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LABOUR SURPLUS ECONOMIES AND THE THEORY OF INTERNATIONAL TRADE

Sandwip Kumar DAS

Abstract: In search of a theoretical foundation of South-South trade the paper looks at some of the determinants of trade pattern between the two labour-surplus economies characterised by an intersectoral wage-differential, labour immobility, unemployment and a labour training technology which may generate either an economy or a diseconomy in the employment of industrial workers. An increase in capital stock raises production in both industry and agriculture. The trade pattern seems to depend on the endowment of capital relative to the exogenously given labour force engaged in agriculture. A small open economy may have a distorted trade pattern in which case its protection policy may not work.

I. INTRODUCTION

The Theory of international trade which has evolved from the writings of Heckscher, Ohlin and Samuelson has been universally applied to explain patterns of trade among all countries. Little attention has been given to the fact that developed market economies and less developed countries do not have an identical economic system. A theory of trade which is based upon an autarkic general equilibrium model that supposedly fits all types of economies is likely to be misleading. Attempts have been made to highlight certain features of less developed countries in trade models. Concern over intersectoral wage differentials can be noted in the early works of Ohlin (1931, 1933) and Viner (1932). In the post War literature Hagen (1958), Bhagwati and Ramaswami (1963), Johnson (1965, 1966), Jones (1971) and Lapan (1976) deal with positive and normative aspects of wage differentials.[1)] Haberler (1950), Johnson (1965) and Batra and Pattanaik (1970) have examined the issue of intersectoral factor immobility. The unemployment problem has been considered in the context of tariff policy by Hagen (1958) and Lewis (1954). But the general approach adopted in the writings of all except Lewis has been to view a less developed country as a small open economy which deviates from Pareto optimality because of domestic distortions in the form of unemployment, wage differentials and factor immobility. These features have not been included in a closed-economy model to determine the pattern of trade among countries which are similar in respect of the so-called domestic distortions.

The purpose of this paper is to develop the autarkic model of a labour surplus

[1] Chacholiades (1978) has an elaborate list of references on factor market imperfections.

economy where intersectoral wage differentials and labour immobility are present. The model is then extended to find an explanation of trade pattern between two similar labour surplus economies. The paper develops a two-good-two-factor model with constant-returns-to-scale production functions and perfect competition among producers and factor owners. The capital-intensive industrial sector pays a variable wage differential which includes a cost of training workers for industrial jobs. The supply of untrained workers is unlimited for the industrial sector. Labour supply in agriculture is specific to that sector. In this sense there is no labour mobility at all.[2)] But unemployed workers are always available for industrial jobs. Training of labour is subject to external economies or diseconomies which the firms cannot internalise. There is perfect capital mobility and capital stock is fixed. External diseconomy in training labour and fixity of capital stock are the two constraints on industrial employment.

The main findings are summarised in the following. The pattern of trade between two labour surplus economies is determined by their endowments of capital relative to the size of the agricultural labour force. Industrial employment is endogenously determined. The Rybczynski theorem changes substantially. An increase in the stock of capital raises output in both sectors at constant terms of trade. An increase in the labour force employed in agriculture has the usual Rybczynski effects. In this model factor intensities are defined in value terms. Physical factor intensities do not play an important role. Under certain conditions the Samuelson-Stolper theorem partially retains its validity. The paper deals with only the protective aspects of trade policy. The normative aspect has been excluded. A tariff or a production subsidy may not protect the import competing sector in an economy whose trade pattern is distorted. However, if the tariff's protective effect is positive, its effect on total employment is also positive. Nonprice policies are needed to correct distortions in the trade pattern of a small open economy. The analysis produces certain testable propositions regarding South-South trade.

The paper is organised in the following way. The second section deals with the labour markets of the two sectors. The model is introduced in the third section. The comparative-static results are derived in the fourth and fifth sections where propositions relating to trade theory and policy are established. Conclusions appear in the last section.

