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Tax Policy in a Labor Surplus Economy

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Working Paper #3
July 23, 1986

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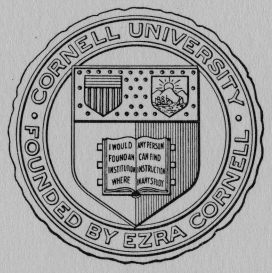

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Tax Policy in a Labor Surplus Economy[1]

Development economists have debated about surplus labor for the last thirty years. A notable feature of the debate is that it still centers on the theoretical acceptability and the empirical validity of the idea without having fully considered its policy significance. In this paper I explore the implications of surplus labor for tax policy. Specifically, what are the effects of taxes in a surplus labor economy? How do they differ from the effects of taxes in an economy without surplus labor? Is a resolution to the issue of surplus labor critical to the formulation of tax policy in less developed countries?

In Section 1 the literature on surplus labor is briefly reviewed. Section 2 contains a model of tax incidence in a surplus labor economy. The incidence elasticities are presented in Section 3. In Section 4 the policies' implications for national income, disguised unemployment and poverty are outlined. Section 5 contains a comparison of tax incidence in the neoclassical and labor surplus models. Section 6 concludes.

SECTION 1: The Literature

The basic notion of surplus labor is that in a two sector economy, labor can be withdrawn from one sector without lowering that sector's output, and used to raise output in the other sector. Because the quantities of complementary factors are held constant, this gives a sort of

developmental free lunch. Labor surplus has been built into models of several different types. Good reviews of the issue are found in B. N. Ghosh (1979), Sen (1975), and Kao, Anschel and Eicher (1964). The seminal paper in each of the major branches of the surplus labor literature is revieved in this section. The section concludes by drawing out the common elements of the different approaches so that the work of the paper may proceed without having to choose between them. The extension pertains to most of the models of labor surplus, while abstracting from the debate as to the underlying cause.

The theoretical discussion has centered on whether and how the notion of surplus labor can be expressed in a consistent and rigorous manner (usually taken to mean a neoclassical framework). The most seminal article in the surplus labor literature is Lewis (1954). His fundamental premise is that in some developing countries the classical assumption of unlimited supplies of labor available at a subsistence wage is a more reasonable point of departure than the neoclassical assumption of labor scarcity. Lewis accepts the notion that labor may be employed to the point of zero, or even negative marginal product in the traditional sector. Employers in this sector are willing to pay wages above marginal product because rather than being mere profit maximizers, they are also imbued with a sense either that the maintenance of large numbers of retainers is their social responsibility, or that it enhances their prestige. Capitalists maximize profits and so will pay wages less than or equal to the value of marginal product of their workers. Thus there is an ample range over which capitalists may expand their employment while paying a subsistence wage or some constant mark-up thereon, without decreasing output in the traditional

sector and without facing an upward-sloping labor supply curve. Lewis' article traces the transition to a fully developed economy and cases of both open and closed economies, as well as several institutional frameworks. The key to his arguments, however, are the two mentioned--a classical framework, and behavior in the traditional sector which is not strictly profit maximizing.

The Lewis model is consistent and eloquently expressed in his paper. Indeed, the major dissatisfaction with the model seems to be the ascription of other than maximizing behavior to employers in the traditional sector. This can be fit into a neoclassical framework if the traditional employers are thought of as maximizing utility as a function not of profits exclusively, but also of the number of people employed (as above, for reasons of prestige or social responsibility). Judging, however, from the number of articles written trying to produce a surplus of labor in a profit maximizing framework, this conceptual twist has not satisfied the profession.

Ranis and Fei (1961) follow closely in Lewis' vein. The crucial assumption of their work is that all workers not needed in manufacturing will be employed in agriculture at an institutionally determined wage equal to the average product in agriculture when the entire population is employed there. All workers whose marginal product is zero may be removed without lowering agricultural output. Those whose marginal product is lower than the institutional wage may also be removed without raising industrial labor costs. Using this basic framework, Ranis and Fei concentrate on population and productivity growth and their implications for development.

The article is deservedly considered a classic, but fails in providing a complete theoretical grounding for surplus labor in two respects. The existence of an institutional wage in agriculture is not sufficiently motivated. In referring to the initial average agriculture product they say only that

> The persistence of this wage level is sustained by institutional or non-market forces since under competitive assumptions the real wage would fall to zero, at equality with marginal physical product. We shall call this the institutional wage. (p. 536)

The choice of average product as the fixed wage may imply a notion that within families resources are divided equally. This explanation is intuitively appealing, but if it were truly the motivation, the wage would have to be the average product of those remaining in the sector, and would rise with the withdrawal of each person.

The other shortcoming of the article is its failure to explain why agricultural workers are paid more than their marginal product and less than their average product. Apparently it is profit maximizing landlords who hire labor, in which case in the absence of other explanation, it is irrational for them to pay more than the marginal product of labor.

Georgescu-Roegen (1960), argues that neoclassical and Marxist economics have failed to understand agrarian economies because they have failed to conceptualize them as descendants of the feudal system, designed to maximize agricultural surplus. This is the most progressive organization because industry can develop only to the extent that agriculture can produce a surplus. Output maximization will use labor to the point that its marginal product is zero. This does not, however,

explain why many workers with zero marginal product would be used, nor at what wage they would be available to manufacturing.

Eckaus (1955) explains the presence of unproductive labor in agriculture as being a result of limited technical substitutability of factors, with divergences between the proportions in which goods are demanded and in which they can be supplied with full use of available factors. His model also fails in explaining the wage greater than value marginal product paradox.

Leibenstein (1957) works within a completely neoclassical framework to establish a motivation for a profit maximizing firm to pay a wage higher than a worker's value of marginal product. He draws a link between wages and food consumption and between food consumption and labor productivity. Briefly put, better fed workers work better, and can only be better fed if they are better paid. Thus it is in the interests of the firm to pay high wages. If, however, they employ workers only to the point where wages equal value of marginal product, then unemployed workers will bid down wages for all workers. Nutritional levels will fall and the productivity of all the workers will fall. Leibenstein then illustrates a case where total profits are maximized by employing all workers, though the marginal product of some is below the wage. This model is consistent and addresses all the relevant issues but seems a likelier explanation of surplus labor in wage labor manufacturing than in small holder agriculture, and only holds for wage levels at the very borderline of subsistence.

The merits of these explanations of surplus labor vary, but none seem to have satisfactorily explained the presence of positive wages for individuals whose product was zero. Indeed, employment beyond this point

seems to be too much for most economists to accept even when other than profit maximizing frameworks are used.

To address this problem a slightly different and more satisfactory approach was provided by Sen (1966) and employed subsequently with various modifications [Zarembka, (1972); Bhatia, (1979); Gang and Gangopadyhay, (forthcoming)]. Surplus labor here is conceived not in terms of workers having a zero marginal product, but rather having positive product though working for fewer hours than "full time". When a laborer is withdrawn from agriculture, those who remain work more hours and thus maintain output.

