

MODELS OF DEVELOPMENT AND EMPLOYMENT DYNAMICS IN LOW-INCOME AFRICAN ECONOMIES

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ABSTRACT

Since the 1950s, economists have extensively used the concept of *surplus labor* to analyze output and employment dynamics in dualistic economies, characterized by a large agricultural sector, and a small industrial or mining enclave. Many countries in Africa have structural features described by the labor surplus model of development. The striking prediction of this model is that a *complete* reallocation of surplus labor, away from agriculture to industry, eventually transforms a stagnant economy with widespread underemployment to a growing economy — without dualism or underemployment. However, labor in this model is homogeneous, with no differentiation based on the level of human capital or skills. We introduce skill into the model, and postulate a dualistic economy, with two segmented labor markets — one a market for labor with marketable skills and the other a market for labor with little skills. This model aptly explains the labor market outcome common in Sub-Saharan Africa, namely the co-existence of small yet significant *unemployment* of skilled labor and *full employment* of much larger unskilled labor at extremely low wages, i. e., the working poor. It is *full employment* rather than *underemployment* because the wage is set at its marginal

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product, which is extremely low because of the limited human capital. In this model, economic growth does not by itself lead to an increase of the wage of unskilled labor because it is set by the level of its human capital. Thus, a key determinant of growth and employment is investment in human capital, i. e., skills, particularly for children at an early age. This investment drives migration, technical progress, and formation of physical capital. Moreover, the transformation of the economy occurs over a much longer time period than in a surplus labor model. We highlight policy implications of this new model of segmented labor markets.

I. INTRODUCTION

Prof Gustav Ranis, our friend, colleague and mentor, passed away on October 15, 2013. In his last paper that he co-authored with Douglas Gollin, Prof Ranis explained the phenomenon of underemployment in low-income countries, especially in Africa, as follows:

“Although the literature has obviously grown immensely in the past several decades, it is still strikingly useful to conceptualize employment and unemployment in Africa through the lens of the Fei-Ranis model, which built on the earlier work of W. Arthur Lewis. The Fei-Ranis model represents a poor developing economy as essentially dualistic, with a traditional sector and a modern sector. The traditional sector has very low productivity, and it corresponds roughly to the rural farm and non-farm sector and to the urban informal sector. The modern sector would include any modern formal-sector manufacturing and services, plus the government sector. The modern private sector is modeled as an approximately neoclassical sector, in terms of the supply of and demand for labor; within the modern private sector, workers are paid their marginal product, and the market is competitive.

In contrast, the traditional sector is characterized by a sharing rule in which output is pooled to some degree within households, family networks, and even

village communities. This implies that individual workers receive the average product of labor, rather than the (substantially lower) marginal product. This implies that marginal product in rural areas may be much lower than that in the urban formal sector, even with free labor mobility. A potential migrant compares his or her wage in the modern sector with the average product of the traditional sector, rather than the *marginal* product.

Moreover, in the traditional sector, long-run Malthusian forces will tend to drive the average product close to subsistence levels. As long as the average product is greater than the subsistence level, survival rates will remain high. When average product falls below the subsistence level, Malthusian forces of death and disease, combined perhaps with outmigration, will tend to restore an equilibrium in which the traditional sector operates with average product close to subsistence.”

Thus, in the Fei-Ranis model, underemployment is associated with the traditional sector. Within that sector, labor demand can be highly seasonal, leading to periods of slack. Labor demand may also be spatially uneven, as year-to-year variations in rainfall or market conditions may shift the need for agricultural work from one location to another.

Underemployment also characterizes the urban informal sector, which operates effectively as part of the traditional sector. Families and kinship networks may share output, so it is not uncommon to find some individuals productively and gainfully employed (e. g., as shopkeepers or craftsmen) while others look for work, perform casual labor, or take on self-employment tasks with very low entry costs but also low sales prospects (e. g., shoe shining, food selling, or roadside marketing).

