LECTURE 2

THE EARLY STRUCTURALIST MODELS OF ECONOMIC DEVELOPMENT - STILL RELEVANT?

Plan of Lecture

A. Distinctions of Early **Positive** Development Economics

B. Structural **Constraints** on Development?

   The Vicious Circle

C. Development as a Resource **Accumulation** Issue and Growth:

   The Harrod-Domar Growth Model

D. Development as a Resource **Reallocation** Issue and **Structuralism:**

   The Lewis Two-Sector Model

E. The Singer-Prebisch Trade Model and Deteriorating

   Terms of Trade

Literature cited: see last slide

[2.2] Distinctions of early development economics

Development economics emerged as a separate sub-discipline within economics in the early 1950s. The main concern was "modernisation" (industrialisation) and **economic growth** (objective 1) rather than distribution and/or poverty alleviation (objectives 2-5 in lecture 1)

Underdevelopment was seen as a "structural" problem; due to **market failures**; the underdeveloped countries were caught in a **"vicious circle** of poverty", or poverty trap:

* **Missing markets** (e.g. savings and credit markets)

* **Market failures** (e.g. wage setting in agriculture)

* **Poorly working markets** (low supply elasticities)

[Fig 2.1]

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Big role for government to break the "vicious circles" of low productivity in agriculture and move labour and other resources into industry.

Industrialisation was also considered necessary as the world market prices for the predominant primary products exported by most poor countries at the time were projected to fall in relation to the prices of imported manufactured good, i.e. deteriorating terms of trade (The Singer-Prebisch theory of immizerising growth, come back to later)

[2.3] Figure 2.1: The Structuralist Poverty Trap and the Vicious Circle Paradigm
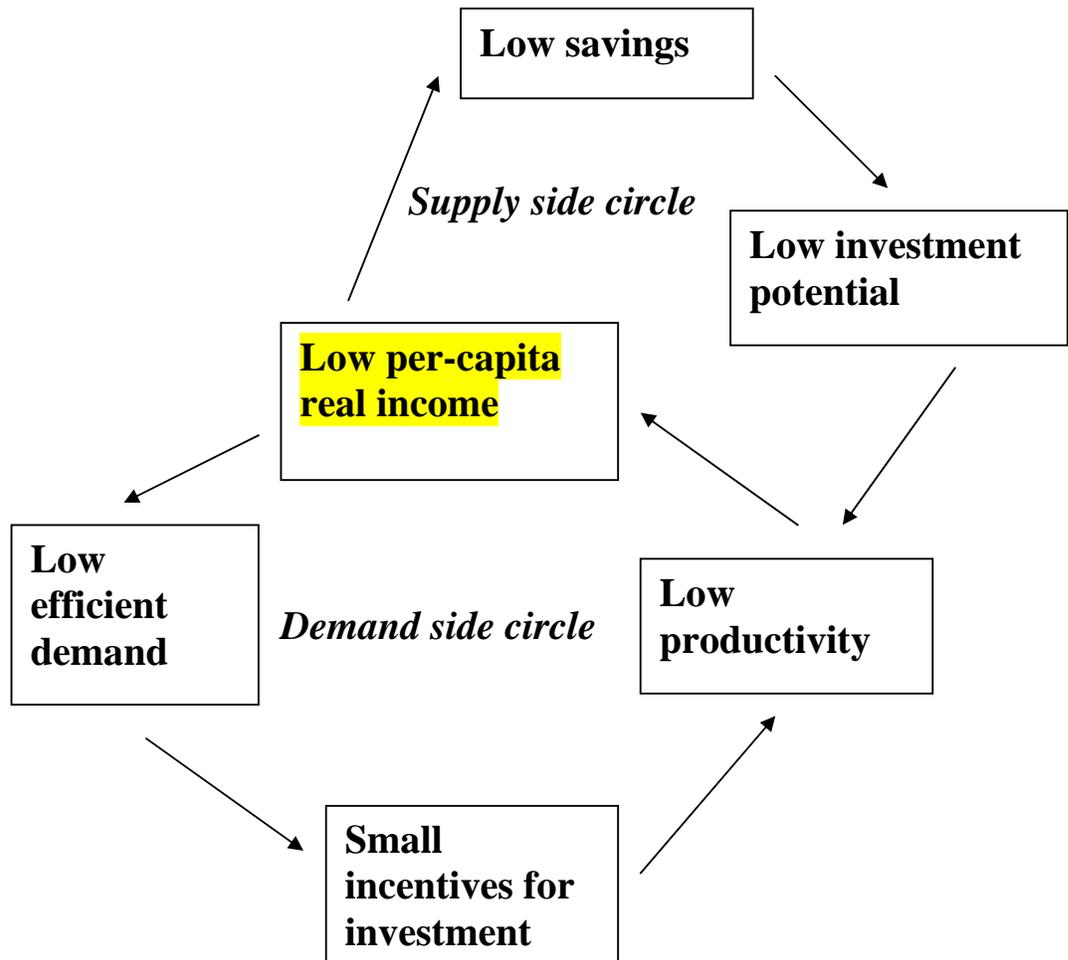
[2.4] Characteristics of poor countries, as then envisioned

OUT OF AGRICULTURE!

1) The chief reason why countries were poor, or underdeveloped as labeled then, it was widely held, was that they were almost entirely <u>agricultural</u>, with only <u>land </u>as "capital" besides unskilled, low-productive <u>labour</u>

2) Traditional agriculture is <u>inefficient </u>and productivity is too low to generate incomes high enough to make <u>savings </u>and, hence, <u>investment </u>and output growth feasible

3) Moreover, the scope for increasing the <u>productivity </u>of agricultural land in the "tropics" was held to be very limited

INTO INDUSTRY!

1) Only industrialisation could break this <u>vicious circle </u>and raise income to levels that permit the <u>savings and investments </u>that produce self-sustained growth

2) Industrialisation was equated with producing goods for the domestic market (<u>import substitution</u>); exports of manufactured goods for the world market was not considered an option

3) Big role for governments, but most development economist of the day did not embrace Soviet-type of full-scale state control and overall planning.