II. LABOUR MARKETS

In the developed market economies unemployment of labour can be explained by seasonal, frictional and search factors and by the Keynesian mechanism of downwardly rigid wages. All these forces do operate in labour surplus economies, but in a smaller degree. It appears that the primary reason for large-scale

[2] Casas (1984) has developed a model of factor market imperfection with imperfect labour mobility, variable wage differential and full employment. The reason for the variable wage differential in his model is entirely different. 2a. Unionisation in industries is the standard justification for β.

unemployment is the fact that a major portion of the population is unemployable. A worker has to be trained for most industrial jobs. The cost of training will be assumed to be of the "iceberg" type, that is, only a fraction θ of a labour unit hired and paid for by a firm can be used in the production process, with $(1-\theta)$ lost in training. Training is not the only source of loss of labour units. Loss occurs due to poor health of workers, indiscipline, industrial disputes and many other sociopolitical factors. The value of θ is assumed to be the same for all firms in the industrial sector.

Skill formation is also necessary in agriculture. But organised training facilities are not commonly available for the agricultural workers. The knowledge of agricultural technology remains confined within the farm households and this severely restricts entry into agricultural occupations. Given the population size and the ownership-distribution of land, the number of people qualified to work either as share-croppers or as wage-labourers is likely to be fixed at any point of time. A greater equality in the distribution of land may motivate some people to acquire farming skills which, in the long run, would increase agricultural employment. Population growth has the same long term effect on agricultural employment. The people who are thus tied to the soil due to the specificity of their skills and assets (land) find it extremely costly in social and economic terms to move to industrial jobs. In fact, such labour movements from rural areas to the towns take place only during a crisis in which the agricultural wage rate sinks below the subsistence level. For the rural unemployed the social and economic costs of moving to industrial occupations are negligible.

Let L^* be the number of labour units hired by a firm in the industrial sector at the market wage rate W and c the number of capital units hired at the rental price r. With P being the price of the product, the firm's profit is

$$\begin{aligned} &PF(\theta L^*, c) - WL^* - rc \\ &= PF(L, c) - WL/\theta - rc \end{aligned} \tag{1}$$

where $L = \theta L^*$. $F(L, c)$ is the firm's production function. The firm maximises (1) with respect to L and c. Since θ is a constant, less than unity, the firm pays $W/\theta > W$ for every unit of labour used in the production process. The number of labour units hired by the firm is L/θ.

Assuming that the profit function has an interior maximum, it is clear that the firm chooses a non-optimal technique which is more capital-intensive than the cost minimising technique the firm would have chosen otherwise. This follows from the first order conditions of maximum profit which are summarised as

$$\frac{F_L}{Fc} = \frac{1}{\theta}\frac{W}{r} > \frac{W}{r}$$

where F_L and Fc are marginal products of labour and capital.

The training cost is fixed for every firm but variable for the industry, as an

expansion of industrial employment may cause the cost of training to increase or decrease. The loss of labour units due to industrial disputes and other sociological factors seems to have increased in the developing countries where industrialisation has taken place over the last three decades or so. Growth of labour unions and union rivalries connected with political factionalism tend to support this hypothesis. But the cost of training, isolated from other factors, may have decreased due to improvements in educational technology. In this paper $1/\theta$ has been assumed to be a function of total employment in the industrial sector. The sign of the first derivative of this function has been left as an open question which can be resolved empirically. Some of our results depend upon $1/\theta$ being positively related with industrial employment. But a negative relation between $1/\theta$ and industrial employment has not been ignored.