In the Fei-Ranis model, growth involves parallel improvements in the traditional and modern sectors. Increases in agricultural productivity can generate

surpluses that sustain investment in the modern sector; capital inflows and investments in the modern sector create jobs and labor demand that draw people in from the traditional sector” (Ranis and Gollin, 2013, pp: . . .). In an earlier paper (2012) Ranis clarified that “The definition of surplus labor does not mean that a substantial portion of the agricultural labor force can be withdrawn without loss of output, i. e., that they have a marginal productivity of zero” (p. 3). . .” In fact, all that is needed for the relevance of the labor surplus theory is that the low marginal product of labor be initially below the bargaining wage. . .” (p. 5).

On the basis of the above model of a dual economy, Ranis and Gollin concluded that underemployment can best be reduced through growth-oriented policies that support the structural transformation of the economy and ultimately the expansion of the modern sector.

In this paper, we present another dual economy model, which is not based on the dichotomy of modern vs traditional sectors, but rather on the segregation of labor force by the level of skill embodied in labor. One market consists of a limited supply of skilled labor. In the other market, there is virtually unlimited supply of unskilled labor with a low productivity that is below the consumption requirement of workers. From this model, we draw a conclusion that is strikingly different from that of Fei-Ranis, namely, underemployment can be reduced only by raising human capital, i. e., productivity of unskilled labor through investment in nutrition, health and education from conception through young adulthood.

II. 1 The labor surplus model

Lewis (1954) and Ranis and Fei (1961) developed a labor surplus model that has been used extensively to explain both the stagnation and growth of low-income economies, particularly in Africa. This model is based on the idea that the production structure of a developing economy has two key factors of production, namely,

labor and capital, broadly defined to include natural resources. Further, the economy is assumed to be structurally divided into two distinct parts—agriculture and industry—or into rural and urban sectors.

Migration of surplus labor from agriculture (where its marginal product is low or close to zero) to industry or urban areas (where its marginal product is substantially above zero) is the source of economic development. Development occurs through improvement in labor productivity, first in industry—where profits are invested to equip workers with more productive tools—and eventually in rural areas, where migration exhausts surplus labor in agriculture, raising land-labor ratio, and thus labor productivity. In the same vein, growth in wage employment is made possible by rising demand for labor in the industrial sector at a constant institutional wage (see Figure A1). The constancy of the institutional wage is assured by a perfectly elastic supply of labor to the industrial sector.

Thus over time, the urban economy accumulates large profits that can be used to support balanced growth (Fei and Ranis, 1964), i. e., to increase per capita incomes and employment in both rural and urban areas. Balanced growth in the labor surplus model is an equilibrium situation where there is no migration to either sector because the market determined wage in the industrial sector is equal to the institutional wage in agriculture. Furthermore, the economy is self-sustaining in the sense that the marginal product of labor (the main factor of production) is sufficient to cover its marginal cost (the wage rate) in both sectors. The fraction of the wage income that is saved is used for capital investments that keep the economy growing. Thus, in a labor surplus model, a developing economy reaches a self-sustaining point when both its dualism and surplus labor disappear. More importantly, at that point, both unemployment and underemployment of labor are eliminated.

However, the dynamics that make for the above process of development are of a short-run nature. The economy's take-off to self-sustaining growth is propelled

by internal migration, which is restricted to a particular generation. In particular, an adult population of a particular age is shifted from agriculture to industry until its surplus portion is exhausted. The investment made in physical capital in the industrial sector is also of a short-run nature because it benefits the current generation of workers. More importantly, there is no human capital formation in the surplus labor model. Moreover, the model lacks intergenerational linkages, in that there are no dynamics linking investments by the current generation of workers to labor productivities of future generations.

In labor surplus economies, labor supply is perfectly elastic because of a rapidly expanding population. In the same vein, physical capital is scarce because a rapid population increase leads to a high aggregate propensity to consume, and to a low saving rate. Since a high population growth rate is an important feature of labor surplus models, its source needs clarification.

