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Economic Development and Surplus Labour: A Critical Review of the Lewis Model

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Abstract

The Lewis dual economy model is widely recognised in development economics for its profound explanatory power and applications in economic development. However, there remain some confusions and ambiguities, especially with respect to the definition of surplus labour and the wage determination mechanisms in both the traditional and modern sectors. This has prohibited its use, especially in empirical studies. This paper clarifies and extends this theory. Several questions are addressed. Firstly, it defines two types of surplus labour. Second, it considers the pattern of production and of population growth in the traditional agricultural sector to define the subsistence level of consumption. Third, it considers two wage determination mechanisms in the modern sector, which are then applied to the relationships between these mechanisms and labour market restrictions. Fourth, the role of agriculture and food supply is discussed. Fifth, it considers the dynamics of surplus labour and labour transfer, and defines two types of turning points, which have important implications for empirical studies. Sixth, a scenario for urban surplus labour is presented. In summary, the paper seeks to enhance the general level of understanding of the Lewis model and its application to the process of economic development.

Keywords: Economic development, Dual economy model, Surplus labour

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1. Introduction

The Lewis dual economy model is widely recognised in development economics for providing profound explanatory insights into the early stages of development. Although its general framework is inspiring, its fundamental concepts and micro-mechanisms – especially, the definition of surplus labour, the wage determination mechanisms in both the traditional and modern sectors and the dynamics of labour flows between the two sectors – lack sufficient detail. This creates several problems. First, this lack of detail has impeded further advances of theory along this line. Second, it has made it difficult to conduct empirical work, whether to examine the process of development or to confirm the insights of the theory.

There is an increasing urgency¹ to address these problems. Some recent advances allow us to address these problems and provide a more coherent and consistent theory of development in a dual economy. This paper contributes to the literature in three ways: first, it identifies in the existing literature the vagueness and ambiguities that have led to theoretical confusion, which may have caused the conflicting empirical results. Second, the source of this vagueness is due to subtly different assumptions – we examine the sensitivity of the model to these different assumptions. Third, it provides a sound theoretical foundation upon which empirical studies may be built.

Specifically, this paper provides the micro-foundations of the theory of surplus labour, clarifies the distribution principle (or wage determination mechanism) in the subsistence sector, presents two competing wage determination mechanisms in the modern sector, and considers the relationships between these mechanisms and labour market restrictions. The paper also reflects on the role of agriculture and food supply. The dynamics of surplus labour and labour transfer and two types of turning points and their applications in empirical studies are discussed. By addressing these key concepts and mechanisms, clarifying recent and ongoing arguments in this area, the paper clears the decks for further theoretical advances and allows dual economy models to be applied more widely in empirical studies. It increases the overall level of understanding of the process of economic development and will shed light on the economic development of current less developed countries.

Historical evidence shows that the consumption share of agricultural goods and the employment share in the agricultural sector declines as countries get richer (Kuznets, 1957, 1973). These observations inspired a large literature which attributed the early

¹ Temple (2005), among many prominent economists, calls for a revisiting of dual economy models.

stages of economic development to this structural change (Parente and Prescott, 2000; Ngai, 2004). As most contemporary less developed countries are dualistic economies, in which a modern capitalist sector exists alongside a larger traditional agricultural sector, development for many of these countries is based on structural transformation from agriculture to manufacturing.

There is a need to develop dual- or multi-sector models to study economic development and transformation (Kongsamut, Rebelo and Xie, 2001; Ngai and Pissarides, 2007; Acemoglu and Guerrieri, 2008). However, one-sector growth models have dominated much of the recent literature on growth and development, but these do not provide any insights into the nature of this structural change process. As Temple (2005) argues, 'one-sector models cannot address the changes in employment structure, away from agriculture and towards manufacturing and services, which are currently under way on a vast scale in parts of the developing world, including China'. As Lewis (1979) argues:

during the first fifty years of the industrial revolution, real wages in Britain remained more or less constant while profits and savings soared. This could not be squared with the neoclassical framework, in which a rise in investment should raise wages and depress the rate of return on capital.

This phenomenon is also true in many countries during the early stages of their development, including Taiwan (Fields, 2004) and China.

In order to answer these questions in developing countries, Lewis (1954) assumes that in a developing country there is a dual economy, characterised by the separation of the traditional rural agricultural sector from the modern industrial sector.² Labour in the agricultural sector is plentiful, frequently with zero marginal productivity, while the urban sector has a positive marginal product of labour. There is an income gap between the two sectors and the rural surplus labourer has incentives to move to the urban industrial

² There is a need to clarify the terms being used for two sectors. The two sectors are different, not because they produce different products or concentrate in different locations, but because they have different objectives and organisational models. In this sense, not all agriculture is traditional, nor is it all based on the subsistence mode. Not all the subsistence sector's outputs are agricultural, and that not all the modern sector is industrial. In two-sector theoretical models, large-scale commercial agriculture has been classed as part of the capitalist industrial sector, and the term 'agriculture' is applied to the whole non-capitalist sector. To be precise, the labels 'subsistence' and 'capitalist' would be more accurate, because they imply the output level in the former sector is at subsistence level, and the latter sector is for profit, which suggests that the wage in the capitalist sector must be no higher than workers' marginal contribution. However, much dual economy literature does not distinguish these delicate differences, but uses them interchangeably. In this paper, for simplicity, except in the section discussing special issues, we assume that rural is agricultural and is subsistence, and that the modern sector is mostly non-agricultural. Therefore, in this paper, terms such as 'subsistence', 'traditional', 'rural', and 'agricultural', 'non-commercialised', 'non-capitalised sector' are used interchangeably, unless otherwise stated. The same applies to 'modern', 'urban', 'non-agricultural', 'industry', 'manufacture', 'commercialised' and 'capitalist sector'.

sector. The rural population is sufficiently high that there is an unlimited supply of labour able to move to the urban sector at a subsistence wage level in a given period without lowering agricultural output. This unlimited supply of labour from the traditional sector keeps wages in the modern sector low, ensures that capital accumulation in the modern sector is sustained over time, and thus leads towards economic transformation.

Lewis, taking a classical perspective, addresses the stylised facts of savings growth, and labour transfer, while explaining how the real wage can remain low during industrialisation. The dual economy theory seeks to provide an explanation of how a primarily agrarian economy is transformed, via a dualistic state, into a mature economy, or, in other words, how, and under what conditions, industry may grow from small beginnings to overtake agriculture in both production and employment.

It has been more than 50 years since the publication of Arthur Lewis' seminal paper in *The Manchester School* in 1954 (Lewis, 1954). This paper was considered by many to be the starting point of development economics and has generated a large theoretical and empirical literature.³ It is 'widely regarded as the single most influential contribution to the establishment of development economics as an academic discipline' (Kirkpatrick and Barrientos 2004). A large part of the literature on development economics can be seen as extended commentary on the meaning and ramification of the ideas set out in the 1954 paper (Findlay, 1980: 64). Discussion and debate on the ramifications of Lewis' paper mapped out the sub-discipline of development economics (Ranis, 2004a).

However, much confusion and ambiguity regarding some of the fundamental concepts still exist. For example, the concept of surplus labour and the mechanisms relating to labour mobility and wage determination are still unclear (Brown 2006, Fields 2006). This lack of clarity was also true of Lewis himself. These ambiguities have been a barrier to further development of the model and have prevented it from being used rigorously in empirical research.