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[2.5] The Early Formal (Structuralist) Models

Two of the most well-known and influential models that capture these "structuralist" characteristics, which dominated the positive academic economic thinking in the 1950s and 1960s, will be the main concerns in this lecture.

a) **Harrod-Domar Growth Model**. This model is a growth model proper, i.e. based on the notion that income growth stems from resource (i.e. physical capital) **accumulation**. It also emphasised the role of savings/ <u>investments</u> and sector <u>reallocation</u> of resources.

It is also by modern terminology, an **endogenous** growth model!

b) **Lewis Two Sector Model with Unlimited Supply of Labour,** a model in which income per capita grows as a results of **reallocation** of existing resources (labour) from one sector (agriculture) to another (industry).

Both these models were derived so as to help understanding how to convert the vicious circle into a virtuous one with self–generating growth:

  H-D through breaking the savings/investment constraint

  Lewis through reallocating labour to more productive sectors

[2.6]   Why study these old models?

1. Have had an enormous <u>influence</u> on actual policy.
Most of the leading development economists of this time
worked for long periods in the UN and other international
organisations, which were the main agenda-setters.

2. Understand the development policies pursued up to the
present in many countries. Several of the problems faced by
the now poor countries emanate from policies that were
adopted on the advice of early structuralist economists in the
**1950s, i.e. protection of industry.**

3. Still of relevance according to many economists:

a) The determinant of growth in the H-D model,
accumulation of physical capital, is a central building block
also in all new growth models. Moreover, investment in
physical capital is one of the few determinants of growth
that has been found robust in growth empirics. China!

b) The Lewis model was long thought obsolete, but has
recently been revived when trying to understand the growth
miracle of all times: China since 1978 (come back to).

[2.7] Figure 2.2: The Harrod-Domar Growth Model

Assumptions:

1) Given production technique
   (Liontief production function)
2) Capital and Labor only
3) Constant returns to scale
4) Labor in unlimited supply
5) No falling marginal product of
   capital (cf. Solow model)
6) No human capital
7) Savings/investment exogenous
8) Closed economy (no trade)
9) No prices
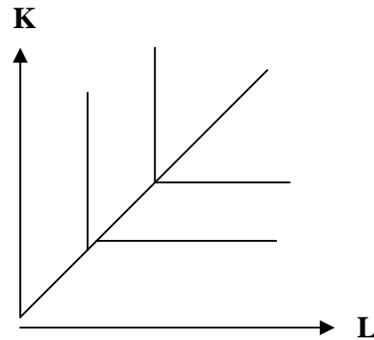
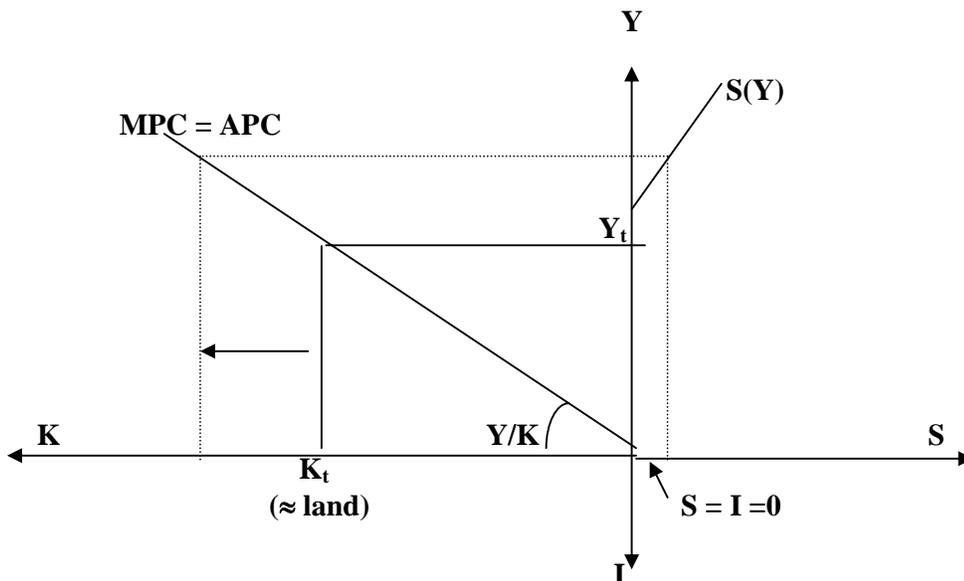$k = K/Y$

$\Delta Y\, k = sY$

$\Delta Y/Y = s/k$
growth as a function of
savings and return to capital

Preconditions for growth lacking. Capital stock and hence income too low to generate <u>savings and investment</u>. To break this <u>vicious circle</u>, the capital stock has to be increased

[2.8] Policies for breaking the vicious circle

Establishing the preconditions for growth. Several policy instruments were advocated for breaking out of the poverty trap in the poor countries.