The labor surplus model, first proposed by Arthur Lewis in the 1950s and developed further by Gustav Ranis and John Fei in the 1960s, was intended to analyze economies at a particular stage of the demographic transition. In these economies, crude births exceed crude deaths so that population growth is high. Moreover, as infant mortality is reduced, child population increases more rapidly relative to the adult population. Thus, the population is not only increasing rapidly, but the youth constitute the bulk of the total population. This demographic feature is due to medical innovations that increase child survival through the control and treatment of communicable diseases. The well-known positive effects of economic growth on health (Grossman, 1972) are negligible at this stage. A model of how to move an economy from a labor surplus point – with massive labor underemployment, to a self-sustaining point – with full employment, must address the problem of youth unemployment.

II.2 Dual economy model with skill-based segmentation of labor market

Preliminaries

Before proceeding further, it is important to briefly contrast the above labor surplus model of development with what we call a human capital model. We start from the observation that knowledge (conceptual or cognitive ability) and skill (technical ability) are indispensable factors of production in all economies. Moreover, knowledge and/or skill are imbedded in labor, i. e., it is part and parcel of human beings (T. W. Schultz, 1961). Thus, 'labor' is a bundle of inputs, such as good health, strength, knowledge, skill, and experience. Thus labor can be categorized or disaggregated according to its productive attributes. We assume that all productive attributes of labor at any age are positively correlated with good health at birth or *in utero* (see e. g., Strauss and Thomas, 1996). Thus, by assumption, an economy populated by workers who were malnourished or sickly in utero or at birth will have a low per capita income and a low standard of living. In a knowledge economy—where cognitive skill is an essential complement to other factors of production—economic stagnation and low standard of living can be explained by inability to accumulate cognitive or practical skills due to poor health or nutrition in utero or during the first 1000 days of life (Hino et al., 2013). Moreover, even in brawn-based economies (see Rozenzweig et al. 2012), poverty traps can be explained by lack of the strength needed to perform strenuous work due to poor health during the nascent days of life.

To simplify analysis, we view all accumulated productive attributes of labor (i. e., attributes of labor that are a consequence of investment activities), e. g., good health, strength, concepts, experience, and practical abilities as human capital or skill in short. Extra-ordinary natural capacities such as sporting or cognitive talents

due to genetics or environmental conditions are excluded. An example of an extraordinary cognitive skill due to a particular environmental conditioning is the ability to know whether or not all members of a large herd of cattle or goats are present without ever counting the herd.

We define skill as an ‘accumulated productive attribute’ of labor. In contrast, labor is a non-reproducible factor of production endowed with ordinary abilities to perform work. The term ‘ordinary’ stresses the fact that natural work abilities are commonly found across all categories of people. We assume a threshold minimum bundle of natural abilities in the population. Thus the term ‘labor’ means people who can carry out productive activities because of the natural abilities that they possess. Skill increases people’s capacity for work beyond what they possess naturally.

In labor surplus models, the term ‘labor’ refers to unskilled workers. In a knowledge-based economy, the term ‘skill’ means skilled workers because skill cannot exist without people. However, in a production function context, the effect of skill on output can be distinguished from the effect of labor (natural human ability). The distinction involves comparing marginal products of skilled and unskilled workers, with the difference being the effect of skill on output, i.e., the amount by which an accumulated productive attribute raises output beyond the quantity attributable to natural ability. Following Ranis (2012), labor is in surplus when the marginal product of labor is below the institutional (subsistence) wage, and can include a zero value. Although a similar definition can be offered for ‘surplus skill’, this concept is not applicable in low-income economies. Indeed, skilled labor (human capital) is even scarcer than physical capital in labor surplus economies. However, excess supply of skilled labor is in African economies because of labor market wages that are rigidly fixed above the market clearing wage. As will be shown shortly, the introduction of human capital or skill in the labor surplus model

drastically alters the predictions of that model about growth and employment dynamics in low-income economies.