Rather than developing a single mathematical model, this paper retains the essence of the Lewis model but extends it in order to provide a conceptual review to help clarify the issues. Before achieving such a clarification, any construction of technical models is not likely to be of great use. This paper is organised as follows. Section 2 reviews the characteristics of a traditional agricultural economy. Section 3 defines the concept of surplus labour and Section 4 discusses the wage determination mechanism in the traditional sector. The next section defines two different wage determination mechanisms for the modern capitalist sector. Section 6 presents three stages of labour transfer and two turning points based on the concept of two types of surplus labour.

³ 'The Manchester School' published two special volumes (Vol. 47 No. 3 and Vol. 72 No. 6) in 1979 and 2004, on the 25th and 50th anniversaries of the publication of Lewis' seminal paper, which provide reviews of the development of the dual economy model over the last 50 years.

Section 7 considers the role of agriculture and food supply. Section 8 studies the dynamics of surplus labour and its relationship to technical change in the traditional sector. Section 9 studies the dynamics of labour transfer, and factors that affect it, such as capital accumulation and technological change. Section 10 comments on the existence of urban and industrial surplus labour. Section 11 concludes and outlines further research.

2. The traditional agriculture economy and subsistence wage

Since one of the key concepts in the Lewis model is the ‘subsistence wage’, the starting point of the Lewis model is the wage⁴ level in the traditional sector. In order to study that, we need to study the organisational structure and the distributional principles of the traditional economy. This section investigates the characteristics of the traditional economy and analyses the wage determination mechanism in the traditional sector.

We assume a predominately agricultural economy which is at an early stage of development. It is closed, there is no unused arable land and households engage solely in agricultural production. The economy is at its long run equilibrium. In this traditional agricultural society, population growth is that described by Malthus (1798). Malthus’ basic idea is this: there is a negative relationship between population level (which is itself endogenously determined) and income per capita. It predicts that population will adjust up or down (by births or deaths) until all individuals are at the subsistence level of consumption. In the long run, income per capita is limited by the available technology, so that the population growth rate is proportional to the rate of technological change (Kremer, 1993). Historical evidence supports the Malthusian hypothesis, as up until the last 200 years the population grew very slowly, despite a biological potential for very rapid growth.

In this economy, output is given by

$$Y = F(A, P, Z) \quad (1)$$

where A is the level of technology, P is population, Z is land and is normalised to one. Per capita output is then

$$y = \frac{Y}{P} \quad (2)$$

⁴ The word ‘wage’ is used for simplicity. It does not necessarily mean the wage in the employer-employee framework; instead, it should be understood as an individual’s income or output share from any production. Properly speaking, it should be called ‘output share’ or ‘income share’; as will be discussed later, the traditional sector does not have ‘wage’ in the neoclassical sense.

This per capita output is the average product of labour⁵ (*APL*). Following Kremer (1993) there is a critical level of income per capita, \bar{y} , above which population P tends to increase, while below \bar{y} , population tends to fall.

The equilibrium population \bar{P} corresponding to the critical level of income can be found by solving the equation:

$$\bar{P} = G(\bar{y}, A) \quad (3)$$

Where the equilibrium per capita output, \bar{y} is

$$\bar{y} = \frac{Y}{\bar{P}} \quad (4)$$

According to Malthus, \bar{y} is the subsistence level of income.

The 'law of diminishing returns' states that adding additional amounts of labour to a fixed amount of land will eventually reduce the marginal product of labour (*MPL*).

At the subsistence level, \bar{y} , if we use marginal analysis, we will find that the first person employed will have an *MPL* that is higher than \bar{y} (*APL*), and the last person employed has an *MPL* that is lower than \bar{y} . Neoclassical theory suggests that firms would stop employing people at the point when the worker's *MPL* equals the wage.

However, the rural agricultural sector mainly consists of family units. There is no commercial plantation agriculture that is comprised of neoclassical type profit-maximising firms that are able to hire and fire workers.⁶ Rural families' allocation of labour is different from competitive firms' hiring decisions. Families do not follow the neoclassical rule that sets wages equal to the marginal product of labour. Rather, they work together and share the output (wage and/or profits⁷). Individual income determination is based on a sharing principle and can be above labour's marginal product. This could be the result of social norms, or a system of income sharing within families. Family work means they would not allow one member of the family to be paid

⁵ Two issues need to be clarified. First, in reality, not all of the population engages in production, but for simplicity, without losing generality, we assume population equals the labour force. Second, the word 'labour' is used for convenience. Properly speaking, we should distinguish between the number of workers and hours worked, and labour should be defined in terms of man-hours rather than people. This involves the concepts of dynamic surplus and static surplus. For example, there is an enormous dynamic surplus which takes the form of a low number of hours worked. If people leave the land, those remaining must work longer or harder to compensate. However, to avoid unnecessary complications, this paper does not distinguish between the two. Thus the *MPL* can be seen as the product of the last man-hours applied in agriculture or industry.

⁶ There are two assumptions in the neoclassical model that determine how much labour to demand: the firm is in a competitive market and the firm is profit-maximising. Only under these two assumptions does a typical firm decide how many workers to hire and how much output to produce. Family enterprises do not fulfill these two assumptions and hence it is not appropriate to use this model for any labour market analysis directly.

⁷ If families own land, profits are also theirs. If they do not own land, they only get the labour share of it. For simplicity, these cases are not distinguished here.

more while others are starving.⁸ As a result, nobody in the family is unemployed or excluded from food. If the output is divided equally among family members, each will earn the average product of labour of the agricultural sector, APL_a .⁹ Lewis (1954), Fei and Ranis (1964, 1997), Sen (1967) and Fields (2004) all agreed that wages in the informal sector are a function of the average product of labour in the informal sector.¹⁰

The following lemma now becomes obvious:

Lemma 1 *In the traditional agricultural economy all the family members share the work and the subsequent output. Thus, they do not receive the marginal product of their labour but rather the average product of their labour, $w = APL$.*

Now, we can define and quantify the Lewis subsistence wage. As Lewis (1954: 189) noted, ‘The subsistence wage ... may be determined by a conventional view of the minimum required for subsistence; or it may be equal to the average product per man in subsistence agriculture, plus a margin.’ It is safe to think that what Lewis claims to be the ‘the minimum required for subsistence’ is the level of subsistence in the Malthusian sense. The Lewis subsistence wage and the Malthusian subsistence wage are either identical or there is a mark-up between the two.¹¹ However:

The notion of a subsistence minimum is, of course, not without ambiguity. To the bare biological minimum necessary for work is to be added something to facilitate the reproduction of the work force, the feeding and clothing of the worker’s family. And there is an element of customary rather than biological necessity which renders

⁸ This is addressed in more detail in the literature on the economics of the family, which has sought to study within-household decision making and intra-family inequality, including joint labour supply and labour demand. Further, the literature on economic sociology studies the patterns of rural family cropping behaviours.

⁹ This need not be literally equal shares for the basic idea to hold.

¹⁰ Kirkpatrick and Barrientos (2004) and Colman and Nixon (1994) describe this well: ‘In the initial stage, labour in the traditional sector is not therefore remunerated in line with its marginal productivity. In the case of family farms, members may share their output equally, and “wages” correspond to average productivity per person (Sen, 1966). Even where a “wage” is paid, for example to domestic servants, it has at best a weak link to marginal productivity, as: ‘in overpopulated countries the code of ethical behaviour so shapes itself that it becomes good for each person to offer as much employment as he can. The line between employees and dependents is very thinly drawn’ (Lewis, 1954: 142)’ (Kirkpatrick and Barrientos, 2004).

‘Such a situation can occur where the system of land tenure grants some land-use rights to every family and where each family subsists by sharing out among its members the products of the family holding. Under this system, agriculture forms a sink in which everybody not supported by employment industry can find a livelihood, and it enables non-productive family members to consume at the level of the average product per person’ (Colman and Nixon, 1994: 37).

