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**Working Paper**

## Structural Change, Wage Formation and Economic Growth in Low-Income Countries

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**DIETER BENDER**

STRUCTURAL CHANGE, WAGE FORMATION  
AND ECONOMIC GROWTH IN LOW-INCOME  
COUNTRIES

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Dieter Bender

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## Abstract

This paper analyzes the effects of structural change on the rates of growth of wages, employment and per capita income in low income countries. Their dualistic structure is shown by a Lewis-type two sector model. Structural change is measured by the varying shares of sectoral employment in total employment. It is shown that the growth rates of GDP and per capita income can be formulated as functions of these sectoral employment shares. Distinguishing the phases of dualistic development with and without labour surplus and post-dualistic development, it is demonstrated that each of these stages exhibits different growth dynamics: high but falling growth rates under dualistic development with labour surplus, low but rising growth rates under dualistic development after absorption of the labour surplus, growth rates falling again and converging towards a higher income steady state in the post-dual economy. As the growth dynamics of dualistic development are explained by a modified Lewis model and those of post-dualistic development by the Solow model, the study also highlights the complementary roles both models are playing in development economics.

Keywords: economic growth, dualistic development, labour surplus, rural urban migration

JEL codes: O11, O41



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# 1 INTRODUCTION

Examining the impacts of structural change on wages, employment and income growth in low income countries (LICs), this study attempts to provide a deeper understanding of pro poor growth dynamics. For this purpose, a synthesis of two seemingly contradictory models is proposed and used: the non-neoclassical Lewis model of labour surplus in a dual economy (LEWIS 1954) and the neoclassical Solow model of economic growth in a market economy with perfect competition and equilibria in goods and factor markets (SOLOW 1956). Both of these contributions to understanding the forces behind long run growth have the same objective in common, but take different views on wage formation (wages deviating from or equal to marginal productivity of labour), labour markets (hidden unemployment or full employment equilibrium), labour supply functions (unlimited labour supply at wages given or upward bending labour supply curve), production functions (Leontief-type or Cobb-Douglas-type, labour or capital intensive) and other aspects such as distribution and use of national income, market structure and economic behaviour of producers and consumers. Structural change is regarded as systematic changes in these characteristics linked with changes in the composition of GDP.

Many development economists rejected the Solow model as being inappropriate for any exploration of development prospects and impediments in less or particularly least developed countries and built upon the Lewis model (LEIBENSTEIN 1957, JORGENSEN 1961, FEI/RANIS 1964 among others). Many growth analysts dismissed the Lewis model due to its lack of a rigorous growth-theoretical foundation. Influenced by endogenous growth models, these attitudes or research strategies are changing since development economists acknowledged that these approaches to the explanation of the origins of technological progress opened the door to better understanding the prerequisites for developing countries catching up by adopting newer and better technologies and thus taking advantage from technology diffusion in a globalized world economy (KELLER 2002, PAPAGEORGIOU 2002).

On the one hand, this is good news since the separation of development economics from growth theory may come to an end (see for example AGENOR/MONTIEL 1996, BASU 1997, RAY 1998, ROS 2000, ACEMOGLU 2009, GALOR 2011). On the other hand, endogenous growth models do not address the problems of those least developed LICs (mainly in Sub-Saharan Africa and South Asia) where the prerequisites for technological adoption due to lack of human capital are not met and technological gaps are widening. The focus of this paper is directed at these developing countries to show how structural transformation in the earlier stages of economic development works as the most powerful engine of income growth and which role the wage formation mechanism is playing in technologically stagnating underdeveloped countries, where imperfections of labour and financial markets prevail.

## 2 DUAL ECONOMY

Many LICs can be characterized as dual economies. They are split in two sectors. Sector 1 is the traditional sector producing output  $X_1$  with traditional production methods (highly labour intensive, small production units, labour supplied by family, low productivity). Sector 2 produces output  $X_2$  with more modern methods of production (relatively capital intensive, large scale production, higher productivity). Sectors 1 and 2 could be production of an agricultural good by small farms (sector 1) and large agro-industry firms (sector 2). The traditional sector could as well be total agricultural production and the modern sector production of manufactured goods. Traditional production is located in rural areas, while the modern sector produces in urban regions. Prices of the goods are assumed to be constant and are normalized at unity, so that GDP is  $Y = X_1 + X_2$ .