Working less than full time can be interpreted in two ways. It may mean spending a limited number of hours at work but with intense effort during these hours. It is more likely to mean working at a leisurely pace for a standard number of hours. This is clearly the notion that Lewis had in mind when discussing the flocks of errand boys who only occasionally are sent on errands or the vendors in the markets who make only a few sales per day.

In Sen's model the manufacturing sector is completely neoclassical. Agricultural workers are utility maximizers deriving utility from both income and leisure. The first order conditions for utility maximization reduce to the marginal product of labor equated to the ratio of the marginal utility of leisure to the marginal utility of income. This is termed the real cost of labor. With appropriate assumptions on the shape of the utility function the real cost of labor will be constant over a range of workday lengths. Thus workers can be withdrawn from the sector and those remaining will increase their workdays to maintain output and would be willing to work outside the sector for a constant wage.

The simplest set of assumptions which give a constant real cost of labor are that utility be separable in income and the disutility of work, and that over a range, the marginal utility of income and the marginal disutility of work be constant. Near the subsistence level one would not expect the marginal utility of income to fall rapidly. Assuming it to be constant, then, may not be unreasonable. For fully employed people the constant disutility of work seems implausible. For the underemployed it may be perfectly appropriate. Extra hours of work may actually increase the individual's self respect and help justify his share of family output (see Sen, (1975)). If the extra work takes the form of more diligent effort exerted during the same number of hours spent on the job, the relief from boredom and increased self esteem may make up for the extra effort.

The features that all of these approaches to surplus labor have in common are a lower bound to wages in agriculture, and the absorption in agriculture at the lower bound wage of all labor not needed in industry. From this starting point industry may expand by drawing workers away from agriculture at a constant wage and without decreasing agricultural output. After all of the surplus labor has been removed from agriculture, further industrial expansion will cause wages to rise in both sectors and agricultural output to decline. In short, the model becomes neoclassical.

In the next section I build a model of an economy with surplus labor. I do not pretend to explain its occurrence, on this point the reader is referred to the works just cited, particularly Lewis (1954), Ranis and Fei (1961), and Sen (1966). Because my sole purpose here is the extend our knowledge of tax policy into surplus labor economies, I have chosen as a

starting point the occurrence of surplus labor and abstract from differences in opinion as to its cause.

SECTION 2: The Labor Surplus Model

The economy is small and open with two sectors. Each produces its good using an industry specific factor and labor. The two sectors represent the two halves of a dual economy. They have been labeled as urban and rural, industrial and agricultural, or modern and traditional by various authors. In this paper they will be referred to as manufacturing and agricultural, though the terms are not used literally. The manufacturing sector is more capital intensive and usually located in the urban centers. It includes most manufacturing, energy production, communications, government, banking, and the sort of commerce that import-export firms and department stores handle. The agricultural sector is labor intensive, not industrial and predominantly rural. It includes subsistence and some small- to medium-scale commercial agriculture, cottage industries, and the sort of small-scale commerce that is carried on by "Mom and Pop" businesses and street vendors.

Manufacturing

Goods are manufactured according to a constant returns to scale, constant elasticity of substitution production function with two inputs, capital and labor. Thus where M is manufactures, L_m is labor in manufacturing and K_m is capital in manufacturing,

$$M = F(L_m, K_m). \qquad (1)$$

Firms maximize profit so that the factors are used in proportion to factor prices. Hence

$$K_m/L_m = K_a/L_a \ (r_m/w_m).^{2} \qquad (2)$$

It is assumed that there is perfect competition and thus that profits will in equilibrium be equal to zero. The product exhaustion relationship may be expressed as

$$P_m M = w_m L_m + r_m K_m, \qquad (3)$$

where P_m is the price of the manufactured good.

Agriculture

I will assume that the supply curve of laborers available to manufacturing from agriculture is horizontal over a range and then rises as shown by AA' in Figure 1. The length of the horizontal axis represents the number of laborers in the economy. Measuring to the right from O_m, the manufacturing origin, gives the number of workers in manufacturing. Measuring to the left from O_a, the agricultural origin, gives the number of workers employed in agriculture. The maximum number of workers that can be productively employed in agriculture is L^o, which the reader will note is the point at which supply becomes completely elastic.

If the demand curve for labor in manufacturing crosses the supply curve of agricultural labor to manufacturing to the left of L^o, as is the case for MM', then surplus labor is said to exist. A laborer may be withdrawn from agriculture without decreasing output there, and employed in manufacturing at wage w. If the intersection occurs to the right of L^o as for mm', then the surplus labor has been entirely absorbed into manufacturing and the economy has become neoclassical. By definition, when

surplus labor exists agricultural output is at a maximum. In Sen's framework we can think of the number of labor hours as constant and predetermined. Thus the inputs being known, the output is known and we can omit the production function from consideration. The factor mix is similarly determined so that no parallel to the factor substitution equation 2 is needed either. The product must be sold, however, and as there is free entry, revenue exhaustion will occur. Thus

$$P_a A = w_a L_a + r_a K_a \ldots \quad (4)$$

The derivation of this equation may differ from the neoclassical case. If the agricultural wage is institutionally determined and all non-manufacturing workers are employed there, then the wage cost is fixed to the sector. There is no alternate use for agricultural capital, so its value is determined by how much it is worth in agriculture. If its price is low enough that there are profits in agriculture then another buyer would be willing to pay more in exchange for a slightly lower but still positive economic profit. This process would continue until the cost of capital consumes profits and equation 4 holds. In Sen's model in the agricultural wage is determined by the real cost of labor, which is equated with the value of marginal product of labor, so the usual derivation by application of Euler's theorem will apply.

Factor Markets

Capital is sector-specific. Many similar models deal with "capital" in manufacturing and "land" in agriculture. Here the term capital will be used in both sectors so that land, improvements on it, and tools are all considered part of agricultural capital. The joint assumption of sector-

specific capital and zero profits implies that the return to capital is an economic rent and may differ between sectors.

The total number of laborers is fixed. They may be employed in either sector. Normalizing over the labor force gives

$$1 = L_a + L_m \quad . \tag{5}$$

L_a is the number of laborers in agriculture,[3] and L^o is the minimum number needed to sustain maximum output, so the amount of surplus labor, or underemployment is U, where

$$U = L_a - L^o \quad . \tag{6}$$

Labor is mobile between the two sectors. In equilibrium the wages will be equal, that is

$$w_a = w_m \quad . \tag{7}$$

This is the whole of the model. The two sectors represent the two sides of a dualistic economy. The shape of the supply of labor to manufacturing from agriculture schedule introduces the existence of surplus agricultural labor in equilibrium. Product prices have been made exogenous to reflect the small, open nature of most LDCs. The general equilibrium cast of the model facilitates meaningful tax incidence results.