¹¹ If they are identical, the Lewis subsistence level of consumption is a biologically determined constant. The level of consumption can be easily extended to be not determined biologically, but by preferences and technology. The essences of the Lewis model holds in both cases. Of course, the subsistence wage level evolves with time – that is, it can meet the minimum cost of living, but is not necessarily the absolute low wage that only meets the minimum cost of survival. Rather, it keeps up with time and development.

the concept very hazy. The contribution of early development economics was to define the subsistence minimum in terms of the alternative available to the worker i.e. the living standard of the members of the subsistence sector. (Leeson 2008: 31)

For simplicity, we ignore the situation of the latter.¹²

According to Lemma 1, in the traditional agricultural sector, family members work together and earn a wage equal to their APL . When land is fixed and more people enter this sector, the marginal product of labour will decrease, and therefore so does the average product of labour. In order to survive, APL will be at least the subsistence wage. It is possible that the average product of labour is lower than the subsistence level, $APL_s < w_s$, where w_s is the subsistence wage. However, this may be the case in the short run but cannot exist in the long run. If, for some reason, such as bad weather, there is a reduction in output, or because the population is growing too fast, $APL_s < w_s$, and output cannot support the whole population even if it is distributed equitably, famine results. This will reduce the population level and return the average product of labour to the subsistence level. If for any reason the average product is above the subsistence level, more people will be born and drive it back to equilibrium where $APL = w_s$. This Malthus population growth theory well illustrates the relationship between the average product and the subsistence wage in the traditional sector. Now the subsistence wage, w_s , has to be equal to the subsistence level of output per head, \bar{y} , in equilibrium.

So we have:

Proposition 1: *In the long run in the traditional economy, the law of Malthusian population growth keeps the average product in the traditional sector equal to the subsistence wage of that sector. The equilibrium is found where $w_s = APL = \bar{y}$.*

Proposition 2: *In the long run in the traditional economy, the equilibrium population level, \bar{P} , is given at the point where $APL = \bar{y}$.*

3. The concept of surplus labour

The concept of surplus labour is widely discussed among development economics but its specific meaning needs to be defined, especially in technical terms, as many neoclassical economists still doubt the existence of surplus labour in an economy. Defining the source and the extent of surplus labour is then a prerequisite for further

¹² We can prove that even in the situation of a mark-up above the biologically determined level of consumption, it is still a conventional view of the minimum required for subsistence. Below that, survival is not possible.

discussion. This section considers the various definitions of surplus labour and clarifies them.

The simple definition of surplus labour implies the existence of a point at which the marginal product of labour becomes zero and labour can be transferred out of the traditional sector without reducing the quantity of output, as noted by Wellisz (1968: 22):

The (disguised-unemployment or the Unlimited Supply of Labour) hypothesis claims that in poor, densely populated countries, more people are employed than needed to produce the prevailing output with the existing techniques and the existing supply of non-labour inputs. The 'surplus' labour constitutes 'hidden' or 'disguised' unemployment. Many of the proponents of the hypothesis make the further claim that agricultural output will not decrease, and industrial output will increase, if measures are taken to re-allocate labour from subsistence agriculture (where the surplus is supposed to exist) to industry (where there is no surplus labour). Since labour can be removed from agriculture at no social cost, its supply to industry is, in a sense, 'unlimited' as long as disguised unemployment prevails.

However, Ranis (2004b) does not agree with this definition of 'surplus labour', preferring to regard those whose marginal product lies below their consumption or income share as 'surplus labour', or more specifically, as 'disguised unemployed' or 'underemployed'.

Ranis defines surplus labour as follows:

The basic premise is that there exist some sectors or sub-sectors in which, in the presence of a large endowment of unskilled labour and the absence of sufficient cooperating land or capital, with a given technology and a wage level bounded from below, labour markets cannot clear. A full employment, neoclassical 'wage equals marginal product' solution would drive remuneration below socially acceptable, possibly subsistence, levels of consumption. Consequently, a labour surplus exists in the sense that a substantial portion of the labour force contributes less to output than it requires, i.e., its marginal product falls below its remuneration, set by bargaining. (Ranis, 2004b: 1)

Lewis (1954: 141) provides a general definition that:

an unlimited supply of labour may be said to exist in those countries where population is so large relatively to capital and natural resources, that there are large sectors of the economy where the marginal productivity of labour is negligible, zero, or even negative.

This paper agrees with Lewis that both these circumstances exist, but we distinguish these two types of surplus labour: the labourers with positive but 'negligible' marginal

productivity, and labourers with 'zero, or even negative' marginal productivity of labour, because they have different implications in the wage determination in the modern sector, which will be discussed later.

If w is the real wage of a labourer, we have:

Definition 1: Type I surplus labour (or Absolute Surplus Labour, ASL): Labour is defined as Absolute Surplus Labour if the MPL is equal to or less than zero, that is, when $MPL \leq 0 < w_s \leq w$.

Type II surplus labour (Relative Surplus Labour, RSL): Labour is defined as Relative Surplus Labour if the MPL is greater than zero but lower than the actual wage received, that is, when $0 < MPL < w$.

ASL is a narrow definition and RSL a more general one. The definition of RSL means that, as long as $0 < MPL < w$ holds, it does not matter if MPL is lower or higher than the subsistence level (whether $MPL < w_s$ or $MPL > w_s$), though normally it is assumed to be lower than the subsistence level ($MPL < w_s$).

Having defined the concept, let us now examine the micro-foundations of surplus labour to see how it operates in reality. Surplus labour also includes unutilised labour, including those who do not participate in production in the neoclassical way. People can be considered to be 'surplus labour' even if they do not work. That is, were they to work, their MPL would be small, zero or even negative. In reality, these people may stay idle, doing nothing, rather than participate in work and contribute non-positively. Of course, as discussed previously, they have to be supported by their families to survive. Their marginal utility of leisure is also zero.¹³ They want to work but there is no job for them. In such a situation, these people either do not work or work less than any reasonable conception of full time, and they could readily be put to work at subsistence level wages. For example, in the traditional agricultural economy, a certain amount of field work (e.g. ploughing a certain piece of land) may need either all family members to work one-fifth of their time, or only one-fifth of the members to work full-time while the rest are idle. Surplus labour exists in this sense.¹⁴

¹³ For these surplus labourers, leisure is so abundant that it merely has marginal value. To some extent, leisure is irrelevant in this context, because the concept of 'surplus labour' is not about if these labourers participate in work or not.

¹⁴ In neoclassical terms, this is called involuntary unemployment. Workers' marginal utility of leisure is very low, they want to work, but are unable to find work at the subsistence wage level. A job paying lower than the subsistence level is not feasible in the neoclassical framework.

4. Wage determination mechanisms in the traditional sector in the absence of population growth¹⁵

We have previously established that, in the long run, the wage (which is also the average product of labour) in the traditional sector is set to a constant low wage at the subsistence level, as a result of the population adjustment dynamics. Now we consider how the wage in the traditional agricultural sector changes in the presence of labour transfer, but in the absence of population growth in the traditional sector. When economic growth takes place and the modern capitalist sector emerges, workers are drawn out of the traditional sector into the modern capitalist sector. Because the wage in the traditional sector is set in relation to the average productivity of that sector, in the absence of population growth (or when emigration outweighs the population increase), those who remain in the traditional sector each enjoy higher average productivity and thus receive a *higher* income than before.¹⁶

Assume w_a is the wage in the traditional agricultural sector. There are some surplus labourers whose *MPL* is smaller than w_a and they would have been unemployed if the neoclassical model were to be appropriate in the agricultural sector,¹⁷ but are now underemployed with a wage higher than their *MPL*. The departure of the workers has raised the standard of living of the remainder, simply because the same output (whether partially traded or not) is now divided amongst a smaller number of sectoral members. This is true for both type I and type II surplus labourers.¹⁸

Proposition 3: *The wage in the subsistence sector increases when type I and/or type II surplus labour moves out, although type I surplus labourers make no marginal contribution.*

5. Wage determination mechanisms in the modern sector

While the determination of the real wage in the modern sector is at the core of the Lewis model (Fields, 2004), Lewis (1954, 1972 and his later work) is unclear on the

¹⁵ These arguments are also relevant when the labour transfer rate is greater than the population growth rate in the traditional sector.