1) An initial "big push" of *Foreign aid* directed to increase capital accumulation (in mainly infrastructure)
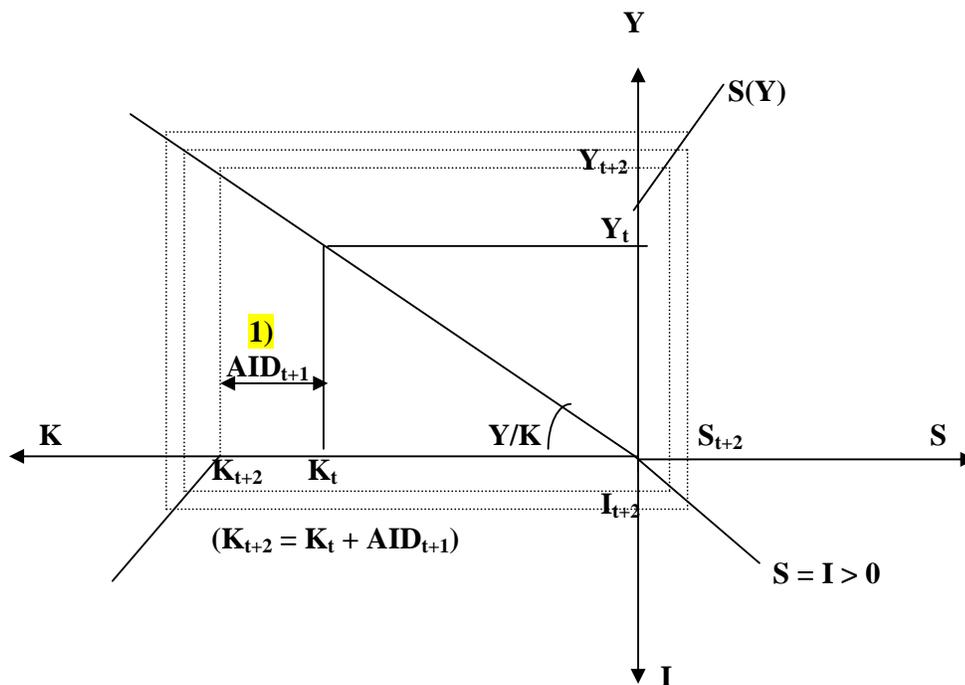
A "big push" in the form of aid would increase the capital stock (and break infrastructure bottlenecks), and raise the income to a level where <u>net</u> savings and domestic investments could take place.

**Increase savings/investment from below 5% (≈ depreciation) to above 10%, and subsequently higher.**

The *vicious* circle would turn into a *virtuous* circle.

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[2.9] The "big push" policies and the H-D growth model

2) Concurrent supplementation of domestic saving/investments with foreign soft loans (shifting the investment schedule from I = S to I + Aid)

3) Enhance savings and investment propensities by establishing financial markets (through government intervention), shifting the S(Y) function to the right

4) Increasing the return to capital (raise Y/K) through the re-allocation of labour from agriculture to high-productivity industries, the application of "appropriate" technologies, and labour skill formation in industry.   Out of agriculture = Lewis model!
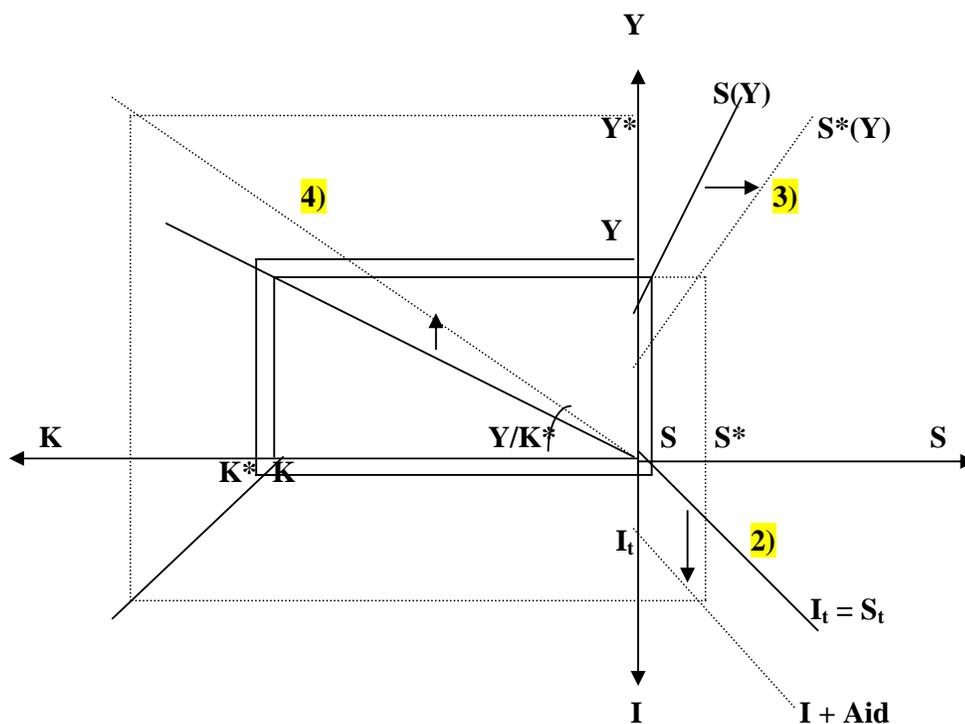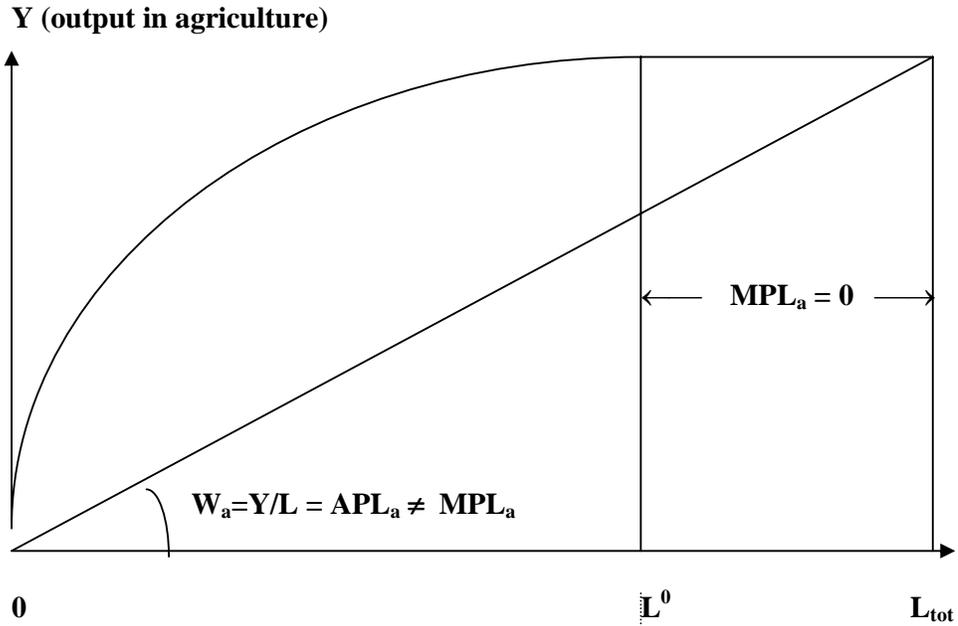
[2.10] The Lewis Model