Following in the tradition of the Harberger (1962) tax incidence models the basic equations in the system are differentiated and manipulated in their differential form. Expression of the system in the percent change ("hat") notation frequently used in public finance and international trade literature is useful in understanding the flow of changes through the system. The key equations are presented in differential form in Table 1, along with the definition of the elasticities which will recur in the tax incidence results.

SECTION 3: Tax Incidence Elasticities with Surplus Labor

A variety of taxes and subsidies may be introduced into the basic model. They include taxes or subsidies on domestic value added, wages, and the return to capital in either sector or in both jointly. The taxes considered are ad valorem, so the price of the good in question is multiplied by unity plus the percentage tax rate. For capital in the manufacturing sector, the taxed factor price r_m^* is

$$r_m^* = r_m(1 + t_{rm}) \qquad (8)$$

where t_{rm} denotes a tax on the return to capital in manufacturing. Wage taxes work analogously. When a value added tax is levied on domestic production it will drive a wedge between the world price and the home price for the good. This formulation is more general than that used in most of the tax incidence literature in that it requires no normalization and it allows for non-zero initial taxes.[4]

When a tax is imposed, the untaxed price is replaced in the system with the taxed price as appropriate. Consumers respond to the gross of tax product price which in the open economy must equal the world price P^w. Firms respond to the net of tax, or home, product prices, P^w, and the gross factor input prices r^* and w^*, reflecting their costs and revenues. Factor owners respond to the net of tax factor prices w and r.

Some tax combinations are equivalent to each other. The effect of an across-the-board (national) tax is the sum of the effects of taxes in the individual sectors when the tax rates are the same. A subsidy may be regarded as a negative tax, so the derivations hold for subsidies as well as taxes.

It is assumed that the revenue raised from the taxes is redistributed to consumers in a lump sum transfer (If a subsidy is used then revenue to finance it is raised through a lump sum tax). This assumption is clearly unrealistic but allows us to concentrate on one change in the system at a time. To calculate the effect of multiple instruments the elasticities for a variable with respect to each tax are summed. The number of possible permutations is quite large and will not be dealt with here.

The basic method of deriving the incidence results is the same for all of the taxes. A tax is inserted into the system, and the elasticity of the system's variables with respect to the policy is ascertained by applying Cramer's rule to the differential forms of the equations as presented in Table 1. The elasticities are presented in Table 2. A graphical explanation of the principal qualitative results follows.

A Value Added Tax in Manufacturing

An intuitive understanding of these results can be achieved through the use of a diagram similar to Figure 1. In Figure 2 only the portion of the economy with surplus labor is represented. Thus the right hand origin is no longer the point where no workers are employed in agriculture, but rather where all that can be productively employed there are, or L°. The supply curve of labor to manufacturing from agriculture is completely flat and given by AA'. The demand curve for labor in manufacturing, its value of marginal product curve, is given by MM'. Thus L_m workers are employed in manufacturing, the rest are in agriculture, and U of them are underemployed.

The introduction of a tax on the value added in manufacturing will drive a wedge between its gross (world) and the net (domestic) prices. The world price is fixed, and as consumers are free to purchase on the international market, the gross price of domestically produced goods can be no higher than the international price. Thus $P^w_m = P^w_m(1+t_m)$. A tax lowers the net price that a domestic producer can receive and hence lowers the value of labor's marginal product, as shown by a move to mm'. Now l_m workers are employed in manufacturing. The number of underemployed in agriculture has grown to u. With fewer laborers in manufacturing, fewer manufactures are produced. Agricultural output is, of course, constant, as are wages. Either agricultural workers are working less hard or they are working unproductively. The return to capital in manufacturing has fallen as the value of the product it produces and its labor complement have both fallen. The return to agricultural capital is constant.

A Value Added Tax in Agriculture

A tax on the agricultural product will not change the net wage at which labor is willing to move to manufacturing. The reader will recall that in the various models this wage is institutionally determined, subsistence level, or determined by workers' income-leisure choice. There is no reason to suppose that an institutional net wage should change in the face of tax changes, particularly if as in the Ranis-Fei model it is based upon a historical datum which current taxation does not affect. Because the economy is small and open the gross product prices are capped by constant world prices. Workers will not need a higher net wage to achieve a subsistence income, so a constant net wage formulation will apply to

models such as Lewis, Georgescu-Roegan and Leibenstein. In the Sen model the wage is determined by the real cost of labor, which is directly determined by the shape of the utility function. This will not be changed by taxation. In a technological model like Eckaus' labor surplus does not occur until the wage-insensitive portion of the isoquant has been reached, so even a change is wage would not affect employment in his model. Thus the constant net wage formulation is valid for the whole spectrum of labor surplus models.

If the agricultural net wage is constant, then the wage at which labor can be attracted to manufacturing is constant. The supply curve of agricultural labor to manufacturing, AA', is unchanged from its position in Figure 1. The value marginal product in manufacturing, MM', is also unaffected. None of the variables read off the diagram have changed. The only effect of the tax on agricultural value added is to lower the net agricultural price and thus the rent available to agricultural capital.

A National Value Added Tax

The effect of a national value added tax is the same as that of taxes in the individual sectors applied at a uniform rate. The demand for labor in manufacturing is reduced, but the supply from agriculture is constant. Thus the diagram is the same as Figure 2. Manufacturing employment, product, and rents are reduced. Agricultural underemployment is increased. Agricultural output is constant, but rents are reduced.

Taxes on Labor

A tax on labor affects the supply and demand for manufacturing labor in the same manner as a value added tax on the product. Indeed, the

elasticities computed for changes in a tax on labor are identical in all cases to those computed for changes in value added taxes, save those for the returns to capital. This is not surprising when we realize that the initial demand curve for labor is

$$P^M MP_L = w. \tag{9}$$

Taxing the commodity modifies the demand for labor to be

$$P^M MP_L = w \tag{10}$$

where $P^M = P^M(1+t)$. Taxing the wage modifies the curve to

$$P^M MP_L = w(1+t) \tag{11}$$

or $$(P^M/(1+t))\ MP_L = w$$

but by substitution $$P^M MP_L = w.$$

Net agricultural wage is constant for the reasons given above, so the supply of labor to agriculture is constant. The equivalency of wage and value added taxes holds only so long as capital is immobile, and the tax rates are the same. It should be borne in mind that value added taxes will raise more revenue than wage taxes at the same rate because the former capture some of the rent to capital.

The equivalence does not hold for the elasticities of returns to capital. This accords with McClure's result (1975) that the effect of an equal rate tax on both factors of production will be identical to that of a tax on the product, and with the differential form of equation 1 and 4 in which the change in the product's price is the weighted sum of changes in the factor prices, with the weights being the share of each factor in revenue.