¹⁶ One would argue that there are two exceptions: one that the informal sector is so big and the formal sector is so small that there is merely any impact on the average productivity in the informal sector when small-scale emigration happens. However, non-measurable, or neglectable increase in *APL* does not mean no increase. The second is that when population growth in the informal sector is the same as the number of emigrations, the *APL* will not change. We admit this, but what we are discussing here is either there is no population growth, or that the emigration number is bigger than the number of population increase. We will discuss this dynamic later.

¹⁷ However, as these people have to be supported with food, the agricultural sector can be viewed as a sink for all the population excluded from modern sector.

¹⁸ Contact the authors for proof.

mechanisms at work (Fields, 2006). There are two mutually contradictory mechanisms in this regard. One mechanism, reflected in the subsequent elaboration of Lewis' model by Fei and Ranis (1964) and most literature which supports a labour market dualism¹⁹ (for example, Fields, 2004), is the following:

Definition 2: Wage Determination Mechanism I: the modern capitalist sector wage is set above the competitive wage level²⁰ and is independent of the wage level in the traditional subsistence sector.

A second mechanism is a Harris-Todaro (1970) type of mechanism:

Definition 3: Wage Determination Mechanism II, the real wage in the modern sector is determined by the real wage in the traditional sector and 'Anything which raises the productivity of the subsistence sector (average per person) will raise real wages in the capitalist sector' (Lewis, 1954: 172).

The distinction between the two mechanisms is that, while in Mechanism I the wage in the modern sector is independent of that in the traditional sector, Mechanism II says that they are correlated. Why are these two mechanisms contradictory? Fields (2006: 356) explains, 'either (i) the wage in the formal sector is institutionally fixed, meaning that it is a function only of institutions and not other things, or (ii) the wage in the formal sector is a function of subsistence sector productivity. It cannot be both.'

According to Mechanism II, the modern sector wage is determined by the wage in the traditional sector. Following Todaro (1969) and Harris and Todaro (1970), we can identify u as the urban unemployment rate, $(1-u)$ is then the probability of finding an urban job, the new labour market equilibrium condition is

$$(1-u)w_n = w_a \quad (5)$$

where w_n is the wage level in the modern section and w_a is the wage level in the rural agricultural sector, which equals the subsistence level w_s . Although the urban wage is nominally higher, the wage level of the two sectors is the same after being deflated by unemployment.

So now, because $w_n(t) = \frac{w_a(t)}{1-u}$ and, when u is kept constant, $w_n(t)$ will increase if $w_a(t)$ increases, and the two are equal when u is zero. The increase in the subsistence

¹⁹ There is no real labour market in the informal sector. The term is used here for convenience.

²⁰ This is typically influenced by a combination of institutional forces that could include unions, a minimum wage and a public sector pay policy.

wage in the agricultural sector increases the wage in the non-agricultural sector. As Brown (2006: 352) claims:

the earnings differential between the two sectors is not attributable to a segmented labour market, but simply to the costs (for Lewis, both real and perceived) of moving from the traditional to the modern sector. After allowing for cost differences, there might be no effective real wage differential.

To Brown (2006: 351):

Although the labour force in the original Lewis model is divided between the two sectors of the economy, there was no segmentation or labour market dualism in terms of restrictions on the entry of labour into the formal from the informal sector.

If this is the case, there is no real wage difference, the two sectors have identical real wages (after having made adjustments), and any wage increase in the agricultural sector will increase the real wage in the modern sector. There would then, in no sense, be an unlimited supply of labour²¹ to the modern sector at a constant wage rate if population is not growing. This is because, when there is no population growth, if surplus labour moves out of the agricultural sector, wages in that sector will increase and if wages in that sector increase, wages in the non-agricultural sector will also increase. Therefore:

Proposition 4: *There is no unlimited supply of labour (at a constant wage rate for a period of time) under Wage Determination Mechanism II, even in the circumstance that the traditional sector has a stock of type I (absolute) surplus labour and type II (relative) surplus labour, given the population in the economy is constant.*

Proposition 4 takes a static view. However, there can be unlimited supply of labour (at a constant wage rate) under Wage Determination Mechanism II, if population growth in the traditional sector keeps the stock of surplus labour in that sector unchanged, when surplus labour moves out. As discussed previously, in the long run, when the *APL* is higher than the subsistence level, population in the traditional sector will grow. The amount of entry to the traditional sector would be equal to the number of people who moved out of this sector. In a dynamic sense, an unlimited supply of labour for the modern sector can be said to exist. Thus we have:

Proposition 5: *There can be an unlimited supply of labour (at a constant wage rate for a period of time) under Wage Determination Mechanism II, if emigration to the modern sector happens slowly, which allows a dynamic population adjustment to take place.*

²¹ Unlimited supply of labour means that wage in the non-agricultural sector will not change for at least some period of time.

Now to return to Mechanism I. Define an equilibrium wage rate²² in the modern sector as

$$w_e = \frac{w_n(1-u) - c_m}{(1+\xi)} \quad (6)$$

where w_e is the equilibrium wage rate in the modern sector, $c_m \geq 0$ is the cost of migration²³, $\xi \geq 0$ is the proportionally higher living costs in the capitalist urban sector. Here w_e is the urban real wage deflated by unemployment, migration costs and higher living costs in the urban sector.²⁴

If the wage is determined by Mechanism I, modern sector wage is institutionally set at a higher level than the traditional sector wage,²⁵ 'Earnings in the subsistence sector set a floor to wages in the capitalist sector, but in practice wages have to be higher than this' (Lewis, 1954: 150), and 'different wages are paid to comparable workers' (Lewis, 1954: 148–149). In this case, the wage in the modern sector is set independently of the traditional sector, even after all the cost adjustment, there are some real wage differences between the two sectors, $w_e(t) > w_a(t)$. The increase in w_a will reduce the gap between the two sectors but will not necessarily affect w_e , given that the wage rate in the modern sector was not set as a fixed rate above the traditional wage rate. So, the modern capitalist sector still faces an unlimited supply of labour, until the turning point $w_e(t) = w_a(t)$ is reached.²⁶ Before this point, w_a approaches w_e .

Proposition 6: *There is unlimited supply of labour (at a constant wage rate) under Wage Determination Mechanism I until the turning point is reached, where $w_e(t) = w_a(t)$, with or without population growth.*

²² The equilibrium wage, w_e is introduced to rule out the possibility that sometimes, although the urban wage, w_n , is higher than w_a , it is also a subsistence wage. In this case, only the modern urban sector subsistence wage (the nominal wage), w_n , is higher than the rural subsistence wage, w_a , while after adjusting for urban unemployment, migration costs and living cost, the deflated urban wage, w_e is the same as the rural subsistence wage, w_a . So, even if workers in both sectors are living at a subsistence level, the urban wage level may be higher than that of the rural. That is why the real comparable wage, w_e , not the nominal wage, w_n , is used in comparison.