Basic Assumptions

* **Two sectors, agriculture and industry**

* **Initially, all labor in agriculture**

* **Zero marginal productivity of labor in agriculture**

* **Wages in agriculture equal to average productivity (*not* marginal)**

* **Labor and land only factors of production in agriculture**

* **Capital and labor in industry sector**

* **Declining marginal productivity of capital in industry (while not in the H-D model)**
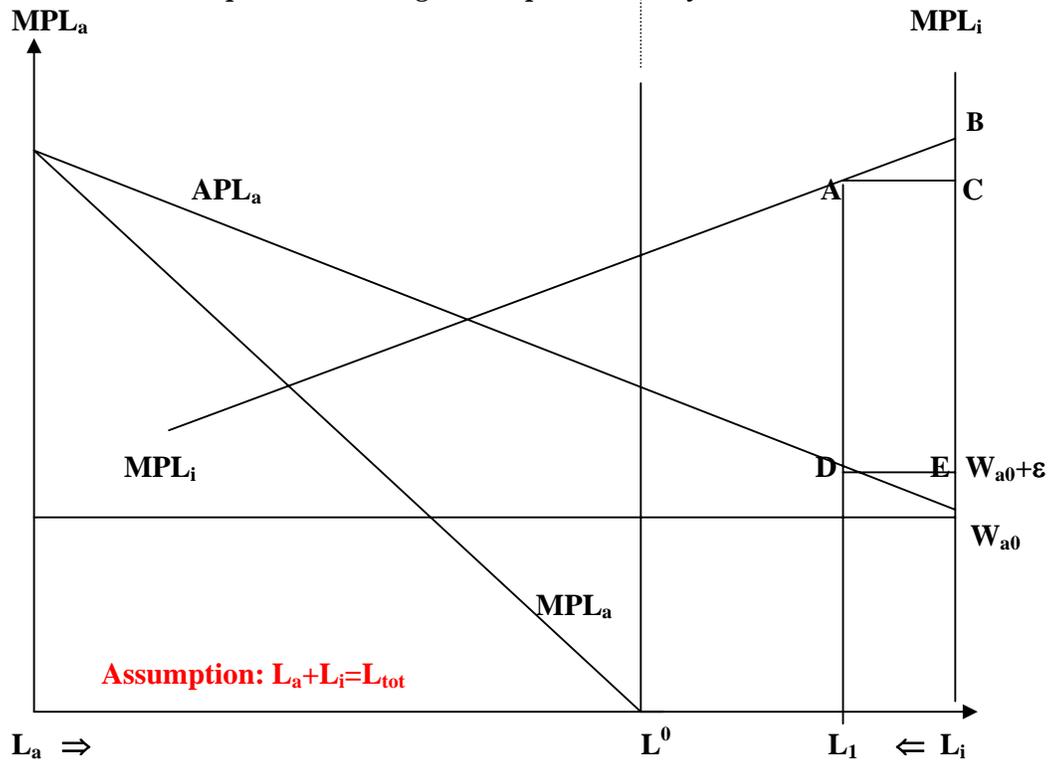
[2.11]
Figure: The Lewis Two-sector Model with "Unlimited" Labor Supply

Step 1: All Labor in Agriculture with Zero Marginal Productivity

Y (output in agriculture)

$MPL_a = 0$

$W_a = Y/L = APL_a \neq MPL_a$

0   L^0 L_{tot}

Step 2: Introducing an Incipient Industry Sector

MPL_a MPL_i

B

APL_a A   C

MPL_i

D   E $W_{a0} + \varepsilon$

W_{a0}

MPL_a

Assumption: $L_a + L_i = L_{tot}$

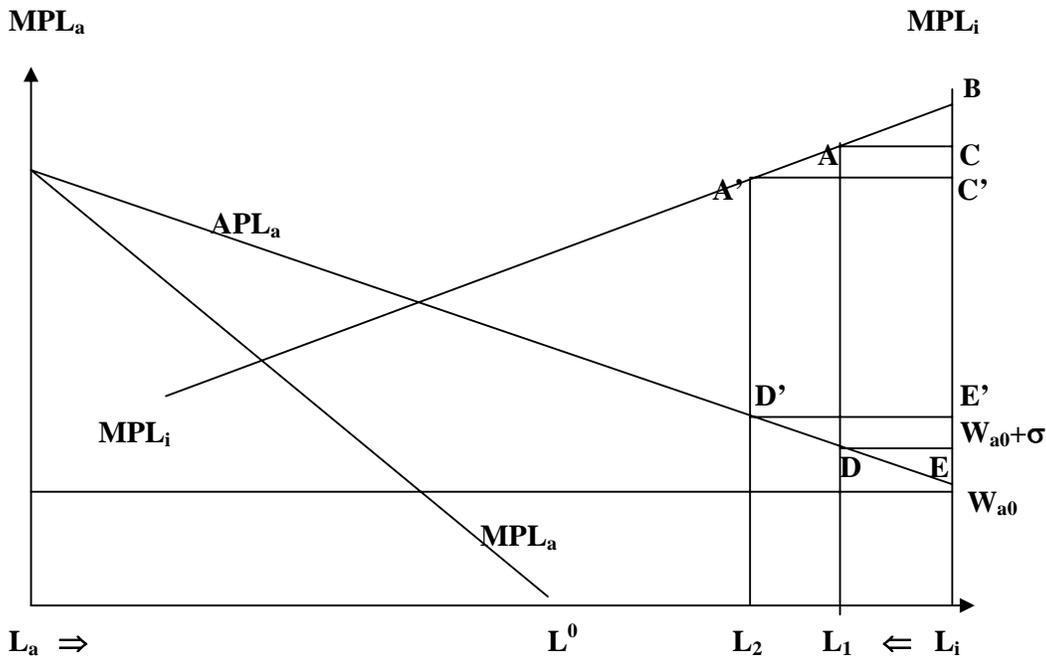$L_a \Rightarrow$ L^0 L_1 $\Leftarrow L_i$