Let L_X and K_X be the amounts of labour and capital used in the industrial sector for the production of output X. All firms are assumed to identical. Therefore, $L_X^* = (1/\theta)L_X$ is the number of labour units hired in the industry. It is now assumed that

$$\frac{1}{\theta} = 1 + \alpha(L_X), \qquad \alpha(L_X) > 0 \tag{2}$$

It follows that

$$L_X^* = [1 + \alpha(L_X)]L_X \tag{3}$$

If $\alpha' > 0$ (external diseconomy case), L_X and L_X^* are positively related. If $\alpha' < 0$ (external economy case), the relationship between the two is ambiguous. If W is the industrial wage rate, the firms pay W_X for every unit of labour going into the production process, where

$$W_X = W[1 + \alpha(L_X)] \tag{4}$$

III. THE MODEL

We are looking at a two-sector economy where X and Y are the two goods produced by labour and capital. The production functions are linear homogeneous of degree one in labour and capital. These are:

$$X = L_X f(k_X);\ f' > 0,\ f'' < 0 \tag{5}$$

$$Y = L_Y g(k_Y);\ g' > 0,\ g'' < 0 \tag{6}$$

where L_Y is labour employed in the agricultural sector producing Y and k_X and k_Y are capital labour ratios in industry and agriculture. The supply of agricultural labour is assumed to be perfectly inelastic. With population remaining fixed, the people who are tied to the soil are unlikely to move to industries in response to variations in the wage rates in view of high social and economic costs of mobility. L_Y varies from country to country because of historical and geopolitical reasons.

In one country L_Y is fixed:

$$L_Y = \bar{L}_Y \tag{7}$$

and it changes only in response to such exogenous factors as a ceiling on land holdings.

The capital stock $K = k_X L_X + k_Y \bar{L}_Y$ is fixed and fully employed which constrains L_X in the following way:

$$L_X = \frac{K - k_Y \bar{L}_Y}{k_X} \tag{8}$$

The two sectors pay the same rental price of capital (r) which is equated to the respective marginal productivities of capital measured in terms of good Y. With p denoting the price of X in terms of Y we get

$$pf'(k_X) = g'(k_Y) \tag{9}$$

Due to the perfectly inelastic labour supply the agricultural wage rate (W_Y) is entirely demand determined:

$$W_Y = g(k_Y) - k_Y g'(k_Y) \tag{10}$$

The unemployed workers in both sectors are primarily interested in industrial jobs due to a fixed wage differential paid by industries: $W = W_Y(1+\beta)$, where β is a positive constant.[2a] While the wage rate paid in the industrial sector (W_X) per unit of labour used in the production process is equated to the value of the marginal product of labour, i.e.,

$$W_X = p[f(k_X) - k_X f'(k_X)] \,. \tag{11}$$

the following relationship between the two sectors' marginal productivities of labour emerges from (4) and (10):

$$p[f(k_X) - k_X f'(k_X)] = [g(k_Y) - k_Y g'(k_Y)][1 + \alpha(L_X)](1+\beta) \tag{12}$$

Equations (9) and (12) form the core of the model. The level of unemployment is

$$u = \bar{L} - L_X^* - \bar{L}_Y \tag{13}$$

where $\bar{L}$ is the size of the working population. We assume u to be positive.[3]

[3] Using (3), (4) and (8) in (13) it can be shown that

$$u = \frac{(1+\alpha)W}{rk_X}[\bar{L}(k_{VX} - k_V) - \bar{L}_Y(k_{VX} - k_{VY})]$$

where

$$k_{VX} = \frac{rk_X}{W(1+\alpha)}, \quad k_{VY} = \frac{rk_Y}{W} \quad \text{and} \quad k_V = \frac{rK}{WL}$$

k_{VX} and k_{VY} are capital labour ratios in value terms and k_V is the factor endowment ratio in value terms. It should be noted here that an intermediate wage rate W which lies between W_X and W_Y has

Nothing in the model is constrained by $\bar{L}$. An increase in the population size simply raises the level of unemployment without affecting anything else. The standard wage differential model follows if we ignore the training cost and immobility of persons employed in agricultural occupations. All we have to do is to assume: $u=\alpha(L_X)=0$ and let $\bar{L}_Y$ be determined endogenously by (13).