²³ These migration costs can result from credit market barriers. The funds involved may be relatively modest, but because of the underdeveloped rural credit markets those who would have migrated still have no means of raising the initial money to cover the migration costs and hence are locked into the rural areas and, subsequently, in a poverty trap.

²⁴ For simplicity, without bringing into the formulation, we assume this equilibrium wage also takes consideration of all other costs of living in the modern sector, i.e. psychological cost and pollution cost.

²⁵ This level is higher in real terms after being deflated by all the related factors.

²⁶ This turning point will be defined later.

If this is the case, however, there must be a segmentation or dualism in the labour market in the form of restrictions on entry by labour from the traditional sector into the modern capitalist sector. Otherwise, labour will have no reason not to migrate in order to gain a higher wage. In this case, barriers should exist to prevent labour moving from the traditional sector to the modern sector to maintain the labour market dualism. This segmentation can either be caused by an institutional segmentation (man-made barriers), such as governmental policy restriction on migration, labour unions, and even efficiency wages, or by other natural barriers of migration, such as low education levels, lack of information about the urban capitalist sector, physiological costs associated with distance from family, etc., which could result in insurmountable problems, even without institutional labour market segmentation.

Thus, we now may be able to explain Lewis' (1954: 150) claims: 'there is usually a gap of 30 per cent or more between capitalist wages and subsistence earnings'. The gap can be composed just by either cost factors or by real labour market barriers or some combination of the two. In a real economy, many factors can not be got rid of so easily. They cause labour market segmentation. However, to study the development process theoretically, we have to assume a simplified world without entry barriers, without labour market segmentation, which means the modern sector wage is the same as the wage level in the traditional sector. This assumption applies to most of our discussion unless otherwise stated.²⁷

Proposition 7: *If there is no institutional barrier and/or market segmentation, the adjusted real wage in the modern sector, w_e , would be equal to the subsistence level in the traditional sector, w_a .*

Proposition 8: *Under Wage Determination Mechanism I, if $w_n \geq w_e = w_a$, no labour market segmentation is needed; if $w_n \geq w_e > w_a$, market segmentation is needed to maintain higher wages in the urban sector.*

6. Two turning points and three stages

Fei and Ranis (1964; 1997: 120) define three stages of labour transfer in terms of the institutional real wage (*IRW*), which represents per labour consumption of food.

Stage I: $MPL = 0 < IRW$

Stage II: $0 < MPL < IRW$

Stage III: $0 < IRW < MPL$

²⁷ This assumption is just taken for simplicity. We can easily add the amount of mark-up caused by the barriers to represent the segmentation – this will not alter the principles of our arguments.

Fei and Ranis (1997: 120-121) explain that:

in stage I there exists disguised unemployment with labour redundancy, in stage II there exists disguised unemployment with labour non-redundancy, and in stage III the disguised unemployment has disappeared completely. ... labour release proceeds through the three stages in the given order.

Their definitions involve the institutional real wage. However, as we have made clear in the wage determination mechanism section, the subsistence level of wage may not be determined by institutional factors (Wage Determination Mechanism I), but by market competition (Wage Determination Mechanism II). So we replace the IRW with the more general concept, the subsistence level of wage, w_s , in our discussion.

We now rewrite the Fei and Ranis three stages using two types of surplus labour given in definition 1.

Definition 4: Three stages of labour transfer can be defined as follows: stage I is when there exists type I (absolute) surplus labour; stage II is when there exists type II (relative) surplus labour. Stage III is when there is no surplus labour.

After we have defined two types of surplus labour and three stages of labour transfer, we define two turning points, which divide the three stages.

Definition 5: A Type I Turning Point is defined as one when type I (absolute) surplus labour is exhausted (MPL approaches a positive value), and a Type II Turning Point as one when type II (relative) surplus labour is exhausted (MPL approaches the real wage they get paid).

When in the case of an unlimited supply of labour, in the first stage, the modern sector wage is constant, when all type I surplus labour is absorbed by the modern sector, the economy passes a type I turning point and enters stage II, then the modern sector wage starts to increase. When type II surplus labour has been exhausted and the economy passes a type II turning point into stage III, the wage in the traditional sector also begins to increase (since the agricultural sector starts to compete with the modern sector for labourers) at a rate that is determined by neoclassical demand and supply principles. The economy now can be modelled by a neoclassical one-sector theory.

Since there was no distinction between the two different types of surplus labour in the literature, which of the two turning points is the 'Lewis turning point' is ambiguous. Fei and Ranis (1997) refer to the second turning point as the Lewis turning point, but much of the literature refers to the first as the Lewis turning point instead. Therefore, in discussing the exhaustion of surplus labour, the types of surplus labour must be clarified, and in the discussion of an economy approaching the Lewis turning point, the specific

turning point being referred to must also be clarified, since the wage patterns are totally different.

We now explain the three phases of surplus labour using a diagram to illustrate the traditional agricultural sector. In Diagram 1, the horizontal axis, OP , is used to show the population in the economy. The curve MPL is the marginal product of labour and the curve APL is the average product of labour of the traditional sector. \bar{y} is the subsistence level of output per capita, and is also the level of the average product of labour in the steady state (in the Malthusian equilibrium).

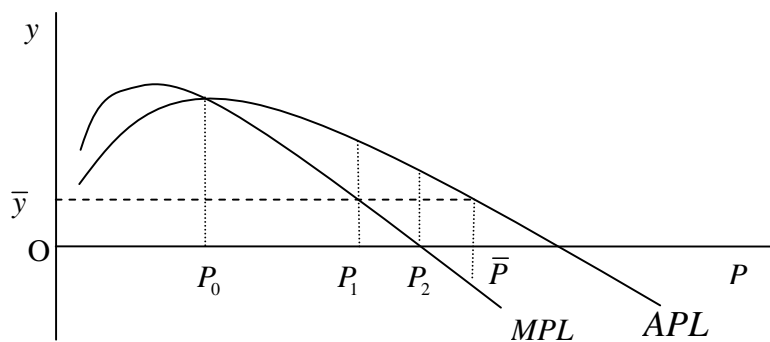


Diagram 1

As analysed previously, the equilibrium population level in the traditional agricultural society is at \bar{P} , where $APL = \bar{y}$. That is to say, \bar{P} is total population in the steady state. In this one-sector economy, there is no modern industry, no labour transfer. According to the definition of two types of surplus labour, in the diagram, $\bar{P} - P_2$ are type I surplus labour, and $P_2 - P_1$ are type II surplus labour. $P_1 - O$ is not surplus labour because its marginal product is greater than the subsistence wage.

7. Role of agriculture and food supply

This section discusses the role of agriculture and food supply in the development process. In the discussion so far, the rural–urban migration of surplus labour has been limited only by demand. However, when people move out of the traditional agricultural sector, they have to consume agricultural products to survive. That is, the rural-to-urban migration might be limited by the supply of food. If there is a modern agricultural sector, which produces food for people engaged in the modern sector, or, in other words, the modern sector is self-sufficient in terms of food, the development of the modern sector would not face possible restrictions of food supply from the traditional sector. However, if

we assume that all agricultural production is in the traditional sector, and all modern firms are in the industrial sector,²⁸ we need to address how migrants feed themselves when they move. In this scenario, the traditional agricultural sector has to supply food for the whole population.²⁹

Before the migration of type I surplus labour, the whole population was engaged in the agricultural sector. After this migration, only those with a positive *MPL* were left in agriculture. The per capita output share for people staying in the agricultural sector increases, although the average agriculture product for all the population (including those migrants) stays unchanged. Now, those who moved out get food from the traditional sector.³⁰

In this case, a worker would accept a wage of any level which is higher than zero in the modern sector, as he is continuously supported by his family with food. Anything he earns is a net gain to the family. This means that a labourer would migrate at any positive wage level, given that his *MPL* in the agricultural sector is no higher than zero. Theoretically, his wage can be even lower than the subsistence wage, although this may be socially unacceptable. Brown (2006: 352) argues that Lewis also 'believed individuals would still be willing to migrate, provided the family's combined income from both the traditional and modern sectors was higher than in the absence of migration'.