[2.12] Questions for step 2:

1) **How are the incomes in the industry sector "measured" in the graph?**

2) **What happens to total production and the wage rate in agriculture?**

3) **Why is labor allocation at L_1 not an equilibrium?**

4) **Explain the notion of labor as in "unlimited supply"?**
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Figure: The Lewis Two-sector Model (cont'd)
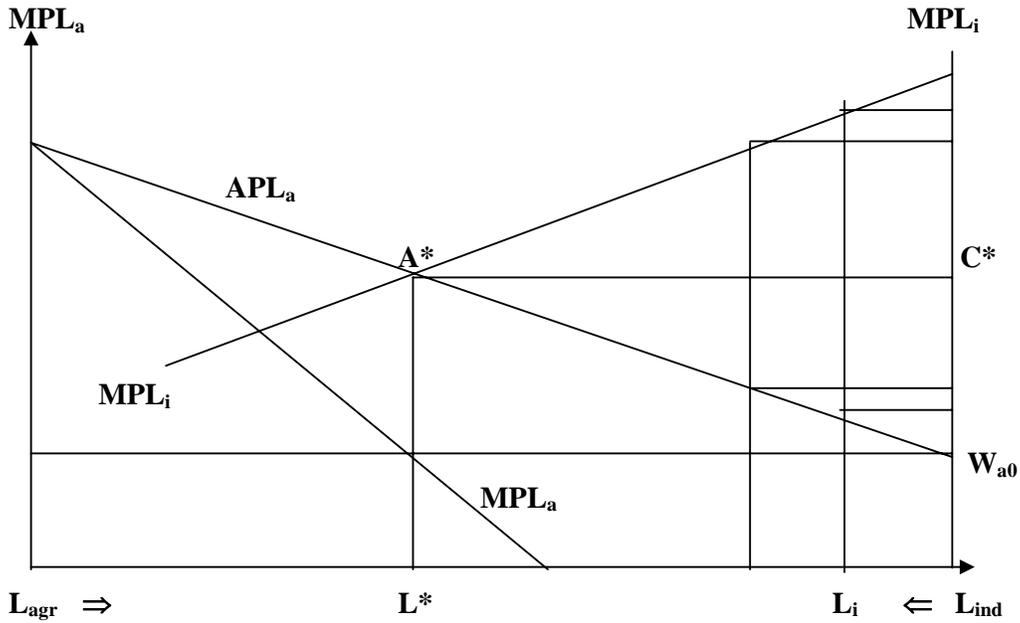
Step 3: Expanding the Industry Sector

Questions for Step 3:

1) **By how much is income in the industry sector increased and how is it divided between return to capital and to labor, respectively?**

2) **How is the "exploitation rent" depicted in the graph?**

3) **What has happened to wage and total production in the agricultural sector when $L_1 - L_2$ of the labor force here shifted to the industry sector?**

4) **Assuming that the industry sector operates in perfect competition, will L_2 be a market equilibrium?**
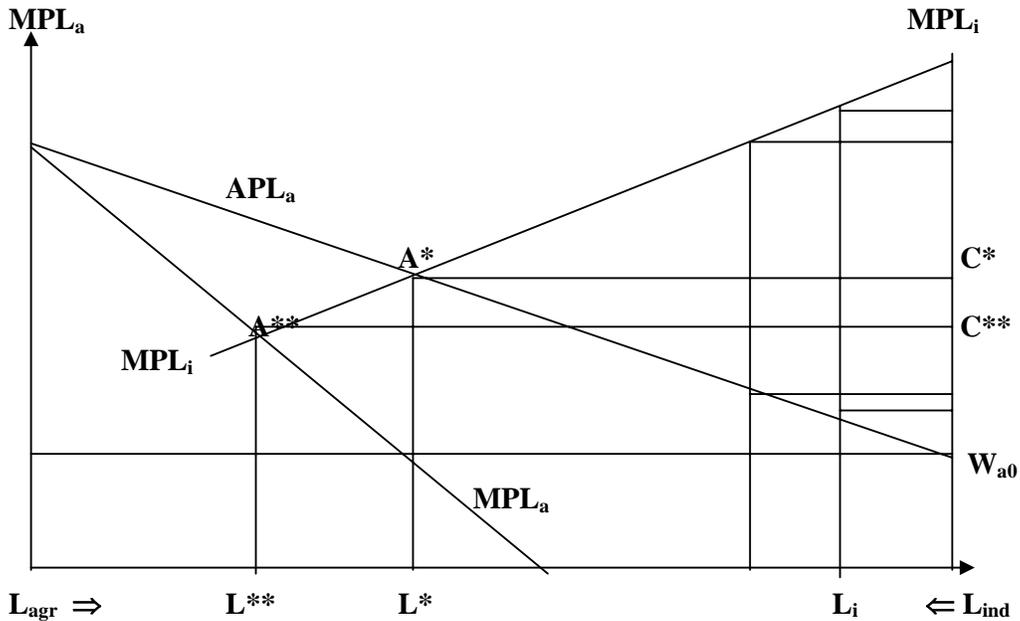
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[2.13] Figure: The Lewis Two-sector Model (cont'd)

Steps 4 and 5: Market (*) and Social Optimal (**) Equilibrium of Allocation of Labor between Agriculture and Industry Sector

Step 4: Market Equilibrium at L*: $W_a = MPL_i = APL_a$ *(*)*

MPL_a ... MPL_i

APL_a

A*

MPL_i

C*

MPL_a

W_a0

$L_{agr} \Rightarrow$ ... L* ... L_i ... $\Leftarrow L_{ind}$

Step 5: Social Optimal Equilibrium at L**: $MPL_i = MPL_a$ *(**)*

MPL_a ... MPL_i

APL_a

A*

A**

MPL_i

C*

C**

MPL_a

W_a0

$L_{agr} \Rightarrow$ ... L** ... L* ... L_i ... $\Leftarrow L_{ind}$

[2.14] Questions for Step 4:

1) Why is labor allocation at L* a market equilibrium?