$X_1$  is produced with inputs of labour ( $L_1$ ) and a fixed amount of land. It is consumed by the relatively poor producer households (subsistence production). Any excess of production over household consumption is sold or exchanged on local markets. The producer incentive is coverage of basic needs.  $X_2$  is produced with inputs of labour ( $L_2$ ) and capital ( $K_2$ ) and is sold on domestic and world markets. The producer incentive is profit maximization.

Structural transformation is driven by the expansion of the modern sector ( $X_2/Y = y_2$  rising) and contraction of the traditional sector ( $X_1/Y = y_1 = 1 - y_2$  falling). Labour market adjustment is driven by a reallocation of labour supply ( $L$ ). An expansion of the modern sector attracts a higher portion of the available supply of labour ( $L_2/L = l_2$  rising) which is withdrawn from the traditional sector ( $L_1/L = l_1 = 1 - l_2$  falling). Of course, reallocation from the low-productivity sector to the sector with higher productivity raises overall productivity of labour, which is the main driver of income growth. Therefore, the following pages present an attempt to quantify this linkage between structural transformation and income growth by developing a functional relation between the rates of growth of GDP respectively per capita income (PCI) as dependent variables and modern sector's share in employment ( $l_2$ ) as the independent variable under the assumptions that there is no technological progress and no functioning credit market, while labour market imperfections keep wages below the equilibrium wages in competitive labour markets.

### 2.1 Traditional sector

Subsistence production uses labour inputs on a constant area of usable land with traditional production methods where capital plays no significant role and is left out of the production function which is assumed to be linear until an output maximum  $X_1^0$  is realized with labour input  $L_1^0$ . Any  $L_1 > L_1^0$  is labour input with zero marginal productivity and constitutes the LEWIS-labour surplus  $LS_1 = L_1 - L_1^0 \geq 0$ . Hence, the production function is broken into two parts (ROS 2000):

$$(1a) \quad X_1 = A_1 L_1 \quad \text{if} \quad 0 < L_1 \leq L_1^0$$

$$(1b) \quad X_1 = A_1 L_1^0 \quad \text{if} \quad L_1 > L_1^0 > 0.$$

$LS_1 = L_1 - L_1^0 \geq 0$  is hidden unemployment in the traditional sector. All workers employed in this sector receive the same wage which is equal to the average product of labour respectively traditional sector output per capita:  $w_1 = x_1 = X_1 / L_1$ . Wage formation in the traditional sector thus follows (ROS 2000)

$$(2a) \quad w_1 = A_1 \quad \text{if} \quad 0 < L_1 < L_1^0$$

$$(2b) \quad w_1 = \frac{A_1 L_1^0}{L_1} = \frac{X_1^0}{L_1} \quad \text{if} \quad 0 < L_1^0 < L_1.$$

If there is no labour surplus (equation 2a), wages are constant and equal to marginal and average productivity of labour. In the case of labour surplus (equation 2b), wages are higher than (zero) marginal productivity of labour but lower than  $A_1$  and a decreasing (increasing) function of traditional (modern) sector employment share:  $w_1 = A_1 (l_1^0 / l_1)$  with  $l_1 = 1 - l_2$  and  $l_1^0 = L_1^0 / L$ .

## 2.2 Modern sector

The modern sector produces output  $X_2$  with more advanced production methods ( $A_2 > A_1$ ) where physical capital  $K_2$  plays a significant role. The production function has the usual properties of constant returns to scale and decreasing marginal productivities of labour ( $MPL_2$ ) and capital ( $MPK_2$ ):

$$(3) \quad X_2 = A_2 K_2^\alpha L_2^{1-\alpha} \quad (0 < \alpha < 1)$$

Output per worker and marginal productivity of labour are increasing functions of the capital labour ratio ( $k_2 = K_2 / L_2$ ):

$$(4) \quad x_2 = X_2 / L_2 = A_2 k_2^\alpha$$

$$(5) \quad MPL_2 = (1 - \alpha) A_2 k_2^\alpha.$$

Taking up production requires that modern sector investors' demand for labour is covered by workers willing to migrate from sector 1 to sector 2. These migrant workers are price takers in the labour market while the producers are wage setters. Therefore, as long as their profits are raised producers offer a higher wage

$$(6) \quad w_2 = (1 + q)w_1$$

which contains a mobility premium  $q > 0$  that is just set high enough to give migration incentives by covering migration costs, compensation for higher cost of living in the destination area and an adequate migration gain. Modern sector wage either is constant and independent from employment shares (if (2a) holds) or is an increasing function of modern sector employment share (if (2b) holds). Equation (6) thus introduces a wage formation mechanism which is contrary to the Lewis model since labour surplus reduction leads to rising wages and the modern sector faces an upward-sloping labour supply curve but no unlimited supply at constant wages.