IV. RYBCZYNSKI EFFECTS

At constant terms of trade a change in the stock of capital or in the supply of labour in agriculture will affect factor intensities, industrial employment and output levels. To find these Rybczynski effects we totally differentiate (9) and (12) with L_X replaced by the expression in (8). This generates the following system of equations:

$$\begin{bmatrix} pf'' & -g'' \\ -pk_X f'' + W\alpha' \dfrac{L_X}{k_X} & (1+\beta)(1+\alpha)k_Y g'' + W\alpha' \dfrac{\bar{L}_Y}{k_X} \end{bmatrix} \begin{bmatrix} dk_X \\ dk_Y \end{bmatrix} = \begin{bmatrix} 0 \\ \dfrac{W\alpha'}{k_X} \quad dK - \dfrac{W\alpha' k_Y}{k_X} d\bar{L}_Y \end{bmatrix} \tag{14}$$

Let J be the determinant of the system of equations in (14). It can be shown that

$$J=pf''g''\frac{W_X}{r}(k_Y^*-k_X^*)+\frac{W\alpha'}{k_X}(pf''\bar{L}_Y+g''L_X) \tag{15}$$

where $k_Y^*=(r/W_Y)k_Y$ and $k_X^*=(r/W_X)k_X$ are the factor intensities in value terms using the standard definition. Since f'' and g'' are negative for all k_X and k_Y, there are two alternative sets of conditions under which J has a determinate sign. These are:

$$J<0 \quad \text{if} \quad k_X^*>k_Y^* \quad \text{and} \quad \alpha'(L_X)\geq 0 \tag{16a}$$

$$J>0 \quad \text{if} \quad k_X^*<k_Y^* \quad \text{and} \quad \alpha'(L_X)<0 \tag{16b}$$

External economy and diseconomy cases are respectively covered by (16a) and (16b). Ranking of sectors according to physical factor intensities is not relevant here. But a situation in which (16b) is true with $k_x>k_Y$ is known in the literature

been used to define these factor intensities in value terms. In the paper, however, we have followed the standard definition. Since u is assumed to be positive, it follows that

$$\frac{\bar{L}}{\bar{L}_Y}>\frac{k_{VX}-k_{VY}}{k_{VX}-k_V}$$

The right-hand-side term in the above is positive if k_V lies between k_{VX} and k_{VY}. Since $\bar{L}$ can be chosen arbitrarily in this model, we can always make sure that the above inequality is satisfied.

as a reversal of physical ranking in value terms. This is a case of agriculture being labour intensive in physical terms but capital intensive in value terms.

Setting $d\bar{L}_Y=0$ in (14) and solving we get

$$\frac{dk_X}{dK}=\frac{W\alpha' g''}{Jk_X}>0 \tag{17}$$

$$\frac{dk_Y}{dK}=\frac{pf''W\alpha'}{Jk_X}>0 \tag{18}$$

Differentiating (8) with respect to K and using (15), (17) and (18) we get

$$\frac{dL_X}{dK}=\frac{pf''g''W_X(k_Y^*-k_X^*)}{Jrk_X}>0 \tag{19}$$

The derivatives in (17), (18) and (19) are all positive if either (16a) or (16b) is assumed.

With $\bar{L}_Y$ assumed to be fixed, (5) and (6) clearly show that dX/dK and dY/dK are both positive. Given the terms of trade, an increase in the capital stock raises production in both sectors in the external diseconomy case if X is capital intensive in value terms and also in the external economy case if X is labour intensive in value terms. Population imposes no constraint on the economy. k_X, k_Y and L_X are all constrained by K and it is shown here that all of these increase as the capital constraint is relaxed.

The effect of a change in K on output ratio is what we investigate next. From (5) and (6) we get

$$Z\equiv\frac{X}{Y}=\frac{L_X f(k_X)}{\bar{L}_Y g(k_Y)} \tag{20}$$

Differentiating (20) with respect to K we derive the following expression by using (17), (18) and (19).

$$\frac{dZ}{dK}=\frac{1}{Jk_X\bar{L}_Y g^2}\left[\frac{L_X W\alpha' f' g'^2}{\sigma_X\sigma_Y k_X^* k_Y^*}(\sigma_Y k_Y^*-\sigma_X k_x^*)+pgff''g''\frac{W_X}{r}(k_Y^*-k_X^*)\right] \tag{21}$$

where σ_X and σ_Y are the elasticities of factor substitution defined as

$$\sigma_X=-\frac{f'^2}{ff''}\frac{W_X/r}{k_X}>0\,, \qquad \sigma_Y=-\frac{g'^2}{gg''}\frac{W_Y/r}{k_Y}>0$$

If we assume $\sigma_X\geq\sigma_Y$ along with (16a), then dZ/dK is unambiguously positive and under (16b) its sign is indeterminate.