2) What is now total income in the economy?

3) How has total production in agriculture been affected by the transfer of additional labor to industry?

4) With the help of the graph in the top panel of OH 2.11, describe how average and marginal productivity of labor have been affected by the establishment of an industry sector employing $L_{ind} - L*$ of the total labor force (see step 4).

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Questions for Step 5

1) Why is labor allocation at L the socially optimal equilibrium?**

2) What would happen to industry profits if employment in industry is expanded from L* to L and to wages?**

3) What is the income loss in the total economy due to the "distortion" ($W_a = APL_a$) in the wage setting in agriculture as compared to a situation without this distortion ($W_a = MPL_a$)

4) How does the distribution of income between labour and capital differ in the market equilibrium and the social optimum?

[2.15] Figure: The Lewis Two-sector Model (cont'd)

### Step 6: Introducing Monopsony, Savings and Growth
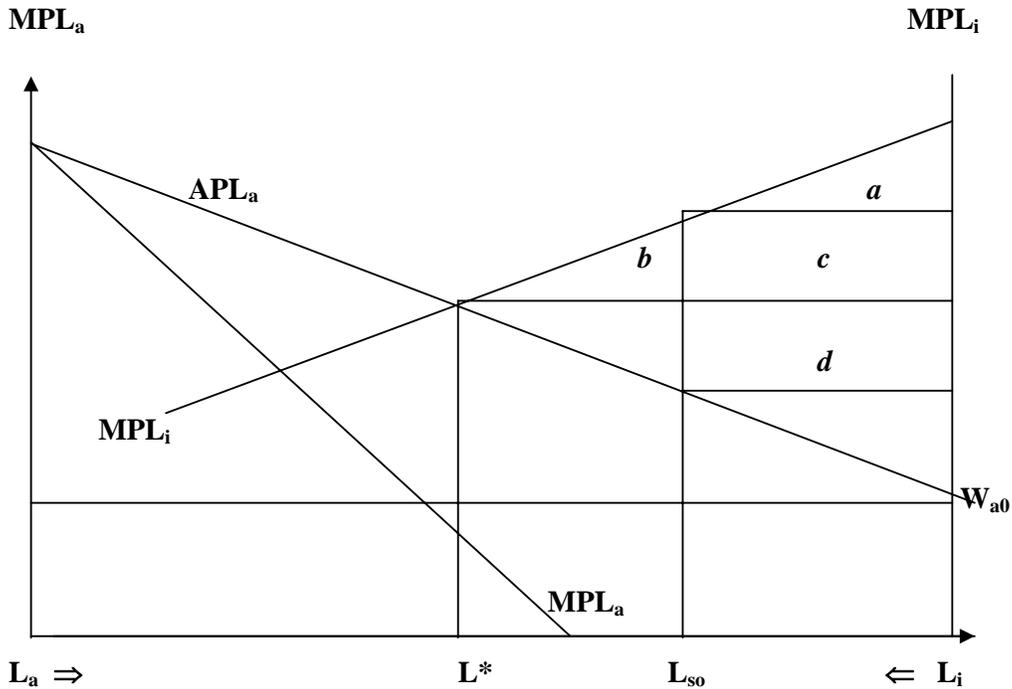
With L_{so} as the monopsonist industrialist's labor demand, his total profit is the
triangle *a* (pure capital rent) and the two rectangles *c* and *d* (the labor
exploitation rent). Explain the condition under which L_{so} is a profit max!
(In the market equilibrium, his total profits would be *a*, *b* and *c*. Since *d > b*,
his total profits would be smaller in this case)

**Question: how can investment and growth in industry be depicted in the graph?**

Assume that the industrialist
saves and reinvests 50% of
total profits and growth is
proportional to investment.
1) What would the optimal
allocation of labor be?
2) How could growth be re-
presented in above Figure?
3) Explain why there is a
conflict between *a-temporal*
and *inter-temporal*
allocation of labor.
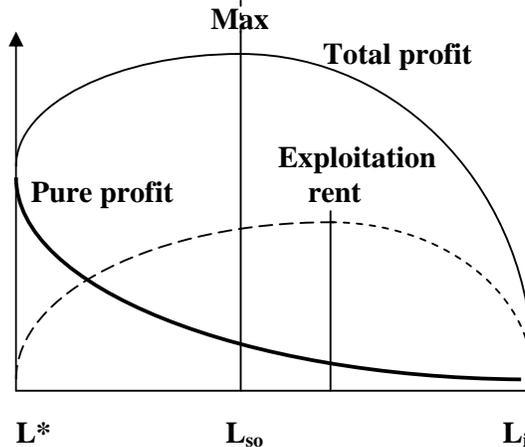
[2.16] Figure: The Lewis Two-sector Model (cont'd)