II.3 The general model

In an economy with skilled and unskilled labor, the production process can be described by the following equation:

$$Q = f(L, K, aL) \quad (1)$$

Where, Q , L and K are output, labor and capital, respectively; a is the average skill level per unit of labor, so that $H = a \sum_i l_i$ is the aggregate skill level in the economy, where, l_i , is the labor effort associated with worker i ; so that $\sum_i l_i = L$, the total labor supply in the economy. Since, in a knowledge-based economy, interaction of skill with labor is a key aspect of the production process, equation (1) can be reformulated econometrically as:

$$\begin{aligned} \text{Log}(Q) = & \alpha_0 + \alpha_1 \text{Log}(L) + \alpha_2 \text{Log}(K) \\ & + \beta_0 \text{Log}(H) + \beta_1 (\text{Log} H \cdot \text{Log} L) + u \end{aligned} \quad (2)$$

Where, $(\text{Log} H \cdot \text{Log} L)$ is the complementary relationship between skill (H) and labor (L) in the production of output, both expressed in logarithmic form; and u is the disturbance term.

From equation (2), the marginal products of labor (L) and skill (H), expressed in *elasticity* form are:

$$Q_L = \alpha_1 + \beta_1 (\text{Log} H) \quad (3)$$

$$Q_H = \beta_0 + \beta_1 (\text{Log} L) \quad (4)$$

It should be noted that (by Young's theorem), the cross-partials for equations (3) and (4) are equal:

$$Q_{LH} = \beta_1 \quad (5a)$$

$$Q_{HL} = \beta_1 \quad (5b)$$

Equations (3)-(5b) have important interpretations in the context of a labor

surplus model with human capital.

In the labor surplus model without human capital (Equation 3)), $Q_L = \alpha_1 = 0$ (or is below the institutional wage). In this model, Q_L (marginal product of *unskilled* workers) is equal to zero (or is below the subsistence wage) because population growth exceeds the rate of job creation, generating a pool of unskilled workers without employment.

However, in a labor surplus model with human capital (Equation (4)), the marginal product of *skilled* workers, Q_H , is equal to zero only when the two parts are both equal to zero. The first part, β_0 , is the effect of skill alone on output, while the second part, $\beta_1(\text{Log } L)$, is the additional increase in output due to the labor effort that is *induced* by skill in the production process. Notice that the inducement of labor effort by skill is evident from the partial derivative of equation (2) with respect to skilled workers (Equation 4).

Each unit of the amount of labor effort that is induced by skill, i. e., $(\text{Log } L)$, increases the marginal product of skilled labor by β_1 , so that the total marginal product of skilled labor, expressed in logarithmic form is: $\beta_0 + \beta_1(\text{Log } L)$, i. e., the quantity shown in Equation (4) above. Thus indeed, in Equation (2) the supply of skilled labor at a given wage rate is in surplus if and only if both β_0 and $\beta_1(\text{Log } L)$ are equal to zero or fall below the subsistence wage. This is in sharp contrast to the case depicted in Equation (3) where the supply of unskilled labor (in the absence of human capital) is in surplus when α_1 is equal to zero (or falls below the subsistence wage).

Equations (3) and (4) show that ignoring the role of human capital in the economy understates the marginal product of labor and could lead to the wrong conclusions as to whether surplus labor exists. It should be noted that without surplus labor, the mechanics or dynamics of development described in the Lewis-Ranis-Fei model would be weak, irrelevant or severely muted. The next section

brings out the full policy implications of a surplus labor model of development that takes into account the production role of human capital.