Taxes on Capital

Because capital is immobile taxing it can only decrease the rent it accrues. It will not change its allocation, nor the productivity and thus employment and wages of labor, nor the quantity nor composition of the economy's output. Thus none of the variables in the system change except for the net return to capital itself.

Let us consider for a moment how the stylized policies discussed here relate to the somewhat messier real world. The distinction in degree of organization in the two sectors means that a nominally national tax may be closer to a single-sector policy in effect. This can be expected in the case of a wage tax. The degree of organization and enforcement is so low in the agricultural sector (the non-literal aspects of the distinction must be borne firmly in mind in this paragraph) that collections and incentive changes in the agricultural sector are practically non-existent with a national wage tax. A corporate profits tax is similarly prone to burden manufacturing capitalists, because in spite of the nature of their product, large, organized agricultural firms are likely to be classed in the manufacturing sector. A land tax which does not excuse small-holders would be the translation of this model's tax on agricultural capital. Taxation of value added is straight-forward in the organized manufacturing sector. In agriculture, the closest practical instrument may be agricultural pricing policy or crop marketing boards (The reader interested in the practical difficulties of taxation in LDCs may refer to Goode, (1984) and Bird and Oldman, (1967).).

SECTION 4: Taxes and GNP, Underemployment and Poverty

Tax incidence is usually used to determine who actually bears the burden of a tax. In this model we can also quantify the extra cost to society of the levy, that is the change in gross of tax national income. Another common motivation for incidence analysis is a (frequently vague) concern for distributional issues. This is made explicit here through consideration of underemployment and poverty's response to tax policy.

Gross National Product

The gross national product is the value at world prices of production. That is

$$GNP(t) = P^{W}_{m}M(t) + P^{W}_{a}A(t) \; . \qquad (12)$$

Differentiating with respect to the tax and multiplying by t/GNP yields

$$\epsilon_{GNP,t} = \theta_{m}\epsilon_{m,t} + \theta_{a}\epsilon_{a,t} \qquad (13)$$

where θ_{m} and θ_{a} are the share of manufactures and agriculture in GNP. In the presence of surplus labor, however, agricultural output is constant in the face of a tax, so $\epsilon_{a,t}$ is zero, and equation 3.13 reduces to

$$\epsilon_{GNP,t} = \theta_{m}\epsilon_{m,t} \; . \qquad (14)$$

The capital taxes and taxes on agricultural wage or value added are all nondistortionary. Thus they are to be preferred on efficiency grounds.[5]

The elasticities of a tax on manufacturing (wage or value added) and a national tax (wage or value added) are the same when the taxes are applied at the same rate. Different amounts of revenue will be raised by these taxes, however, and this must be considered in their ranking.

Of the four taxes under consideration, the national value added tax has the largest base and will thus raise the most revenue at a given rate. Conversely, to meet a particular revenue requirement, the national value added tax could be applied at the lowest rate and thus cause the least loss of income. It is preferred over the other distortionary taxes.

The tax on manufacturing labor has a smaller tax base than either the national wage tax or the tax on manufacturing value added and so would need to be applied at the highest rate in order to raise a given amount of revenue. It is therefore the least preferred.

The ranking between the manufacturing value added tax and the national wage tax depends upon the rate at which each would need to be levied. This depends in turn upon the relative size of their bases. Since there is no a priori reason why the share of labor in the economy should be either greater or smaller than the share of manufacturing, no general ranking can be determined. The wage tax will (will not) be preferred to the manufacturing tax as the share of labor is greater (smaller) than the share of manufacturing.

In summary, capital and agricultural taxes are non-distortionary and thus ranked first in terms of effect on national income. Of the distortionary taxes the national value added tax is the most preferred. The ranking of the national wage and the manufacturing value added taxes depends upon the share of labor in the economy relative to the share of manufactures. The least preferred tax is the tax on manufacturing wages.

The above ranking is for the effects of taxes on national product. If subsidies are considered then the ranking is reversed. A given expenditure will have the largest effect where the elasticity of output to the tax is

highest. Thus the most efficacious way of raising GNP would be to subsidize labor in manufacturing.

Underemployment

The pattern of incidence elasticities is the same as for national income. Capital and agricultural taxes are again nondistortionary and leave the level of underemployment unchanged. A national value added tax will raise underemployment, but by the smallest amount of any of the distortionary taxes. The ranking of the national wage and the manufacturing value added tax depend on the share of labor and manufacturing in national income. Taxing the manufacturing wage is the least preferred alternative with regard to the effect on underemployment.

Poverty

Although surplus labor models were designed to explain the workings of economies where poverty is widespread, poverty is not easily addressable in the model as presented here. With the assumption of mobile labor wages in the two sectors are equal.

I could have formalized Lewis' notion that manufacturing wages are approximately thirty percent higher than agricultural wages. This would have reduced the numbers in manufacturing and have marked all those in agriculture as comparatively poor. The workings of the model would remain asically unchanged[6] and the ranking of taxes by their effect on the number of poor would be identical to the ranking for their effect on the number of underemployed.

If the basis for surplus labor is the constancy of the real cost of labor[7] as Sen postulates, and if it is assumed that the length of the workday in manufacturing is exactly the number of hours per day that is the upper bound to the range over which real labor costs are constant,[8] then a different interpretation to poverty may be given. In this case, the hourly wage is the same for all workers but agricultural workers work fewer hours per day than do those in manufacturing. Shifting workers out of agriculture will decrease both the number in poverty and will leave those in agriculture working longer hours and thus receiving higher total incomes. The tax/subsidy ranking in this case is the same as in the other cases.

SECTION 5: Neoclassical vs. Labor Surplus Tax Incidence

One of the important reasons to examine tax incidence in a labor surplus economy is to learn how it differs from that of the neoclassical economy, and to see to what extent tax policy rules are sensitive to the labor market distortion.

The Neoclassical Model

In the agricultural sector of the neoclassical model the assumptions made for the manufacturing sector in the labor surplus model are replicated. Thus there are two production equations, 1 and its agricultural analogue; two factor substitution equations, 2 and its agricultural analogue; and two product exhaustion equations, 3 and 4. Labor is still employed in one sector or the other, and wages are equalized by labor mobility so equations 5 and 7 still hold. There is no underemployment so equation 6 is omitted.

Neoclassical Incidence Elasticities

The elasticities for the neoclassical model are presented in Table 3. Graphically, we are now examining the case where $L_a < L^o$, so the supply of labor from agriculture to manufacturing is upward sloping. In Figure 3 we can take MM' and AA' to be the initial schedules.

A tax on manufacturing lowers the value of marginal product there to mm', and the quantity of manufacturing labor and output declines. The return to manufacturing capital falls as it has a smaller complement of labor, and in the case of the value added tax, because the net price of its product falls. Labor is transferred productively into agriculture so agricultural product and its return to capital rise. The wage falls.