It is assumed, that labour incomes  $(w_1L_1 + w_2L_2)$  are spent for consumption ( $C_1$ ) and profits

$$Q_2 = X_2 - w_2L_2$$

used for consumption ( $C_2 = c_2Q_2$ ) and savings ( $S_2 = s_2Q_2$ ). This special type of a Kaldorian savings function (KALDOR 1956) seems appropriate for modelling growth dynamics in LICs starting from a low income level with a large traditional sector and a lack of credit markets.

Building up a modern sector requires capital accumulation. The necessary investment is financed from the investor's own savings respectively retained profits:

$$(7) \quad \Delta K_2 = I_2 = s_2Q_2,$$

yielding a profit rate

$$(8) \quad r_2 = \frac{Q_2}{K_2} = \frac{(x_2 - w_2)}{k_2}.$$

As (8) shows, the profit rate is a decreasing function of the wage and the capital labour ratio in the modern sector. Since an increase in modern sector employment share raises both of these variables, the profit rate becomes a decreasing function of this employment share.

For any  $K_2$  and  $w_2$  given, profit maximization requires

$$\partial Q_2 / \partial L_2 = \partial X_2 / \partial L_2 - w_2 = (1 - \alpha) A_2 k_2^\alpha - w_2 = 0.$$

Inserting  $k_2 = K_2 / L_2$  and solving for  $L_2$  yields modern sector demand for labour which determines migration from the traditional into the modern sector ( $\Delta L_2 = -\Delta L_1$ ) and employment in both sectors:

$$(9) \quad L_2^D = L_2 = \left[ (1 - \alpha) \frac{A_2}{w_2} \right]^{1/\alpha} K_2$$

The labour demand function shows that employment in the modern sector grows proportionately to a growing capital stock and thus the capital labour ratio does not change, if  $w_2 = \text{const}$ . If, however, capital accumulation is accompanied by rising wages, employment grows less than proportionately and the rising capital labour ratio raises the marginal productivity of labour in line with the wage increase.

### 3 DEVELOPMENT STAGES AND TRANSITIONAL GROWTH DYNAMICS

Stages of economic development are distinguished with respect to the sector shares in employment and GDP, composition of GDP and its rate of growth ( $gY$ , henceforth suffix  $g$  before the variable defines the growth rate). The sector shares add up to one:

$$l_1 + l_2 = l_1^0 + ls_1 + l_2 = 1 \quad (ls_1 = (L_1 - L_1^0) / L)$$

$$y_1 + y_2 = 1$$

These identities can be used to distinguish four stages:

First stage: subsistence economy

$$l_1 = y_1 = 1$$

$$Y = X_1 = C_1$$

$$gY = 0$$

Second stage: dual economy with labour surplus

$$y_1 + y_2 = 1$$

$$l_2 < 1 - l_1^0$$

$$Y = X_1^0 + X_2 = C_1 + C_2 + I$$

$$gY = y_2 gX_2$$

Third stage: dual economy without labour surplus

$$y_1 + y_2 = 1$$

$$l_2 \geq 1 - l_1^0$$

$$Y = X_1 + X_2 = C + I_2$$

$$gY = y_1 gX_1 + y_2 gX_2$$

Fourth stage: post-dual economy

$$l_2 = y_2 = 1$$

$$Y = X_2 = C + I_2$$

$$gY = gX_2$$

### 3.1 Subsistence economy

Population is growing at a positive rate ( $n$ ). Assuming that employment is a constant fraction of the population, labour supply grows at the same rate and increases the number  $L_1$  of unproductive workers. The growing labour surplus leads to falling wages. The subsistence economy cannot survive with population growth. Therefore, survival is only possible, if the decline in per capita income feeds back on population growth and drives it down to  $n = 0$ . In such case, a larger but non-growing population is living from a lower subsistence wage.

### 3.2 Dual economy with labour surplus.

These vicious circles can be broken if the growing number of unproductive workers migrate to the growing number of productive jobs offered by profit-seeking investors in the modern sector. As equation (9) shows, growth in demand for labour is determined by the rate of growth of the capital stock. Dividing (7) by  $K_2$  yields this growth rate:

$$(10) \quad \frac{\Delta K_2}{K_2} = gK_2 = \frac{s_2 Q_2}{K_2} = s_2 r_2(k_2, w_2)$$

Since  $k_2$  and  $w_2$  are increasing functions of  $l_2$ ,  $gK_2$  is a decreasing function of  $l_2$ .