Step 7: Introducing trade unions, minimum wages and voluntary unemployment
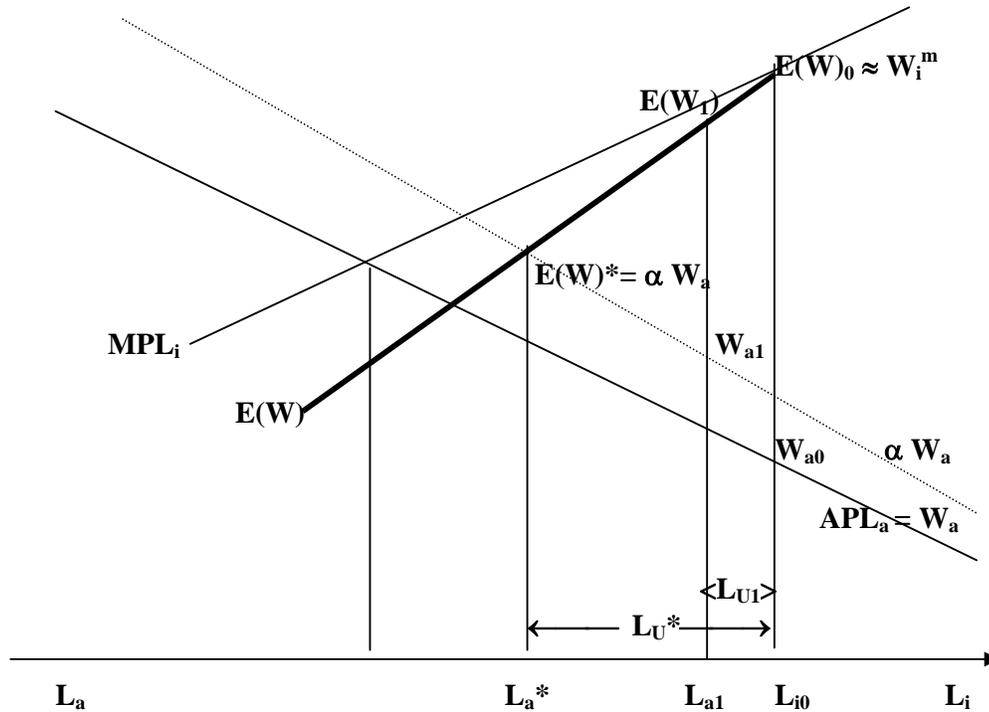
The expected urban wage, E(W), when moving from agriculture (rural) to the industry (urban) sector is:

$$E(W) = \rho\, W_i^m + (1\text{-}\rho)\, W_u > \alpha\, W_a, \qquad \alpha > 1 \qquad (1)$$

where ρ is the probability to get a job at the minimum wage (W_i^m) in industry and $(1\text{-}\rho)$ is the probability of becoming unemployed in the informal sector with a minuscule income W_u.(e.g. selling shoestrings)

$$\rho = L_i/(L_i + L_u) \qquad\qquad (2)$$

If the inequality under (1) holds, the individual has an incentive to move from agriculture to the urban sector

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[2.17] *Assumptions:*

1) At the given minimum wage (W_i^m), employment in industry is fixed at L_{i0}. The agricultural wage is not fixed, but depends on the size of the labor force in this sector: $W_a = APL_a$, and will raise when L_a falls.

2) There is a certain turnover of labour in industry, signifying that new openings do exist.

3) The expected wage in the urban sector, $E(W)$, has to exceed the risk-aversion-adjusted wage in agriculture (αW_a), and where $\alpha > 1$, if people should move and risk unemployment.

4) Think of an initial situation when there is no unemployment in the urban sector, and there is a wage gap $W_i^m - W_{a0}$. In this situation, the expected urban wage is approximately the industry wage ($\rho \approx 1$).

5) As labor starts to move into the urban sector, the expected urban wage rate, $E(W)$, will start falling because: ρ will decline, $(1-\rho)$ will increase, and W_a will raise.

6) When unemployment has reached L_{U1}, the expected wage rate has declined to $E(W_1)$, but is still higher than the risk-adjusted agricultural wage, W_{a1}, for labor left in agriculture at L_{a1}. Labor will hence continue to move.

[2.18] *Assumptions (cont'd)*

7) An equilibrium will be reached when E(W) has declined to match the (increasing) risk-adjusted wage in agriculture (α W$_a$). An equilibrium unemployment of L$_U$* will be reached, with L$_a$* left in agriculture. Now E(W)* = α W$_a$

Questions:

1) Where in Figure 2.5 will equilibrium unemployment be established if $\alpha = 1$ (i.e. when there is no risk aversion)?

2) How does the size of the initial wage gap between the minimum wage in industry and the wage in agriculture affect the equilibrium unemployment rate?

3) How does the size of the "wage" in the informal sector that the unemployed expect to be able to scrap together affect the equilibrium unemployment rate?

4) What is the net loss of national income due to the minimum wage and "voluntary" unemployment? (next slide)

[2.18a] The loss of national income due to the minimum wage compared with the Market Equilibrium and assuming that there is no risk aversion ($\alpha = 1$)

MPL$_a$ MPL$_i$

L$_a$ $\Rightarrow$ L$_a$*   L$_a$**   L$_{ind}$ $\Leftarrow$ L$_i$
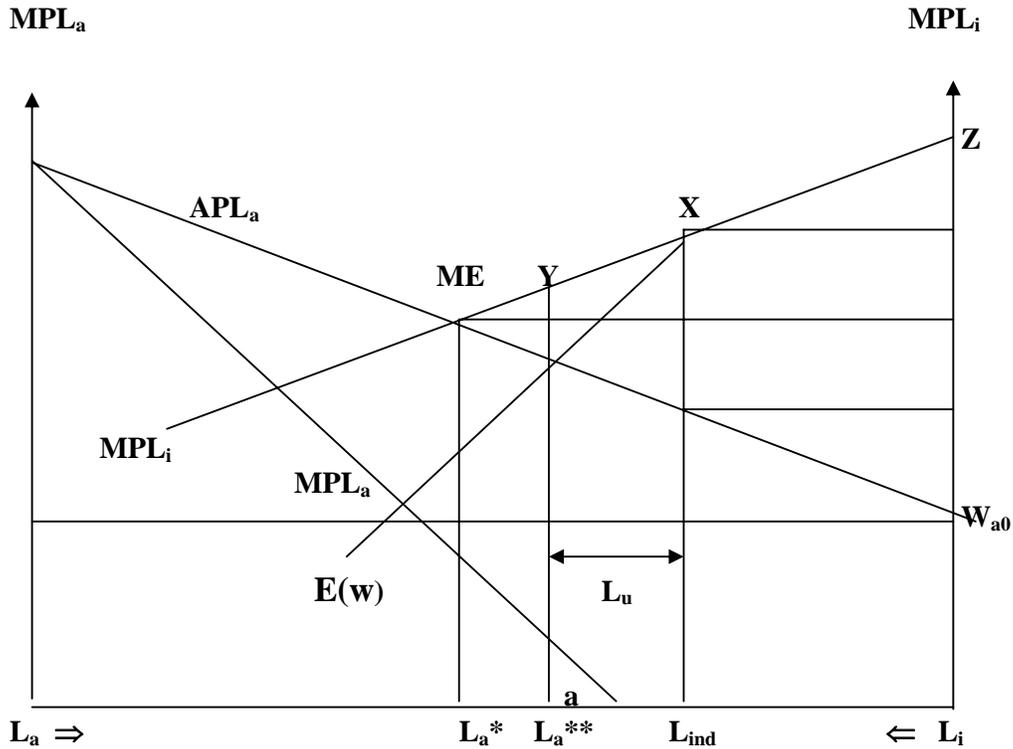
With minimum industry wage and migration and voluntary urban unemployment, employment in agriculture will be at L$_a$** as compared to L$_a$* in ME, and total agricultural production the area under the entire MPL$_a$ curve <u>minus</u> the triangle a.