A tax on agriculture will lower demand for agricultural labor shifting the economy onto the aa' curve.[9] Agricultural employment, product and rents shrink, while manufacturing employment, product, and rents rise. The wage, again, falls.

The imposition of an across-the-board tax is the same as the simultaneous imposition of both sectoral taxes. In the neoclassical model national taxes are nondistortionary. The product and factor prices relative to the corresponding prices in the other sector remain unchanged, so no reallocations are initiated. Product prices relative to factor prices are, of course, changed. Capital taxes are again nondistortionary and the equality of elasticities for wage and value added taxes also holds in the neoclassical model.

Neoclassical Policy Rankings

Capital taxes and national wage and value added taxes are all nondistortionary. They will be the most preferred taxes with respect to

national income in the neoclassical model. The rankings of the distortionary single sector taxes depend on the size of their tax base and thus the rate at which they must be applied to meet revenue goals.

The value added tax will be preferred to the wage tax in the same sector because the former captures some of the return to capital and can thus be applied at a lower rate. The value added tax in the sector with the larger share in GNP is preferred to the value added tax in the smaller sector. The wage tax in the larger sector is preferred to the value added tax in the smaller sector if and only if the share of the larger sector's labor in GNP is larger than the contribution of the entire smaller sector to GNP. The ranking between the two wage taxes depends upon the share of each sectors' labor in national product. Wage taxation is preferred in the sector with the larger wage bill.

The neoclassical model rules out underemployment and guarantees that all workers receive the same incomes, so no treatment of employment or poverty is appropriate.

Comparisons: Labor Surplus vs. Neoclassical

To compare the rankings of the neoclassical and the labor surplus economies the reader is referred to Table 4. The presence of surplus labor reverses the rankings for a national value added tax and the agricultural wage and value added taxes. It reverses the rankings for the national wage and the agricultural wage taxes. It may also reverse the rankings of the national wage and value added taxes in manufacturing and the ranking of the two sectoral wage taxes, depending upon the system's parameters.

Let us turn now to a comparison of the magnitudes of the labor surplus and the neoclassical elasticities. The first and most obvious difference

is in the response in the agricultural sector. This is to be expected given the construction of the surplus labor model. There are, however, two more subtle features.

The response of manufacturing labor and production is greater in the labor surplus model than in the neoclassical model.[10] The change in the number employed in agriculture is also greater in the labor surplus model, though it does not bring with it changes in output. Economic rents are more sensitive in the labor surplus model because changes in wages and agricultural output cannot help to absorb tax shocks.

The generally greater labor surplus elasticities mean that if policy makers have used the neoclassical standards when there is in fact labor surplus present, they may underestimate the consequences of their actions for manufacturing and returns to capital at the same time that they overestimate their impact on agricultural production. Furthermore, as an economy develops, converting from a labor surplus to a neoclassical mode, the elasticities with respect to policies will lessen and policy rankings will change. Historical measurements of elasticities will overestimate actual elasticities and may lead to suboptimal policy decisions.

The second subtlety is the different role that particular parameters play in the elasticities. While the factor shares and factor substitutability in agriculture play important roles in the neoclassical elasticities, they do not appear in the labor surplus terms at all. Furthermore, the initial distribution of the labor force plays a much greater role in the neoclassical case.

The differences is the magnitudes of individual elasticities and in the rankings of taxes by efficiency between the neoclassical and labor

surplus models are marked. Appropriate policy is quite sensitive to the presence or absence of surplus labor in the economy. Thus the importance of empirical estimates of the phenomenon is underscored. If it is found that surplus labor exists in an economy then it is equally important to remeasure it at intervals, so that policy makers will be able to adjust their policies when the surplus labor has been transferred into the manufacturing sector.

SECTION 6: Concluding Remarks

The literature on surplus labor has been reviewed. A general equilibrium tax incidence model has been constructed which takes as a starting point the common, though differently motivated, conclusions of the literature discussed. Incidence elasticities for sectoral allocations of labor, product, and the return to capital have been derived with respect to taxes on national and sectoral value added, wages and returns to capital. Rankings of the taxes by effect on national income, underemployment and poverty emphasize that agricultural taxes are preferred to national taxes which are preferred to manufacturing taxes.

Incidence elasticities and policy rankings have been derived for the neoclassical model. Comparisons of the results of the two models show that the magnitudes of the elasticities vary consistently. The parameters which play important roles, and most importantly, the rankings of taxes by national income differ. Before concluding, let us examine the effect of some of the model's simplifications on the dichotomy between its results and those of the neoclassical model.

This paper differs from much of the labor surplus literature in that its emphasis has been static while much of the literature's concern is dynamic. The literature generally assumes that growth will come about through increases in manufacturing capital stock funded by rents on manufacturing capital. Land owners squander their rents and are not a source of investment or growth. If this is true then the desirability of taxing agriculture rather than manufacturing is justified. On the other hand, there is a whole literature on agricultural-led growth (Schultz and followers). If agricultural profits are a source of investment then their reduction through any sort of taxation will slow growth.

The sector in which the investment occurs is of less moment. Increased manufacturing capital will raise the demand for labor in manufacturing and draw surplus labor out of agriculture. Increased agricultural capital will increase the number of productively employed agricultural workers, thereby lowering underemployment.

In the neoclassical model, growth considerations introduce parallel forces. Taxes should, of course, avoid the source of investment. If that is manufacturing rents, then taxation of manufacturing should be sheltered in the neoclassical model as well as in the labor surplus model. If agricultural rents are also a source of growth then they, in turn, should be sheltered. In short, the addition of growth concerns affects the two models equally and does not change markedly the differences in their results (though it does alter the results themselves).

If capital were mobile between sectors, taxing it in a single sector prompts a reallocation of capital away from the taxed sector. A value added tax on manufacturing, for example, would have two countervailing

effects--labor would be driven from the sector and back to agriculture thereby increasing the amount of surplus labor. Capital would also be driven from manufacturing to agriculture. The increase in agriculture's capital would allow more of the labor force there to be productively employed and would act to reduce surplus labor. Agricultural taxes would have a reverse, but similarly ambiguous effect. This, of course, qualifies agriculture's position as the best revenue source in a surplus labor economy.

In the neoclassical economy capital mobility implies that single sector taxes will cause reallocations of capital and labor much as in the labor surplus economy. The agricultural and manufacturing taxes will be roughly mirror images of each other in effect. Because neither sector was particularly indicated for taxation before the introduction of capital mobility, neither will be after taxation. Capital mobility in the surplus labor model weakens the presumption that agriculture should serve as the first revenue source, so it can be said that the introduction of capital mobility narrows the differences in the two models' results. With the division of sectors such that agricultural capital is primarily land, and manufacturing capital is factories, it is difficult to imagine complete factor mobility in a static model, so its introduction is probably less important than that of growth.