We have shown that as capital stock increases, outputs rise in both sectors but industrial output rises at a higher rate than agricultural output if (16a) is satisfied and the elasticity of substitution in industry is no less than what it is in agriculture.

Labour employment in agriculture is treated as a policy instrument. A ceiling

on land ownership may necessitate a less land intensive (and a more labour intensive) method of cultivation. A land reform that reduces the size of average holding may act like a capital saving technical progress in agriculture and raise agricultural employment. It can be shown that an increase in agricultural labour supply raises output in agriculture and lowers industrial output. This can be formally derived by setting $dK=0$ in (14):

$$\frac{dk_X}{d\bar{L}_Y}=\frac{g''}{pf''}\frac{dk_Y}{d\bar{L}_Y}=-\frac{W\alpha' g'' k_Y}{Jk_X}<0 \tag{22}$$

We can use either (16a) or (16b) to determine the signs of derivatives in (22). Differentiating (6) with respect to $\bar{L}_Y$ and using (22) we get

$$\frac{dY}{d\bar{L}_Y}=\frac{pf''g''}{J}\left[\frac{gW_X}{r}(k_Y^*-k_X^*)+\frac{Wg\alpha' L_X}{pf''k_X}+\frac{\bar{L}_Y W\alpha' W_Y}{k_X g''}\right] \tag{23}$$

which is positive under either (16a) or (16b). Applying (8) in (5) and differentiating with respect to $\bar{L}_Y$ and using (22) we get

$$\frac{dX}{d\bar{L}_Y}=-\frac{k_Y}{Jk_X}\left[pff''g''\frac{W_X}{r}(k_Y^*-k_X^*)+W\alpha' f' g'' L_X\right] \tag{24}$$

which is negative under the two alternative sets of assumptions in (16a) and (16b). Therefore, at constant terms of trade an increase in $\bar{L}_Y$ raises agricultural output and reduces industrial output under either type of externality. This also implies that $dZ/d\bar{L}_Y<0$.

Defining $K^*=K/L_Y$ it can be shown that

$$\frac{dZ}{dK^*}=\left[\frac{1}{\bar{L}_Y}\frac{1}{dZ/dK}-\frac{K}{\bar{L}_Y^2}\frac{1}{dZ/d\bar{L}_Y}\right]^{-1} \tag{25}$$

which is unambiguously positive under (16a) if $\sigma_X \geq \sigma_Y$ and of indeterminate sign under (16b).[4]

(25) is crucial for the determination of trade pattern between two countries which are identical in respect of technology, wage differential and the training cost function. The standard assumption in trade theory is that of a homothetic utility function from which the demand functions are generated. As a result of this assumption the ratio in which X and Y are consumed is independent of income. Starting from an initial equilibrium an increase in K^* raises X/Y without affecting the consumption ratio C_X/C_Y at the initial price ratio. Since this must create an excess demand for Y and an excess supply of X, the relative price of X in the new equilibrium will be lower. Therefore, p and K^* are negatively related under (16a). Extending this logic to two economies, it can be said that the country

[4] It may be noticed that the indeterminancy under (16b) is due to the external economy in labour training. Referring back to the expression in (22) one can see that dZ/dK^* is also positive under (16b) if the external economy α' is not very strong.

whose capital stock relative to the labour supply in agriculture is higher will have comparative advantage in the capital intensive good provided that the training of labour is subject to external diseconomies. In the external economy case the capital-abundant country may discover comparative advantage in the labour-intensive industry where substantial reductions in labour training costs can be achieved by expanding employment to offset the comparative disadvantage.