III. POLICY IMPLICATIONS OF THE GENERAL MODEL

The main insights and policy implications of the labor surplus model with human capital are the following:

1. In stark contrast to the surplus labor model (Lewis, 1954; Ranis and Fei, 1961; Harris and Todaro, 1970; Fields, 2004), where a single labor market exists for a homogeneous class of workers, the labor market is *segmented* according to skill endowments in an economy with skilled and unskilled workers. In the present case, the labor market is segmented into two specific markets—the market for skilled workers and the market for labor (the unskilled workers). Moreover, each of the two markets clears at a different wage rate because as shown in Equations (3) and (4), the marginal products of the workers differ by skill. It is easy to generalize this case to a multiplicity of labor market segments. Indeed, such segmentation is a common feature of informal labor markets in Africa. Thus, policies designed to address the unemployment problem should take into account the skill composition of unemployed workers.

2. In the general labor surplus model, dynamic labor markets can be located anywhere in the economy. In contrast, in the specific labor surplus model, such markets must be located in urban areas or in the modern sector, where the cooperating factors of production, such as capital and technology are found. In an economy with workers differentiated by skill however, location is not an essential characteristic of the labor market because skilled workers can initiate the technical progress needed for production or for establishment of business enterprises wherever they are located. That is, workers do not have to move to a particular location, such as an urban area to establish own business or to find wage employment. In the general

labor surplus model, workers sort themselves according to activities where their skills are demanded, and such activities can be located in rural or urban areas. Moreover, in this skill-based setting, the balanced growth policies recommended in the Ranis-Fei model are unnecessary for a robust overall growth because skills will be applied in activities with the highest returns. In fact, balanced growth policies can reduce the aggregate growth rate if high productivity investments in certain activities are foregone to ensure balance.

3. Technical progress is one of the main drivers of industrial expansion in the labor surplus model. Lack of human capital in the model must adversely affect the application of new technologies. Our general model remedies this situation.

4. Rural-urban migration in Africa has not been accompanied by industrial expansion and by the growth in wage employment as predicted by the Ranis-Fei model. The nature and quality of skills possessed by workers is likely explanation for this situation.

5. In a skill-based economy, a common institutional wage is unnecessary, because compensation for work differs by skill type and level, unlike in brawn-based economy (Rosenzweig et al, 2012) where natural abilities are nearly uniform in the population.

6. Although skilled workers in our general model are scarce factors of production, they can still be in excess supply in an economy due to rigid wage offers that exceed market clearing wages. It is important to clarify that an excess supply of skilled labor is not the same thing as surplus labor. Surplus labor exists when the marginal product of labor is below the subsistence wage. In contrast, an excess supply of (skilled) labor occurs when the marginal product of labor is both above the subsistence wage and above the market clearing wage. In an economy with excess supply of skilled labor, its reallocation to another sector cannot be accomplished without a reduction in aggregate production. An excess supply of

labor (skilled or unskilled) can be eliminated by adjusting the wage rate without affecting the marginal product of labor. This is in contrast to the case (Ranis Fei model) where elimination of surplus labor through migration (or direct reallocation) increases the marginal products of labor in both agriculture and industry.

7. The excess supply of labor is a market performance issue, i. e., the failure of the labor market to set wages that equate labor demand supply. The concept of surplus labor concerns the structure of the resource base of the economy relative to the population. Labor is in surplus if there exists a large population relative to a resource base that is needed to support it. The great insight of the labor surplus model is that reallocation of the population across sectors of the economy, while at the same time expanding physical capital would not only transform the resource structure, but also substantially increase labor productivity. We have shown that human capital facilitates structural transformation and accelerates development.

8. The interaction of human capital with labor enhances the marginal products of both inputs. In the surplus labor model without human capital, productivity of physical capital dualizes a developing economy into agriculture and industry. In the more general model presented in this paper, productivity of human capital dualizes the same transitional economy into formal and informal sectors.