However, this is contrary to the argument that the minimum wage needed to induce migration should be no lower than the subsistence level. In Lewis's words:

. . . in economies where the majority of people are peasant farmers, working on their own land, we have a more objective index, for the minimum at which labour

²⁸ That is, the traditional sector is identical to the agricultural sector and modern sector is identical to the industrial sector.

²⁹ In contrast to classical models that only emphasise the supply of capital, the neoclassical models of development also stress other factors, such as the supply of labour. The transfer of labour, constrained by the rate of food production (or marketable surplus), is the starting point for the original Jorgenson (1966) critique of the Lewis model, which argues that the growth of non-farm employment can be said to depend on the growth of the agricultural surplus. 'The problem does not arise if productivity in agriculture is expanding rapidly, but Lewis himself recognised that the failure of peasant agriculture to increase its productivity has probably been the chief factor holding back the expansion of the industrial sector in many developing countries' (Thirlwall, 2005: 191-192). A recent example where the rural-to-urban migration was limited is Hayashi and Prescott (2008), in which they claim that pre-war Japan's per capita income is low because she had her own version of the 'labour barrier', that restricted labour moving from the agricultural sector to the industrial sector, resulting in surplus labour in the agricultural sector but an inadequate supply of labour in the industrial sector.

³⁰ Before migration, these type I surplus labourers get their share from engaging in agricultural production, whereas after migration they get their food supply from their families. With type I surplus labour there is no food problem as long as those remaining on the land do not increase their own consumption – but this is a real possibility and is a factor taken into account in the literature on shadow wage determination, for example Stiglitz (1974).

can be had is now set by the average product of the farmer; men will not leave the family farm to seek employment if the wage is worth less than they would be able to consume if they remained at home (Lewis, 1954: 148–149).

This is true only if the worker, once he has migrated to the modern sector, will not get food from his family in the traditional sector for free and has to pay for his food. Thus the minimum wage he receives cannot be lower than the subsistence level. However, this is a rather strong assumption, which may not be realistic. This paper takes the view that this claim of Lewis – the lowest wage the modern sector offers should be no lower than the subsistence wage in the traditional sector subsistence wage – is the one he adopted for simplicity.³¹

People in the agricultural sector must be able to provide enough food for the whole population in both sectors. If we assume the technology and land supply do not change in the traditional sector, with the expansion of the modern sector, surplus labour will transfer out gradually, first type I surplus labour, then type II surplus labour.

When type I surplus labour moves out of the traditional sector, because their *MPL* in the traditional sector was zero or negative, total agriculture output will not fall. In aggregate terms, this sector is still able to provide enough food for the whole population. The emigration of type I surplus labour will not add any pressure on the agricultural sector in terms of food supply. The modern sector can absorb as much type I surplus labour as it is willing and able to absorb.

Since the *MPL* of type I surplus labour in the traditional sector was zero or negative, the transfer of these labourers is a net gain to the economy. There is no reason for the government to restrict this transfer so long as the modern sector has the ability to absorb them.³²

In this case, the claim put forward by Fei and Rains (1997: 51): – ‘Increases in agricultural productivity generating an agricultural surplus to sustain the workers in the non-agricultural sector is a prerequisite for the emergence of a non-agricultural sector and the expansion of its size’ – can be seen to be problematic. The non-agricultural sector can emerge and expand so long as there is type I surplus labour in the traditional sector. Fei and Rains’ claim is only true for type II surplus labour.

³¹ This paper also, for the sake of convenience, takes the view that the minimum wage is no lower than the subsistence level. However, Stiglitz (1976) provides an efficiency wage hypothesis to solve this ‘paradox’. He implies that a wage which is below the subsistence level and only marginally different from zero is not practical. The modern sector would either leave a worker unemployed or employ them at the subsistence wage.

³² Of course, if the modern sector has not got the ability to absorb these people, this transfer will have no growth effects. Rather this transfer may cause severe unemployment and urban tensions. This creates a reason for governments to restrict the transfer. This will be discussed in detail later.

Because the *MPL* of type II surplus labour is positive, total food supply needs to be taken into consideration. Even if the modern sector has the ability to absorb more labour, if the agricultural sector is unable to provide enough food, further labour transfer would not be possible. If technology and land supply in the traditional sector are still constant, no transfer of type II surplus labour is possible, since any such transfer will lower total agriculture output.³³ In this case, the increase in agricultural productivity becomes 'a prerequisite for the emergence of a non-agricultural sector and the expansion of its size'. The surplus generated from this can be 'used to permit both the allocation of more workers to non-agricultural activity and additional consumption of agricultural goods' (Fei and Rains 1997: 52). Thus we have:

Proposition 9: *If technology and land supply in the traditional sector are constant, thus total food supply is constant, there is no food constraint with the transfer of type I surplus labour; however no transfer of type II surplus labour is possible.*

Proposition 10: *The transfer of type II surplus labour is possible only if agricultural technology improves and/or land supply increases, which increases productivity in the agricultural sector.*

Proposition 11: *The maximum rate of transfer of type II surplus labour is constrained by the rate of food increase generated by technical change and/or the rate of land supply increases in the traditional sector.*

These propositions confirm the argument put forward by Fei and Ranis (1997: 122):

for successful transition growth to occur, agricultural technology cannot be stationary after the shortage point has arrived. Success is necessarily associated with balanced growth where continuous agricultural technology change must accompany the labour release process.

The above analysis is for a real economy without money. It is not difficult to introduce money and prices into this situation to show the mechanisms of change. In this case, the terms of trade would be in favour of agriculture goods, labour from agricultural sector will be more expensive. When there is not enough food in the whole economy if this labour moves out, the price of the last unit of food will be infinitely high and so will the price for this labour. No transfer would be possible. When technology improves, less labour is needed to produce the given amount of food, the food price drops, and labour transfer becomes possible again.

³³ Of course, as discussed previously, we assume that it is impossible for people to work harder and longer to make up for the loss of output resulting from this transfer. However, even if we were not to assume this, there would come a point beyond which it is impossible.

8. Dynamics of surplus labour

As discussed above, the transfer of type II surplus labour is possible only if agricultural productivity improves. Throughout history agricultural technology has improved and so too has the marginal product of labour. Because the MPL is the benchmark in measuring surplus labour, technical change in the traditional agricultural sector changes the amount of surplus labour in that sector, creating a dynamic story.

Proposition 12: *In the absence of labour transfer, the increase of the agricultural total factor productivity (TFP) will create more surplus labour (both type I and type II) in the traditional sector.*

Proposition 13: *If the rate of emigration is in line with the rate of TFP increase in the traditional sector, the total amount of surplus labour will be constant in the traditional sector; if the rate of TFP increase is quicker than the rate of transfer, the total amount of surplus labour will increase.*

As discussed, when the amount of surplus labour is constant or increasing, the wage will not increase, and the modern sector will have an unlimited supply of labour from the traditional sector at a constant wage level. Take type I surplus labour as an example. Surplus labour is the overall amount of labour not needed to finish the certain amount of work. Technical change will improve efficiency and will increase the total number of labourers not needed for the work, thus increasing the amount of surplus labour. This is in line with the definition that labour can be withdrawn from this sector without lowering total output.