**Proposition 1:** The speed of capital accumulation and growth in the modern sector is determined by the product of the marginal rate of savings out of capital income and the rate of profit. Capital accumulation slows down when the capital labour ratio or wages are rising.

Taking (2b) and (9) in log-form and differentiating yields the growth rates of wages and employment in the modern sector:

$$(11) \quad gw_2 = gw_1 = -gL_1$$

$$(12) \quad gL_2 = gK_2 - \frac{1}{\alpha} gw_2.$$

Both equations show that  $gw_2 > 0$  if  $gL_1 < 0$ . This leads to  $gL_2 < gK_2 = s_2 r_2$  and thus  $gL_2 < gX_2 < gK_2$ . If employment in the traditional sector declines, capital labour ratios, per capita output and wages in the modern sector increase, Therefore,  $r_2$  falls leading to a decrease in  $gK_2$ ,  $gL_2$  and  $gX_2$ .

But, the opposite case that  $gL_1 > 0$  cannot be ruled out since two counteracting forces drive the rate of employment change in the traditional sector. Structural transformation



implies a negative rate of  $gL_1 = -(l_2/l_1)gL_2$  because  $gL_2$  must be positive. Population growth feeds a positive rate of  $gL_1 = n/l_1$ . It thus follows from  $n = l_1gL_1 + l_2gL_2$  that

$$(I3) \quad gL_1 = \frac{n - l_2gL_2}{1 - l_2}$$

Breaking out of the subsistence economy's vicious circle of poverty requires  $gL_1 < 0$  (otherwise labour surplus would increase). For any  $gL_2 > n/l_2 > n$ , this rate of growth of employment in the traditional sector will be negative (as equation (I3) shows) and modern sector employment share  $l_2$  as well as wages increase:  $gl_2 = gL_2 - n > 0$ . If  $gL_2 = n/l_2$ , the labour surplus pool will be maintained ( $gL_1 = 0$  and thus  $gw_1 = gw_2 = 0$ ), because the outflows due to migration are fully compensated by inflows due to the increasing population. This case corresponds to the Lewis-case of an unlimited labour supply at a constant wage, but describes a situation that cannot be maintained because due to  $gL_2 = n/l_2 > n$  the modern sector employment share continues to rise and leads to the first case which is considered here and implies that producers in the modern sector face an upward-sloping labour supply curve.

Now inserting (I3) in (II) gives the wage increase

$$(I4) \quad gw_2 = -gL_1 = \frac{l_2gL_2 - n}{1 - l_2}$$

Inserting (I4) into (I2) and solving for  $gL_2$  yields the employment growth rate

$$(I5) \quad gL_2 = \frac{\alpha(1 - l_2)s_2r_2 + n}{l_2(1 - \alpha) + \alpha}.$$

From (I5) follows, that modern sector employment share is rising and employment growth is slowing down.

Knowing  $gK_2 = s_2r_2$  and  $gL_2$ , the growth rate of modern sector output is determined. After inserting (I5) into the basic growth equation

$$gX_2 = \alpha gK_2 + (1 - \alpha)gL_2,$$

we get

$$(16) \quad gX_2 = \frac{\alpha s_2 r_2 + (1-\alpha)n}{l_2(1-\alpha) + \alpha},$$

showing that  $gX_2$  is a decreasing function of  $l_2$  (because  $gK_2$  as well as  $gL_2$  are falling). The same holds for the rates of growth of GDP and PCI that are determined by  $gY = y_2 gX_2$  and  $gy = y_2 gX_2 - n$ .

**Proposition 2:** Assuming  $gL_2 > n/l_2$ , structural transformation in the dual labour surplus economy leads to the following growth dynamics:  $gL_1 < 0 < n < gY < gL_2 < gX_2 < gK_2$ .

This implies  $gw_1 > 0$ ,  $gw_2 > 0$ ,  $gk_2 > gx_2 > 0$ , which leads to  $\partial r_2 < 0$  and hence to a decreasing  $gK_2$ . The slowdown in capital accumulation draws  $gL_2$ ,  $gX_2$  and  $gY$  downward until the labour surplus has been absorbed by the emerging modern sector.

