term models that it now deserves.1/ This perhaps explains deficiencies in these models which we delineate in this note. Given the basic relevance of the labor surplus models in the current context of agricultural advance it is hoped that the comments here will contribute to eventual improvement of these models.

The current labor surplus models emphasize heavily a decline in the agricultural surplus and show that it will result in an increase in real wages in terms of industrial goods in the industrial sector. Since employment is determined by the equality between the marginal product of labor and the wage rate, this would result in a decline in employment (1, 2, 3, 4). By the same token, the case of an increase in employment through increase in the agricultural surplus seems intuitively clear. This case is not only more interesting, due to its policy implications for most low income countries now experiencing the so-called "Green Revolution", but also more tedious to conceptualize in a formal model. When such a case is incorporated in a rigorous model the mechanics of the forces at work are often confused and wrong policy implications derived.

Ranis and Fei's early statement of a labor surplus model (4) only briefly discusses the effects of increases in agricultural productivity on employment in the industrial sector. It does not examine the effects of changes in the terms of trade on the distribution of income between sectors. These ideas are explained more fully in their book (1), where they attempt

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1/ For example, W. Arthur Lewis (3), states that "the most interesting of these possibilities is that the terms of trade may move against the capitalist sector," (p. 432). Jorgenson (2), on the other hand, has a built-in parameter for technological change in agriculture, but his model does not allow either (a) for savings in the agricultural sector or for (b) redistribution of income through terms of trade and its effect on capital accumulation.

an examination of the redistributive effects of change in agricultural productivity. Unfortunately, their model misrepresents the vital process of how an increase in agricultural production may be transformed into increased capital formation and a consequent increase in employment. Since the "Green Revolution" has given new relevance to the policy implications of such a case it is now particularly important to explore this process accurately.

The Fei-Ranis argument indicates that when there is an increase in agricultural production, there is a net transfer of income from landowners to industrial laborers (1). This is due to a less than unit elasticity of demand for food. Fei and Ranis state that the rise in the real wage of industrial laborers, as a result of the shift in the terms of trade against the agricultural sector, raises the gap between industrial wage rate and the constant institutional wage (CIW) received by the agricultural workers.

> "This wage gap has the effect of 'shaking loose' the agricultural worker from his traditional attachments to soil and family and facilitates his willingness to transfer to industrial employment. Such traditional institutional immobility is more easily overcome when the dualistic landlord is in a position to offer rural by-employment in familiar surroundings" (1, pp. 172-173).

Such a transfer of labor coupled with the shift of investment from the agricultural to the industrial sector by landlords results in an increase in employment in their model.2/ If the wage rate in terms of industrial goods is not reduced simultaneously to maintain a fixed real wage, as assumed by Fei and Ranis in their book, and if laborers do not save, this distribution of income has more complex effects than those indicated by Fei and Ranis.

First, increase in the income of industrial laborers available for nonfood consumption and for savings is exactly equal to the decrease in the incomes of landowners. This is a point of great importance to the analysis which is not made explicit and appears to be implicitly denied in labor surplus models. If the marginal propensity to save of laborers is zero, as assumed by Fei and Ranis, all of this added cash income will be allocated to the increased consumption of industrial goods. However, since the marginal propensities to consume and save are both positive in the case of landowners (Fei and Ranis assumption), there must be a decline in their savings and consumption of industrial goods. Thus the net increase in the demand for industrial goods would be less than the total increase generated by the industrial laborers and may be zero.

2/ Fei and Ranis state, "Our analysis of the short run, moreover, indicates that the market may produce certain disincentive effects with respect to the landlord's desire to further increase agricultural productivity and induce him to turn his attention increasingly toward the industrial sector. The sensitivity of the dualistic landlord in responding to relative investment opportunities in the two sectors greatly facilitates the achievement of a balanced growth pattern via the market mechanism." (1, pp. 173-174)

A positive net increase in the demand for industrial goods may have either of two effects. If capacity in the industrial sector is fully used, this may simply result in increased prices of existing goods and hence increased profits of industrialists determined by the net increase in the demand for industrial goods. However, if capacity was not used fully before, this may result in some immediate increase in employment and some increase in profits of industrialists.

However, it must now be remembered that since landowners are assumed to have a positive marginal propensity to save, there is a decline in the savings in the rural sector. Indeed any net increase in demand for industrial consumer goods is equal to a decline in landlord's savings. If the supply of industrial goods is inelastic as is most likely if equilibrium existed previously, savings of landlords will be transferred to industrialists through increased profits. It is thus quite possible that there is no overall net increase in capital accumulation as a result of the redistribution of income through changes in the terms of trade, but only an increase in the real income of industrial wage earners by the amount of initial increase in agricultural surplus. Further, if capital is only reallocated from the agricultural to the industrial sector, this may result in a drop in agricultural output rather than maintenance of it at the same level as assumed by Fei and Ranis.

This confusion about the redistribution of income and its effect on capital formation is, no doubt, the major factor to be noted in the Fei-Ranis analysis. However, several other features are of analytical interest in their model. First, if the supply of labor for the industrial sector is perfectly elastic even at the earlier lower industrial real wage, as assumed by the Fei and Ranis model, why should a larger wage gap between agriculture and industry and the consequent shaking loose of labor have any effect on increasing employment? Employment will increase if the "turning point" in the labor supply function had been reached before shift in the agricultural surplus, thus now making labor supply more elastic than would otherwise be the case. It may also increase if increase in the real wage permits industrialists to reduce the money wage, thus shifting the labor supply function downward when measured in terms of industrial goods. This will result in increase in the profits of industrialists and may result in increased capital accumulation. In fact, employment will not increase unless the increase in agricultural surplus simultaneously results in reduced wages in terms of industrial goods, thus now increasing the industrial surplus. This will be possible only if the supply of labor is elastic at the institutionally determined real wage rate. Fei and Ranis suggest that more labor becomes available only at a higher real wage rate. Fei-Ranis' initial explanation of increase in employment is obviously in contradiction with their later analysis. For they show that wages decline with increase in employment rather than the other way around.

With a perfectly elastic supply of labor and no automatic decline in the supply schedule, the bottleneck to any increase in employment comes not from the supply of labor but from the demand for it which is determined by capital accumulation and/or technology. There thus seems to be a logical inconsistency in their initial assumption and the subsequent analysis.

To summarize, labor reallocation from increased agricultural output may come about only under two conditions: first, if, in the industrial sector, increase in real wages results in an immediate reduction in wages in terms of industrial goods, thus increasing surplus in the industrial sector in terms of industrial goods. For this to come about it is a necessary but not a sufficient condition that there be a downward shift in the labor supply function corresponding to the change in terms of trade. This process must somehow more than compensate for the rural sector's decreased demand for industrial goods and decreased savings. Second, if "turning point" in labor reallocation had been reached before the shift in the agricultural surplus function, with increase in the availability of food the labor supply curve may become more elastic at a given wage rate and hence may result in an increase in employment. Even in this case to the extent that the neoclassical assumption of perfect substitutability between labor and capital is not fulfilled the burden of increasing employment may be shifted to the complex forces of increased savings and investment.

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