From the neoclassical point of view, Proposition 13 sounds a bit odd, since technological change means people have higher MPL and APL , so fewer people should be defined as surplus labour in the sense of $MPL < w_s$. However, this logic cannot be applied directly in the surplus labour economy. In this economy, the amount of surplus labour is measured by the number of people not needed for the production of a certain amount of output. Technical change (for example, labour-saving technologies and the impact of the Green Revolution) improves the productivity of those who participate in production, thus these workers' MPL increases. Because of the increase of these people's MPL , more people are not needed for the same amount of output, there is obviously more surplus labour in the presence of technical change. For example, if total population in the economy is \bar{P} , to produce a certain amount of output needs P_t people work full time, $\bar{P} - P_t$ is the amount of surplus labour. Now, with some technical change, P_{t+1} people is needed to produce the same amount of output, where $P_{t+1} < P_t$. Now the amount of surplus labour increases to $\bar{P} - P_{t+1}$.

To avoid confusion it should be stressed that technical change increases the *MPL* of those who are really engaged in production, not those surplus labourers' *MPL*. Surplus labourers' *MPL* is now lower if they participate in production. In the estimation and prediction of the size of surplus labour, and in the calculation of a date for the turning point, this dynamic effect needs to be seriously taken into consideration.

9. Dynamics of labour transfer

There are two driving forces that determine the amount of surplus labour and affect the transfer of labour from the traditional sector to the modern sector. On the supply side, the *MPL* and *APL* and the rate of technical change in the traditional sector all determine the amount of labour that can be released. On the demand side, the rate of modern sector expansion and development determines the amount of labour that can be absorbed. The number of people who can be taken on by the modern sector depends on the absorptive capacity or the job creation ability of the modern sector.³⁴

Now let us study the transition dynamics of labour transfer using a diagram to illustrate the modern sector. This new diagram, Diagram 2, is a modified version of Diagram 1 where we have replaced \bar{P} by O' . The horizontal axis, OO' , is the total population in the economy, assumed here to be constant. The traditional agricultural sector's labour is measured rightwards from the origin O . The modern industrial sector's employment is measured leftwards from O' . The curves MPL_A and APL_A are, respectively, the marginal and average product of labour curves in the agricultural sector, as in Diagram 1. The curve MPL_I is the marginal product of labour in the modern industrial sector.

MPL_I' and MPL_I'' represent two stages of industry development.

The question of why and how the modern industrial sector appears is beyond the scope of this paper; for now, we just assume that for some reason industry appears, on a small scale in the beginning, and it creates job vacancies and is willing to take some surplus labour from the traditional agricultural sector. When the modern sector appears and offers jobs, some type I surplus labour is transferred out from the agricultural sector. Up to MPL_I' , all the labour transferred is type I surplus labour. Their marginal product in agriculture is zero or negative, but when they transfer out, their marginal product

³⁴ This sector expands in output and/or employment with technological change, capital deepening, division of labour and with the demand for products, and the improvement in the terms of trade with the agricultural sector.

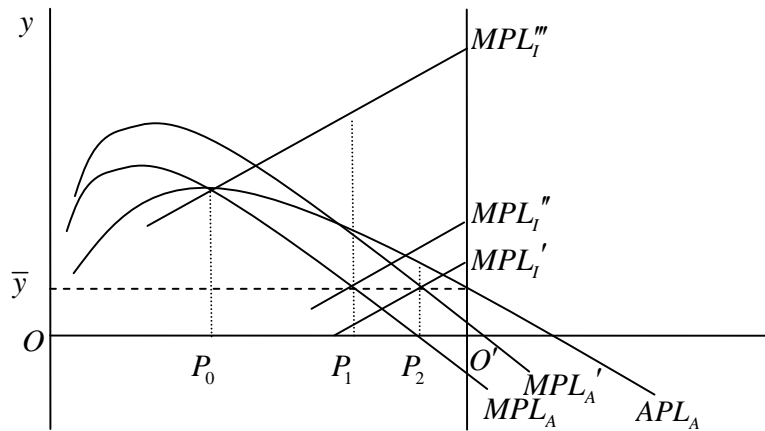


Diagram 2

becomes positive in the industrial sector.³⁵ Although they are still paid a subsistence level of wage, this is a net contribution to the economy. The economy achieves a Pareto gain from this transfer.

When type I surplus labour is transferred out of agriculture, the average product in agriculture will go up. This will cause a population increase, and O' will be moved further east, until again the $APL_A = \bar{y}$ is reached.³⁶ This will not affect productivity in the modern industrial sector, but the agricultural sector will absorb all the increased population. In this sense, we can call the agricultural sector 'the sink of surplus labour'.

In the diagram, the rate of growth of the modern industrial sector is the speed of the shift of the MPL_I towards the northwest. If the speed is lower than the speed of the eastward extension of O' ,³⁷ the agricultural sector will always have surplus labour, and the industrial sector will always be able to pay a subsistence level of wage to get this labour. Population in the agricultural sector will not drop. If industry grows faster than the population growth, i.e. the speed of the shift of MPL_I is quicker than the speed of eastward extension of O' , then the share of population in the agricultural sector will drop and the share of population in industry will increase.

³⁵ We ignore the trade of agriculture goods and industry goods for simplicity, but maintain the assumption that agriculture goods are needed to feed the whole population. So in absolute terms, it has to be able to feed all the population in both sectors.

³⁶ This is not shown in the diagram for simplicity.

³⁷ Meaning, the rate of emigration is smaller than the rate of population growth in the traditional sector.

If we redefine that shift of MPL_I in the diagram as the net shift (in terms of the number of emigrants minus the net increase in people), we can ignore the population increase caused by the transfer for simplicity. So, now, when industry expands, MPL_I moves to the northwest, more people will be transferred out from agriculture to industry until we reach MPL_I' , at which point type I surplus labour is exhausted in the agricultural sector. Before this point, the transfer only depends on the absorptive ability of the industrial sector – the supply of agriculture goods is not a problem. When industry expands further, beyond MPL_I' , the marginal product of labour in the agricultural sector becomes positive (although still lower than subsistence level wage). Between MPL_I' and MPL_I'' we have type II surplus labour transferring out from agriculture. This transfer will not only be determined by the growth of the industrial sector, but also by the development of the agricultural sector. The transfer will not be possible, because if people with positive marginal surplus of labour transfer out, the total output and average output of agricultural goods for the whole population will drop below the subsistence level. The necessary condition for type II surplus labour to be transferred out is for technological change in the agricultural sector to increase the marginal product of the remaining people, making them able to produce enough food for the whole population. This is where the role of agriculture becomes important, as discussed in the previous section. In the diagram, the MPL_A has to shift towards the northeast to make a new line, MPL_A' . The wage the industrial sector offers to these labourers should not be lower than the subsistence level plus their original marginal product.³⁸ So now, the industrial sector wage for type II surplus labour has to be higher than the subsistence level. These people were type II surplus labour in the agricultural sector, before technological change in the agricultural sector. Without faster expansion of the industrial sector, these people would stay in agriculture and become type I surplus labour. But now, with the joint forces from industrial sector expansion and agricultural technology improvements in the traditional sector, they change from the original type II surplus labour to a competitive labour force. After this point, the labour market becomes competitive, the industrial sector has to pay higher wages than the subsistence level, with the wages determined by the intersections of the MPL_I and the MPL_A .