### 3.3 Dual economy without labour surplus

After having brought the labour surplus into productive employment ( $L_2 = LS_1$ ,  $l_2 = 1 - l_1^0$ ), equations (1a) and (2a) replace (1b) and (2b). Wages have risen to  $w_1 = A_1$  and  $w_2 = (1+q)A_1 < MPL_2(L_2)$ . Incentives to migrate from the traditional into the modern sector as well as incentives to invest in the modern sector are still effective since wages are not changing anymore, when  $l_2$  keeps on growing in the range  $1 - l_1^0 < l_2 < 1$ .

Inserting  $gw_2 = 0$  into (14) yields  $gL_2 = gK_2 = s_2 r_2$ . At the lower profit rate  $r_2(1 - l_1^0)$ , capital accumulation is weaker but continues and leads to a proportionate increase in modern sector demand for labour. From this follows:

$$(17) \quad gX_2 = gL_2 = gK_2 = s_2 r_2$$

$$(18) \quad gX_1 = gL_1 = \frac{n - l_2 s_2 r_2}{1 - l_2}.$$

Equation (17) implies  $gk_2 = gK_2 - gL_2 = 0$  and  $gx_2 = gX_2 - gL_2 = 0$ . It then follows from (8) that  $\partial r_2 = 0$ .

**Proposition 3:** In the dual economy without labour surplus, structural transformation proceeds at constant wages and profit rates. The rates of growth of employment and output in the modern sector stay constant and equal to the constant growth rate of its capital stock.

Inserting (17) and (18) into the GDP-growth equation  $gY = (1 - y_2)gX_1 + y_2 gX_2$  yields

$$(19) \quad gY = \frac{y_2 - l_2}{1 - l_2} s_2 r_2 + \frac{1 - y_2}{1 - l_2} n$$

$$(20) \quad gy = \frac{y_2 - l_2}{1 - l_2} (s_2 r_2 - n).$$

It can be proved that  $y_2 - l_2 > 0$ . Therefore  $gy > 0$  and  $gY = gy + n > 0$ .

**Proof:** If  $y_2/l_2 > 1$ , the difference between both variables is positive. The ratio is  $y_2/l_2 = X_2/Y \times L/L_2 = x_2(L/Y)$  and finally equal to one. In the third stage,  $x_2 =$  constant. Since  $L/Y$  is falling ( $n < gY$ ), the ratio  $y_2/l_2$  decreases when  $l_2$  increases and therefore can only converge towards one from above.

As long as migration ( $gL_1 < 0$ ) supports  $gL_2 > n$ ,  $l_2$  continues its rise. In the interval  $1 - l_1^0 \leq l_2 < 1$ ,  $gY$  becomes an increasing function of  $l_2$ , because  $(y_2 - l_2)/(1 - l_2)$  and  $(1 - y_2)/(1 - l_2)$  increase when  $l_2$  is rising. At the beginning of this structural adjustment period  $0 < gY < s_2 r_2$  and at the end the GDP and PCI growth rates approach  $gY = s_2 r_2$  and  $gy = s_2 r_2 - n$  when the structural coefficients are approaching  $l_2 = y_2 = 1$ .

**Proposition 4:** After elimination of the labour surplus, growth rates of GDP, PCI, output and employment in the modern sector are lower but still positive. The growth dynamics have changed to  $gX_1 < 0 < n < gY < gL_2 = gX_2 = gK_2 = s_2 r_2$ . While factor prices and growth rates of modern sector employment and output are not changing anymore, the growth rates of GDP and PCI are rising with ongoing structural transformation. They are drawn up by the growth dynamics in the modern sector which more and more becomes dominating.

### 3.4 Post-dualistic economy

In the post-dual economy, subsistence production plays no significant role anymore and is not accounted for in GDP:  $Y = X_2$ ,  $y = x_2 = A_2 k_2^\alpha$ ,  $L = L_2$ . The subsistence economy and the dual economy have been replaced by a pure market economy. Wage formation is not anymore determined by migration-inducing mark ups on  $w_1 \leq A_1$  but on competitive and flexible labour markets. Factor prices equal marginal factor productivities.

The fourth stage starts with labour market disequilibrium inherited from the dual economy.

Labour supply grows by  $gL = n$ . Labour demand grows at the higher rate  $gL^D = s_2 r_2$ .

Wages rise until a higher market-clearing wage is established. It follows from  $gK_2 > gL_2 = n$ , that the capital labour ratio rises again so that the wage increase is covered by productivity growth.