Two important points have been made in the preceding paragraph. First, factor endowment is defined as the ratio of capital stock to agricultural labour supply. Population size has no bearing on trade pattern. Second, in the external economy case the obverse of the Heckscher-Ohlin theorem may hold. When we deal with trade among labour surplus economies in the Heckscher-Ohlin framework, it turns out that the loss of labour units due to training and other socio-political factors is an important determinant of relative price. Trade between countries identical in technology *and* factor endowments is possible if their training technology is different. The efficiency in labour training may be regarded as an index of a country's economic development. Therefore, trade among developing countries is related with differences in their levels of development.

V. PROTECTION POLICY

Trade among developing countries as a percentage of world trade was fairly low even thirty years ago. But it is growing at a steady and rapid rate. The relevance of this model is to be judged precisely in this context. But most developing countries are price-takers in world trade and for all practical purposes we can use the model described by equations (5) through (13) with the assumption that p is determined through free trade among the developing countries.

If the country under consideration is exporting Y and importing X, the purpose of a protection policy will be to raise the price of X in terms of Y to the domestic producers either by a direct subsidy or by an import tariff. Both have welfare implications. In this paper we are concerned only with the protective effect of a tariff or a production subsidy. Since the purpose of the protection policy is to raise p, we can simply differentiate (9) and (12) totally with p replaced by $p^*=p(1+t)$, where t is the rate of the tariff. With fixed factor endowments total differentiation yields a system of equations similar to (14). Only the right-hand-side vector in (14) is replaced by

$$\begin{bmatrix} -f'dt \\ -(f-k_Xf')dt \end{bmatrix}$$

Solving and simplifying the result we get[5]

$$\frac{dk_X}{dt}=-\frac{1}{J}\left[g''\left(f-k_Xf'+\frac{W_X}{W_Y}k_Yf'\right)+\frac{W\alpha'\bar{L}_Yf'}{k_X}\right] \tag{26}$$

[5] Without loss of generality we have assumed that $p=1$ which makes $dp^*=dt$.

$$\frac{dk_Y}{dt} = -\frac{1}{J}\left[p^*f''(f-k_Xf')+f'\left(p^*k_Xf' - W\alpha'\frac{L_X}{k_X}\right)\right] \tag{27}$$

We can no longer use (16a) and (16b) as alternatives producing the same result. Under (16a) dk_Y/dt is negative but dk_X/dt has an indeterminate sign. The reverse is true if (16b) is assumed except that dk_X/dt turns out to be positive in this case. If we assume (16a), agriculture is labour intensive and protection of the industrial sector shifts capital out of agriculture inducing a decline in agricultural production. It can be seen that industrial production goes up under this assumption. From (8) we get

$$\frac{dL_X}{dt} = \frac{1}{Jk_X}\left[p^*ff''\bar{L}_Y + L_Xg''\left(f-k_Xf'+k_Yf'\frac{W_X}{W_Y}\right)\right] \tag{28}$$

and using (26) and (28) we differentiate (5) to get

$$\frac{dX}{dt} = \frac{1}{Jk_X}\left[p^*f^2f''\bar{L}_Y + L_Xg''(f-k_Xf')\left(f-k_Xf'+k_Yf'\frac{W_X}{W_Y}\right) - L_X\bar{L}_YW\alpha'f'^2\right] \tag{29}$$

which is unambiguously positive if (16a) is assumed.

This leaves a great deal of uncertainty regarding the protective effect of a tariff. If (16b) is assumed, both dY/dt and dX/dt have indeterminate signs. In this case a tariff may not protect the industrial sector.[6] In a multi-sector economy the nature of the training technology may vary from one industry to another. Some industries may derive external economies in training labour while others, particularly the public sector industries, may waste labour units. Our model suggests that an industry-wise correlation between tariff rates and production of output may yield weak results. Two empirical studies[7] using Indian data have found statistically insignificant and sometimes negative correlation between the different indicators of growth of protected industries in India and nominal tariff rates. The correlation results showed no improvement when effective tariff rates were used.