IV. SCHOOL SYSTEMS AND EXCESS SUPPLIES OF SKILLS

Currently, in Africa, the majority of the population, especially the youth, have skills that earn very little or are not demanded in the labor markets. This situation can be traced to public education systems. Public school systems in Africa generally teach curricula that do not adequately equip the youth with skills needed by firms. Moreover, the wages set by firms in the formal sector do not adjust downwards in response to an increase in the number of new graduates from the school system. The consequence of this is excess supply of skilled labor, which is

aggravated by sluggish expansion of the formal sector. The slow absorption of school graduates in formal sector labor markets in Africa is not anticipated by the standard surplus labor model. An interesting long-run consequence of excess supply of skilled workers in the formal sector is the shift of some of the workers to the informal sector where labor market wages are flexible downwards and institutional barriers to entry are limited. Indeed, this shift of skilled workers to low productivity activities in the informal sector is analogous to the migration of unskilled labor to high productivity occupations in the industrial sector in Ranis-Fei model.

However, the formal-informal sector migration in the context of excess supply of skilled labor reduces rather than increases labor productivity—in contrast, rural-urban migration increases labor productivity in a surplus labor context. Elimination of excess supply of educated workers by reallocating them from formal to informal activities can impoverish an economy. Structural transformation of the informal sector—through long-term human capital investment programs—is the only way to avert this situation because of its productivity enhancing effect. Since labor is the only major asset possessed by workers in the informal sector, improving its quality should go a long way towards the generation of productive jobs.

Another problem in the African school systems is that they are *not* oriented towards problem solving learning. The consequence of this is a large supply of graduates with skills that cannot be used to create own employment or to obtain good jobs. Thus, the source of the problem of a large number of educated youth with limited employment opportunities lies in poor learning outcomes in schools rather in the high population growth rate, although that aggravates the problem.

V. POLICY CONCLUSIONS

In reality, the employment problem in Africa can best be addressed by a mixture of the Fei-Ranis model and the model of the labour market segregation presented

above. The solution to the employment problem in Africa requires a comprehensive approach that addresses the observations noted in Section III and IV above. Such an approach was articulated in the Policy Brief “Empowering Young Africans to live their Dreams” that was presented in the TICAD V High-level Panel Discussion on Youth Employment in Africa in June 2013, as follows:

First, strengthen pro-growth strategies and raise the employment intensity of economic growth. Extractives industries and ICT, a big part of Africa’s growth story, do not use many workers, and there are few formal private sector jobs. The employment intensity of growth can be raised by reversing the decline of manufacturing, developing the links to international value chains around the development of mineral resources, supporting high productivity services, and leveraging abundant natural beauty for expanding tourism. Job-creating growth requires strengthened competitiveness and higher productivity.

Second, raise productivity in agriculture, which employs a large majority of Africa’s workers and will continue to do so for years to come. Higher agricultural productivity may not create new farming jobs, but it will convert a large number of low pay jobs to higher earning jobs, and spur an expansion of the rural non-farm informal sector. Promising avenues for raising agricultural productivity include building rural infrastructure, greater use of science and technology to increase yields and control weeds. A green revolution will be a springboard for structural transformation of African economies, as experience in Asia demonstrates.

Third, truly embrace the informal sector, and improve the quality of work and productivity of small informal enterprises. Most informal enterprises remain small; the key will be to remove the constraints they face and help them grow in size and in profitability. Strengthening the protection of property rights supports investment and productivity. Facilitating sharing of physical infrastructure and soft infrastructure among small informal firms can help form clusters, build scale, and raise

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productivity. Developing business management and entrepreneurship skills will also be useful. Informal enterprises often have business links with the formal sector: a goal will be to connect them into the global value chains.

Fourth, build strong human capital for the African youth. Critical actions include:

- Provide adequate nutrition and health care, particularly during the first 1,000 days of life. Nurturing of the new-born, infants and young children in a loving home is crucial, and yields sustained high returns.
- Assure the quality of teaching in schools: improving learning outcomes, as well as acquiring life skills, is critical to raising the productivity and employability of the youth. Special care should be extended to disadvantaged children so that they can remain in school and learn.
- Promote Public-Private Partnership in apprenticeships, internships, and vocational training to match better newly developed skills with what employers actually need. On-the-job training in work place is likely to be more effective than vocational training in school setting.
- Strengthen science and technology. It is essential to strengthen the teaching of mathematics and science from primary school through university. Creating a 'critical mass' of skilled workers is a pre-requisite for industrialization.