Another simplification made is that the model is open but does not constrain trade to balance. This implicitly assumes that foreign exchange is unlimited. Taken by itself this does not affect the results of the surplus labor model because it is likely that the agricultural good is a net export. A move away from the extreme of unlimited foreign exchange

would make it important to maintain production of the exchange earner, or the agricultural product. But in the labor surplus case agricultural production is insensitive to taxation. Hence its position as best revenue source is unaltered by the introduction of a foreign exchange constraint.

In the neoclassical case, agricultural product will decline with taxation so that introduction of a foreign exchange constraint will shelter agriculture from taxation. The models' rankings of sectoral taxes will diverge by greater amounts when foreign exchange constraints are considered.

Of the three extensions reviewed here one brings the recommendations of the neoclassical and surplus labor models more closely in line with one another, one increases the differences in the two policy rankings, and one in basically neutral in effect. Since the consideration which moves the models closer together is arguably the least important, we remain with two very different sets of incidence elasticities and policy rankings. Before tax policy can be well chosen in less developed countries we need a resolution to the theoretical issues underlying surplus labor, a consensus on how to measure it, and thorough empirical studies for each country.

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1. I would like to thank Jan Svenjar for his very useful discussions on this topic.

2. With a homothetic production function, the product's price does not affect the factor mix.

3. Followers of Sen beware. L_a is the number of laborers in agriculture, not the number of labor hours used. Note that in manufacturing with fixed shift lengths, no such confusion arises.

4. For simplicity's sake zero initial taxes are assumed. The formulae for the elasticities derived are applicable to cases with non-zero initial taxes. Their values may change, however, because they are evaluated at different points for the cases of zero and non-zero initial taxes. Where the paper refers to an imposition of a tax, it could as well mean an increase in the rate of a pre-existing tax.

5. Note that the non-distortionary nature of the capital taxes is due to the assumption of sector -specific capital in a static model. The ranking is mentioned for the sake of completeness, but it is not robust.

6. There would be one serious loose end created. If the wage in manufacturing is higher than in agriculture why would workers not move to the city and try to obtain urban jobs either by bidding down the wage or by remaining unemployed and waiting for attrition or growth to leave a job open for them? Basu (1984) pp. 64-67 provides a good discussion of this problem and the relation of the Lewis and Harris-Todaro labor market formulations. D. Ghosh (1985) incorporates migration in a Lewisian framework. The second essay in this dissertation treats tax policy in a Harris-Todaro framework.

7. The real cost of labor is defined as the peasant's marginal utility of leisure divided by his marginal utility of income.

8. This would be the profit maximizing strategy for employers if the wage is the only cost of employment. Where there are training, overhead, or down-time costs it may be desirable to lengthen the workday.

9. Note that on the rising portion the AA' curve may be construed either as the supply curve to manufacturing of agricultural labor, or as the value of marginal product of agricultural labor (or of agricultural laborers). On the flat portion, where additional workers do not add to product the schedule continues to depict the wage at which labor is willing to migrate to manufacturing, but does not depict the value of marginal product of the laborer, which is zero.

10. To make these comparisons it is necessary to assume Cobb-Douglas production functions so that factor shares are constant.

Table 1

Key Equations

Production

$$\hat{M} = f_L \hat{L}_m$$

Factor Substitution

$$\hat{L}_m = S_m(\hat{r}_m^* - \hat{w}_m^*)$$

Product Exhaustion

$$\hat{P}^M_m = f_L \hat{w}_m^* + f_K \hat{r}_m^*$$
$$\hat{P}^M_a = g_L \hat{w}_a^* + g_K \hat{r}_a^*$$

Labor Market

$$0 = \hat{L}_m + (L_a/L_m)\,\hat{L}_a$$

$$0 = \hat{L}_a - (U/L_a)\,\hat{U}$$

$$\hat{w}_a = \hat{w}_m$$

Elasticities

Factor substitution

$$S_m = -\frac{\partial\left(\frac{K_m}{L_m}\right)\frac{r_m}{w_m}}{\partial\frac{r_m}{w_m}\frac{K_m}{L_m}} \qquad S_a = -\frac{\partial\left(\frac{K_a}{L_a}\right)\frac{r_a}{w_a}}{\partial\frac{r_a}{w_a}\frac{K_a}{L_a}}$$

Output with respect to factor input/ factor shares

$$f_L = \frac{\partial f\, L_m}{\partial L_m M} = \frac{w_m L_m}{P_m M} \qquad g_L = \frac{w_a L_a}{P A_a}$$

$$f_K = \frac{\partial f\, K_m}{\partial K_m M} = \frac{r_m K_m}{P_m M} \qquad g_K = \frac{\partial g\, K_a}{\partial K_a A} = \frac{r_a K_a}{P_a A}$$

Table 2

Labor Surplus Tax Incidence Elasticities*

Panel a : Domestic Value-Added Tax

	Manufactures	Agriculture	National
M	$-f_L S_m / f_K$	0	$-f_L S_m / f_K$
L_m	$-S_m / f_K$	0	$-S_m / f_K$
r_m	$-1/f_K$	0	$-1/f_K$
w_m	0	0	0
L_a	$S_m L_m / f_K L_a$	0	$S_m L_m / f_K L_a$
r_a	0	$-1/g_K$	$-1/g_K$
U	$S_m L_m / f_K U$	0	$S_m L_m / f_K U$

* The variables are arranged by row, the sectors by column and the factor taxed by panel. Thus $\epsilon_{m,tm}$, the effect of a change of a value-added tax on manufacturing output is found in the first column of the first row of the first panel.

Table 2 (continued)

Labor Surplus Tax Incidence Elasticities

Panel b: Wage Tax

	Manufacturing	Agriculture	National
M	"**	"	"
L_m	"	"	"
r_m	$-f_{L_m}/f_K$	"	$-f_{L_m}/f_K$
w_m		"	
L_a	"	"	"
r_a	"	$-g_{L_a}/g_K$	$-g_{L_a}/g_K$
U_a	"		

Panel c: Capital Tax

	Manufacturing	Agriculture	National
M	0	0	0
L_m	0	0	0
r_m	-1	0	-1
w_m	0	0	0
L_a	0	0	0
r_a	0	-1	-1
U_a	0	0	0

** Where a " appears the elasticity is identical to the corresponding elasticity for a value-added tax.

Table 3

Neoclassical Tax Incidence Elasticities*

Panel a : Domestic Value-Added Tax

	Manufactures	Agriculture	National
M	$f_L S_m S_a L_a / J$ **	$-f_L S_m S_a L_a / J$	0
L_m	$S_m S_a L_a / J$	$-S_m S_a L_a / J$	0
r_m	$(S_a L_a + S_m L_m g_K)/J$	$-f_L S_a L_a / J$	-1
A	$-g_L S_m S_a L_m / J$	$g_L S_m S_a L_m / J$	0
L_a	$-S_m S_a L_m / J$	$S_m S_a L_m / J$	0
r_a	$-g_L S_m L_m / J$	$(S_m L_m + f_K S_a L_a)/J$	-1
w	$g_K S_m L_m / J$	$f_K S_a L_a / J$	-1

* The variables are arranged by row, the sectors by column and the factor taxed by panel. Thus $\epsilon_{m,tm}$, the effect of a change of a value-added tax on manufacturing output, is found in the first column of the first row of the first panel.