10. Surplus labour in the urban and industrial sector

We have argued that the two sectors in a dual economy are different, not because they produce different products or concentrate in different locations, but because they have different objectives and organisational models. We did not make this distinction for

³⁸ Their wage should be no lower than their MPL in the traditional sector. A mark-up of subsistence wage is just for consistency with previous simplification.

simplicity, but for realism; for example, in urban areas, except in the modern formal sector there is also often an informal sector with surplus labour. This may result in a large rate of urban unemployment.

Unlike the transfer of rural surplus labour, L_s , to urban employment, L_u , which improves social welfare, changing L_s to urban unemployment, L_u , creates no added value for society. Labour efficiency will not change in either sector, and it has no growth effects for the economy, but rather negative political and social effects.³⁹

Proposition 14: *In the presence of the urban (type I) surplus labour, the transfer of rural surplus labour to the urban industrial sector does not create any added value for society and has no growth effect.*

If there are unemployment (surplus labour) problems in the urban sector, the state policies restricting migration do not necessarily create efficiency losses, as these barriers only prevent the transfer of rural surplus labour to urban surplus labour. The transfer of type I surplus labour from rural to urban areas creates no added value because their *MPL* are all zero.⁴⁰ This transfer is different from the previous analysis where urban industry has a positive *MPL*, and migration of rural surplus labour would increase these labourers' own efficiency. Restriction on this kind of transfer prevents the transferring of disguised unemployment in rural areas to open or disguised unemployment in urban areas. Urban unemployment creates more problems than rural disguised unemployment and can lead to political unrest and social instability.⁴¹

Now let us discuss a slightly different issue of surplus labour in the urban industrial sector if this sector is not competitive, such as under socialist planning. In centrally planned economies, governments' objectives in the industrial sector are not only profitability but also employment. In this case, the planner may act as the 'head' of household and put employment as a priority above profitability; a firm is organised in the same way as the family unit in the agricultural sector, thus making surplus labour in the

³⁹ When there exists type I surplus labour in the rural sector and there is a zero social cost associated with them leaving that sector, then, although the proportion of surplus in rural sector will be reduced, the social benefit may also be zero, because of the urban sector's lack of absorptive capacity. Such a lack may mean that the urban sector may not even be able to offer the subsistence wage. It is in this sense, we say that the rural-urban migration of type I surplus labour need not create extra social benefit. If the urban sector were forced to hire these extra workers, then that sector itself would have surplus labour.

⁴⁰ For simplicity, we only discuss the situation of type I surplus labour. However, the same principle holds for type II surplus labour as well. The transfer of type II surplus labour from rural to urban areas involves the comparison of the *MPL*. In this case, although $MPL < w$, it is greater than zero.

⁴¹ This partially explains why the Chinese government sets up huge institutional barriers to stop people migrating from rural areas to urban areas.

industrial sector a possibility. Surplus labour is employed with very low MPL but gets paid higher than its MPL .⁴² Thus, we have:

Proposition 15: *Under a planned economy, the social planner may act as the 'head' of household to put employment as the first priority, thus paying workers a higher wage than their MPL . Then surplus labour in the urban industrial sector in a planned economy or a transitional economy may exist.*

11. Conclusions

For economies in the early stages of development, the rural agricultural sector consists of family farming units, with a hiring principle that is different from that of the firm. Family members work together and share the value of their output. They are paid not the marginal product but the average product of labour. Thus, it is possible that there exists surplus labour in many developing countries. The notions of surplus labour and disguised unemployment have been a central part of development economics since Lewis (1954).

With the presence of surplus labour in the traditional sector, the modern sector can expand without increasing labour costs. This process will continue until the surplus labour in the traditional sector is used up. After this point is reached, wages begin to rise consistent with rising marginal productivity, in which the workers in the traditional sector would also be paid in accordance with their marginal product rather than the subsistence wage. At this stage, the dualistic economic structure disappears, replaced by a competitive one-sector economy that can be explained by the neoclassical model.

This paper contributes to the literature by clarifying some of the ambiguities in the discussions following Lewis' model. There has long been a debate about the precise definition of surplus labour. This paper first identified the problem and defined two types of surplus labour, with type I (absolute) surplus labour being defined to be when the marginal product of labour is equal to or even lower than zero, and type II (relative) surplus labour being when the marginal product of labour is higher than zero but lower than the wage level, which is set at the subsistence level in the long run. This seemingly simple distinction resolves much of the misunderstanding. Based on this classification of two types of surplus labour, we define two turning points: the type I turning point, when type I surplus labour is used up; and the type II turning point, when type II surplus labour is used up. The wage is constant before the type I turning point, increases slowly after it, and the dual economy merges with the neoclassical one-sector economy after the type II turning point is passed.

⁴² China is a good example of this. Disguised unemployment or overstaffing is prevalent, especially in the state sector and the state-owned-enterprises.

Another huge debating point in the literature is how the wage in the formal sector is determined. There are again two mutually contradictory mechanisms at work, and many, including Lewis himself, have been ambiguous in this regard. The latest debate appears between Brown (2006) and Fields (2004, 2006), 52 years after the publication of the Lewis (1954) paper. In this paper, two mechanisms are defined. Wage Determination Mechanism I states that the formal sector wage is set independently of that in the informal sector, by a combination of institutional forces that could include unions, a minimum wage and public sector pay policy. Wage Determination Mechanism II states that the real wage in the modern sector is determined by the real wage in the traditional sector and anything which raises the productivity of the subsistence sector will raise real wages in the capitalist sector. With these clear definitions, several propositions are drawn to address these problems. The conclusion is that there is no unlimited Absolute Surplus Labour under Wage determination Mechanism II. Under Wage Determination Mechanism I, if the urban equilibrium wage equals the rural agriculture wage, no labour market segmentation condition is needed; if the urban equilibrium wage is higher than the rural agriculture wage, market segmentation measures such as restrictions on entry are needed to maintain higher wages in the urban sector. If there is no such restriction on entry, it is very likely to generate surplus labour (in the form of unemployment and underemployment) in urban areas. Or, under the planned system, government's objectives on employment may also cause overstaffing in the urban industrial sector. Thus, it explains how sometimes with urbanisation the dominant feature is urban unemployment, rather than industrialisation. Thus, this kind of rural–urban migration has no effect on economic development, but is just a transfer of rural surplus labour to urban areas.

This paper also takes the role of agriculture and food supply into account in the study of labour transfer. If the agricultural sector is identical to the traditional sector, total agriculture output will not reduce (it may even increase) when type I surplus labour is transferring out. However, when type II surplus labour is transferring out, there is an aggregate food supply problem. Without technological change or an increase in the area of cultivated land, this kind of transfer is not possible.

When technical change in the traditional sector is taken into account, surplus labour becomes dynamic. If the rate of transferring out surplus labour from the traditional sector is in line with the rate of TFP increase, the total amount of surplus labour is constant; if the rate of TFP increase is quicker than the rate of transfer, the total amount of surplus labour will increase. These dynamics are of great importance for empirical studies estimating and predicting the quantity of surplus in a given time.

This paper has paid great attention to the supply mechanism of surplus labour, and has had little to say about demand. More work needs to be done to study the forces behind the expansion and development of the modern sector. How is the growth rate of this

sector determined? And how is the elasticity of labour demand determined? Answers to these questions are crucial to understanding economic development, but they are spread over the whole of economics. Thus we call for a systematic study to integrate these questions.

Many of the ideas discussed in this paper are relevant to the early stages of development, but we need to be aware of the differences between the early stages of development of the now more developed countries and the situation for developing countries in their early stages of development today. Although similar in many respects, there are substantial differences, especially with regards to the pattern of population growth, where, for example, birth control, foreign aid on food and medicine, etc. have changed the patterns of population growth in these countries significantly. These factors imply that the situation in modern-day developing countries may be more complicated than is implied by the discussion here.

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