It follows from Neary's (1978) work that our closed economy model under (16b) is unstable and the economy should tend towards complete specialisation. A large open economy finding itself in this situation should also tend towards complete specialisation due to its influence on the world prices. Problem arises in the case of a small open economy facing the conditions of (16b) which distort its trade pattern and the tax-cum-subsidy policies are likely to fail in correcting the distortions.

[6] In the standard fixed-differential full employment model the assumption in (16b) may yield negatively sloped supply curves. Neary (1978) has shown that equilibrium with negatively sloped supply curves may be dynamically unstable. Neary's conclusion seems quite appropriate in this case also.

[7] Panchamukhi (1978) and Sharma (1981) also found high degrees of tariff escalation.

The possible failure of protection policy in a small open economy under (16b) can be explained. Let us assume that the externality effects are negligible so that the terms involving α' in the various expressions can be ignored. Then, dk_X/dt and dk_Y/dt are both negative under (16a) but both positive under (16b). Under (16a) the tariff has a Samuelson-Stolper effect. As the capital-intensive import competing sector expands, the rental wage ratios go up which restrict the expansion. The diseconomy in labour training is just an additional factor limiting the expansion of the import competing sector. The story is different under (16b). In this case the tariff raises the wage rental ratios and the labour-intensive import competing sector finds the price incentive more than offset by an increase in the wage differential.[8] The output of the import substitute may still rise due to the external economy in labour training which makes the net effect of the tariff quite indeterminate.

The tariff's effect on total employment in the economy is positive under (16a) as it is evident from (3) and (28). Under (16b) dL_X/dt is unambiguously negative, but the sign of dL_X^*/dt which can be derived from (3) is not determinate. In this case the tariff's effect on total employment is not clearly known. Total employment will decrease if the absolute value of the elasticity of the α function is less than unity.[9] If this happens to be the case, the protective effect of a tariff is uncertain but employment effect is negative.

VI. CONCLUDING REMARKS

The Rybczynski theorem has created a false impression that population growth can instantly raise real national income in a small open economy. We have avoided this somewhat absurd result for a labour surplus economy by constructing a model in such a way that population does not put a constraint on anything. Absence of mobility of employed workers from agriculture to industry is a realistic feature. However, we allow for perfect mobility of unemployed people from agriculture to the industrial sector. This is done by not specifying the geographical location of the unemployed. The assumption we have made regarding the sector-specificity of labour employed in agriculture may be somewhat unrealistic. This does not take account of the long-run effect of population growth on labour supply in agriculture. It may be noted that our model differs substantially from the Lewis model in which the agricultural wage rate is equated to the average productivity of labour. Though the Lewis model may still be considered relevant for many developing countries, there have been a great deal of institutional changes in agriculture since Lewis wrote in 1954. One such change is the growth of a market for agricultural labour in the countries of the Indian subcontinent.

[8] The wage differential at a given value of α is $[(1+\beta)(1+\alpha)-1]W_Y$ which rises because $dW_Y/dt = -k_Y g''(dk_Y/dt) > 0$ under (16b).

[9] Since $\alpha' < 0$ under (16b), this elasticity is defined as $-(L_x/\alpha)(d\alpha/dL_X)$. It follows from (3) that dL_X/dt and dL_X^*/dt have the same sign if the elasticity is less than unity.

Two features of this model seem important from the view point of economic development. An increase in the stock of capital through a process of accumulation or foreign aid raises outputs in both sectors of the economy at constant terms of trade. This result strengthens the traditional emphasis on the role of domestic savings and foreign aid in the development process. The second feature is related with protection policy. Under certain circumstances a small open labour-surplus economy may acquire a distorted trade pattern with other labour-surplus economies. Land reforms or policies designed to encourage greater mobility of labour rather than a protection policy are likely to be effective in removing the distortions.

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