** J refers to the Jacobian of the system:

$$J = -S_m L_m g_K - S_a L_a f_K < 0$$

Table 3 (continued)

Neoclassical Tax Incidence Elasticities

Panel b: Wage Tax

	Manufacturing	Agriculture	National
M	"**	"	0
L_m	"	"	0
r_m	$f_L S_a L_a / J$	"	0
A	"	"	0
L_a	"	"	0
r_a	"	$g_L S_m L_m / J$	0
w	"	"	-1

Panel c: Capital Tax

	Manufacturing	Agriculture	National
M	0	0	0
L_m	0	0	0
r_m	-1	0	-1
A_m	0	0	0
L_a	0	0	0
r_a	0	-1	-1
w_a	0	0	0

** Where a " appears the elasticity is identical to the corresponding elasticity for a value-added tax.

Table 4

Tax Policy Rankings by Effect on GNP

Panel a: Labor Surplus Economy*

1)	t_{rm}, t_{ra}, t_r, t_a, t_{wa}	nondistortionary
2)	t	distortionary
3,4)	$t_w \gtrless t_m$ as $\theta_L \gtrless \theta_m$	distortionary
5)	t_{wm}	distortionary

Panel b: Neoclassical Economy

1)	t_{rm}, t_{ra}, t, t_w	nondistortionary
	$t_m > t_{wm}$; $t_a > t_{wa}$	distortionary
	$t_m \gtrless t_a$ as $\theta_m \gtrless \theta_a$	distortionary
	$t_a \gtrless t_{wm}$ as $\theta_a \gtrless \theta_{Lm}$	distortionary
	$t_m \gtrless t_{wa}$ as $\theta_m \gtrless \theta_{La}$	distortionary
	$t_{wm} \gtrless t_{wa}$ as $\theta_{Lm} \gtrless \theta_{La}$	distortionary

* The ranking by effect on underemployment and poverty will be the same in the labor surplus economy.