Now, capital deepening is the only engine of growth:

$$(21) \quad gk_2 = s_2 r_2 - n$$

$$(22) \quad gy = \alpha(s_2 r_2 - n)$$

$$(23) \quad gw_2 = gy$$

This implies  $gY = gX_2 = g(w_2L_2) = gQ_2 = n + \alpha(s_2r_2 - n)$ . GDP, wage income and capital income grow by the same rate so that income distribution does not change anymore whereas the transitional growth dynamics in the dual economy have reduced the wage income share from one to  $1 - \alpha$  and have raised the capital income share from zero to  $\alpha$ .

## 4 STEADY STATE

The growth dynamics in the fourth stage are transitory and only hold for the transition to the long-run steady state equilibrium. As long as wages and capital labour ratios are rising, the profit rates must fall. Capital deepening becomes weaker and the rates of growth of GDP, PCI, capital labour ratio and wages decline until the falling profit rate has reached the steady state (SS) level

$$r_2^{ss} = \frac{n}{s_2}$$

where  $gK_2 = s_2 r_2 = n$  and thus  $gk_2 = gy = gw_2 = 0$ .

**Proposition 5:** In the post-dual market economy growth dynamics have changed to  $0 < n = gL_2 < gY = gX_2 < gK_2 = s_2 r_2$ . Wages are rising and profit rates must fall. Due to capital accumulation slowdown, GDP and PCI growth rates decline and converge towards the steady-state path where  $gY = n$  and  $gy = 0$ .

These results can be translated into the Solow-model by taking into consideration that the difference is the specification of the savings function:  $S = sY$  versus  $S = s_2 Q_2$ . The aggregate savings ratio in the first savings function is the mathematical product of the marginal rate of savings out of capital income and the capital income share in national income:

$$s = \frac{S}{Y} = s_2 \frac{Q_2}{Y}.$$

In the final stage we have  $s = s_2 \alpha = const$  while in the dual economy stages  $s < s_2 \alpha$  and rising proportionately to the capital income share. In the four stages LIC model, the aggregate savings ratio is an increasing function of  $l_2$  and  $y_2$  if  $0 < l_2$ ,  $y_2 < 1$  and a constant portion of  $s_2$  if  $l_2 = y_2 = 1$ .

The steady state values follow from the condition

$$gk_2 = \frac{sy}{k} - n = \frac{s_2 \alpha y}{k} - n = 0.$$

Multiplying by  $k_2$  and inserting (4) yields

$$\partial k_2 = s_2 \alpha y - nk_2 = s \alpha A_2 k_2^\alpha - nk_2 = 0.$$

Solving for  $k_2$  yields

$$(24) \quad k_2^{ss} = \left( \frac{s_2 \alpha A_2}{n} \right)^{1/1-\alpha} = \left( \frac{s A_2}{n} \right)^{1/1-\alpha}$$

$$(25) \quad y_2^{ss} = \left( \frac{s_2 \alpha}{n} \right)^{\alpha/1-\alpha} A_2^{1/1-\alpha}$$

Structural transformation has increased PCI from  $x_1 = A_1 l_1^0$  to  $y^{ss}$ . One possible scenario shows the dimension of such an increase. Assuming

$$A_1 = 1, A_2 = 1,5, l_1^0 = 0,6, s_2 = 0,5, \alpha = 1/3, n = 0,025$$

PCI would rise from 0,6 to approximately 3,7 which is more than six times higher than PCI in the subsistence economy, while wages would increase from 0,6 to 2,5 which is four times higher.

## 5 CONCLUSION

Starting with a vicious circle view of the subsistence economy, this paper shows the growth dynamics of dualistic and post-dualistic development. Dualistic development has been focussed on the growth dynamics of structural shifts between a traditional and a modern sector before and after absorption of labour surplus by the modern sector, where the structural changes have been represented by a continuous increase of modern sector employment share in total employment from zero (only subsistence economy) to one (no subsistence economy). Traditional subsistence production will be completely wiped out if modern sector producers can set migration-incentive compatible wages below the migrants' marginal productivity. By determining the rates of GDP and PCI growth as functions of modern sector employment shares, it is shown that the assumed wage formation mechanism leads to high but declining growth rates in the first stage of dualistic development with labour surplus and low but rising rates of growth in the following stage of dualism without labour surplus. The final stage of post-dualistic development exhibits GDP and PCI growth rate declining again and converging toward a steady state growth path with a constant but (as compared to the initial state) much higher PCI. Since dualistic development, in principle, has been explained by the Lewis model under a different wage formation mechanism and post-dualistic development by the Solow model, these results also highlight the complementary roles both models are playing or should play in development economics.

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