Fifth, improve the health of young adults. African youth face higher rates of absenteeism owing to illness than in other developing countries. In addition to HIV /AIDS, malaria and tuberculosis, the rising incidence of non-communicable diseases has to be addressed. A healthy body is vital for stronger human capital.

Sixth, eradicate gender gaps. The incentives to get girls into school, and to keep them there, need to be strengthened. Early marriages should be prevented and gender discrimination in access to fertilizer, seeds and credit eliminated. In addition, incentives are needed to encourage participation of women in the labor force and in entering high productivity sectors. Empowering young women increases the

productivity of the labor force, and helps achieve inclusive growth.

Finally, address market failures in the labour market. It will be essential to improve access to information about the returns to different occupations, assist with matching employers and job seekers, issue vouchers for vocational education in an institution that students choose, and bundle training with access to finance for business start-up. Ways should be found to mitigate the adverse impact of collective bargaining and high reservation wages on employment, particularly in north and southern Africa. While public works programs have considerable political appeal, rigorous studies are needed to determine how to make these programs more cost-effective and lead to more productive long-term employment.

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ANNEX: WAGES AND EMPLOYMENT

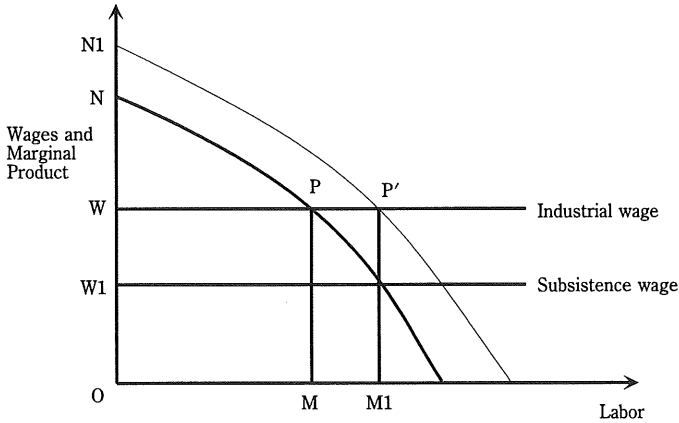


Figure A1: The Perfectly Elastic Labor Supply Curves and Employment Creation

Source: Arthur Lewis (1954).

Although Figure A1 is self-explanatory, a few comments are in order. The y-axis represents wages and the marginal product of labor, while the x-axis depicts the expansion of employment (and indirectly output) as labor demand by firms increases. The marginal product of labor is at the origin, point 0, in accordance with surplus labor assumption. Given the zero marginal product of labor, the subsistence wage (W_1) must be set at $0W_1$ to ensure an acceptable standard of living for everyone. The horizontal line W_1 -Subsistence is the labor supply curve when the institutional wage is set at W_1 . An unlimited number of workers is willing to work at that wage, i.e., labor supply is perfectly elastic with respect to the wage. Notice that the two horizontal schedules are inverse labor supply curves, and the downward sloping schedules (N and N1) are the inverse labor demand curves.

At W_1 , M_1 is the amount of labor supplied by farm households and demand by firms in the industrial sector. The industrial wage is fixed at W in accordance with the level of labor productivity in that sector. As can be seen from Fig. A1, employment increases as the demand curve shifts to the right. Moreover, there is nothing to prevent the industrial wage being set at W_1 when the demand schedule is N1 because the workers' opportunity cost of working in the industrial sector (rather than in agriculture) is their subsistence wage, W_1 —which is offered by firms.