Figure 1

Labor Allocation with Surplus Labor

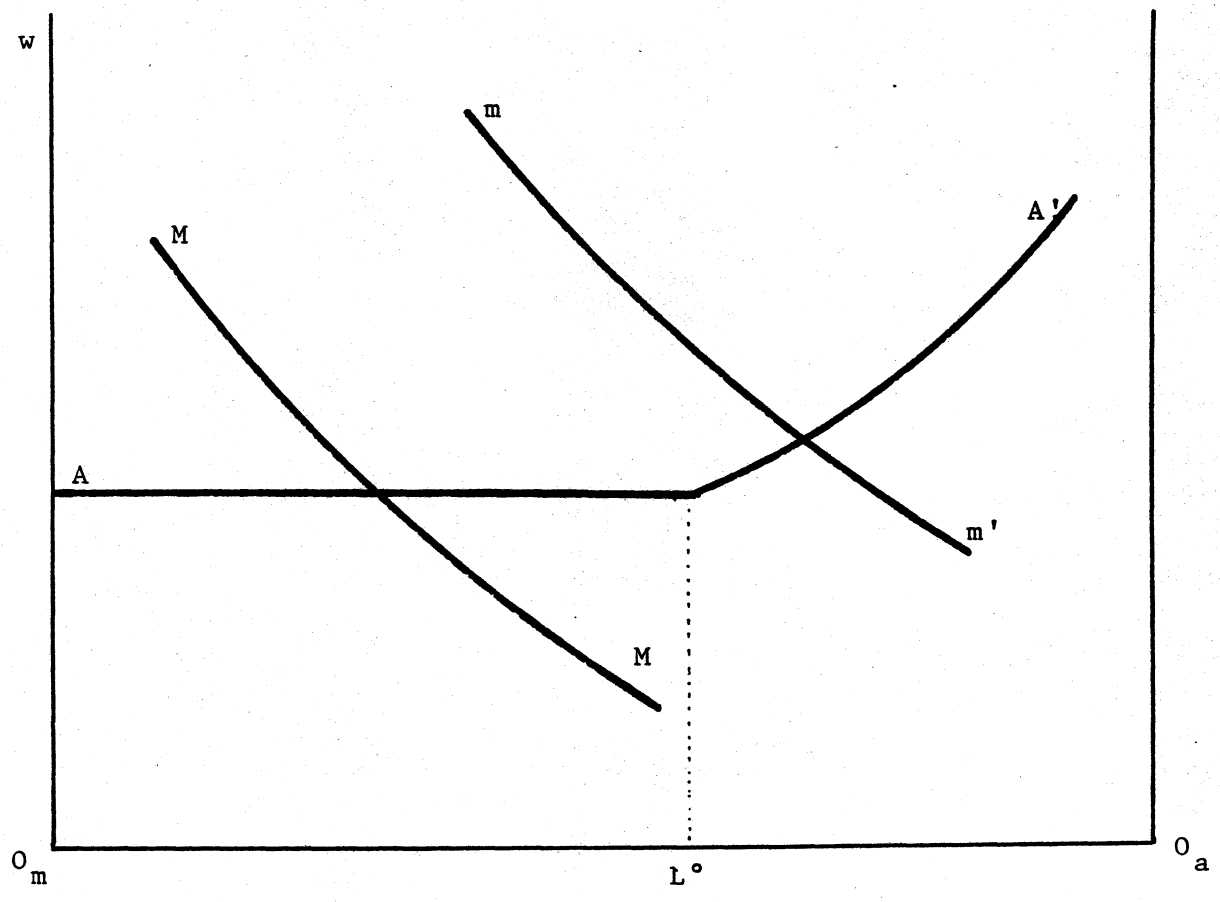

Figure 1

Labor Allocation with Surplus Labor

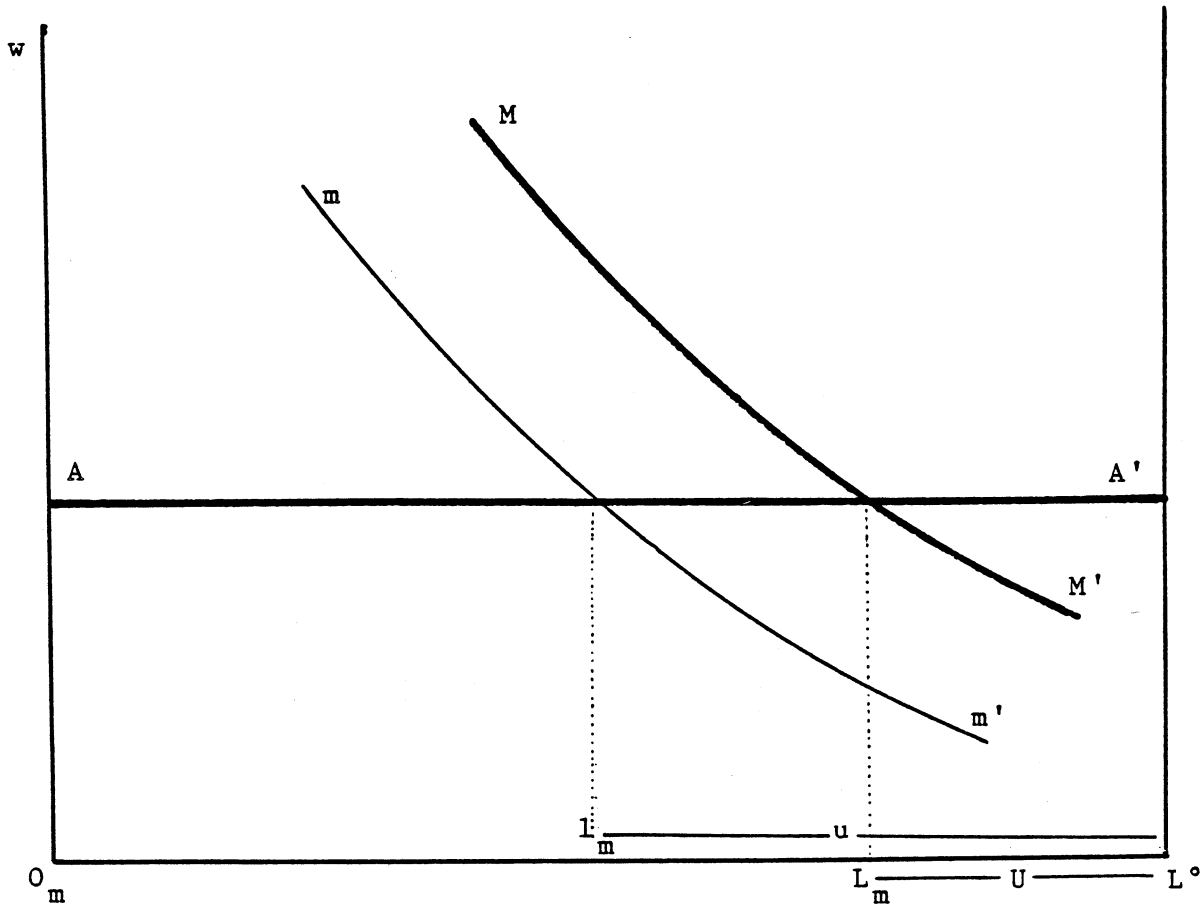

Figure 2

A Value Added Tax in Manufacturing

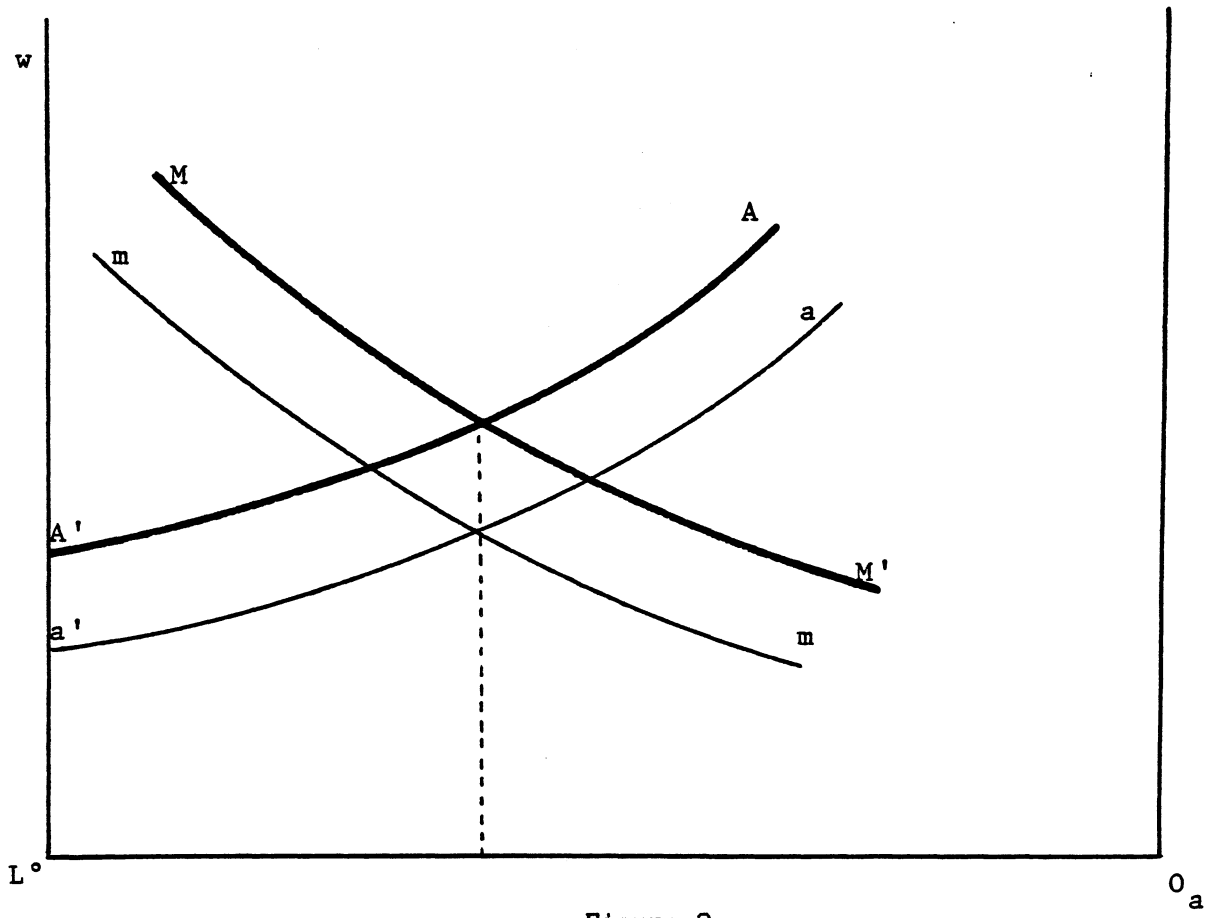

Figure 3

Labor Allocation in the Neoclasscial Model