Income in industry will be XZL$_i$L$_{ind}$ and the loss of income in the total economy due to the minimum wage will hence be YXL$_{ind}$L$_a$*.

[2.19] Figure: The Lewis Two-sector Model (cont'd)

Step 8: Financing Industry Investment by Taxing Agriculture

Y (output in agriculture)
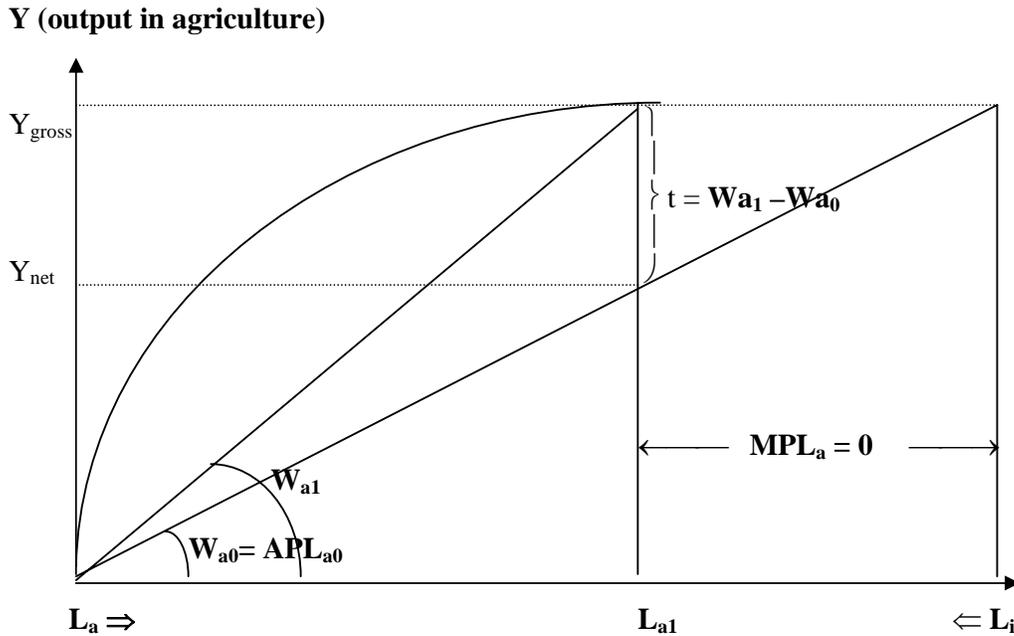
So far we have not dealt with the question of how the initial investment in the industry sector was financed. At the time when the Lewis' and related "structuralist" models were developed, getting resources (labor) from the agricultural sector was the main idea. Since labor in agriculture was postulated to have zero marginal productivity, no loss in output if labor was transferred to an industry sector, up to L_0 in the above Figure.

Without affecting the *initial* income in agriculture (W_{a0} per person), and without lowering output in agriculture, a tax rate of t can be applied. Tax Revenue (TR) would then be (if labor supply is inelastic):

$TR = t\,L_{a1} = [Y_g - Y_n]$ (to be invested in industry)

[2.20] Lessons from early structuralist models

1) The assumptions and analysis underlying the H-D and Lewis models were not uncontested at the time, but prevailed in the international agencies that became the predominant setters of the policy agenda

2) Enormous influence on actual policies in the 1950 and, in many countries, throughout the 1980s:

- High taxation and economic discrimination of agriculture
- Government intervention in almost all markets
- High protection of industry in almost all countries (import substitution)

3) It is notable that several of the leading development economists propagating the protectionist, industry-based (and anti-agriculture) development strategy were working for long periods of time in the agenda-setting international organisations (the UN, ECLA and UNDP

4) The appeal of the Lewis type of model to policy makers in the underdeveloped countries is no surprise. Just by shifting part of the labour force from low-productive agriculture (as envisaged) to high-productive industry, self-sustained growth would follow.

"The model is just too good not to be true"

[2.21] Contemporary Critics

The critique of the Lewis type of analysis was fierce in the contemporary academic debate, but had no impact on actual policy making in the 1950s and 1960s. The critique centered around <u>five main issues</u>:

1) The "underdeveloped country", as envisaged by Lewis and his followers, was no longer in existence in the 1950s. "<u>Traditional</u>" agriculture was already then a small sector in the poor countries

2) Marginal productivity of labor in traditional agriculture is not zero and agriculture cannot be heavily taxed without falling output

3) Productivity in "tropical" agriculture is not given once and for all

4) Savings and investment are not inherently low in the agricultural sector (as shown by China later on)

5) The alternative development strategy, proposed by the opponents to Lewis et al, based on <u>free trade</u>, <u>export-led</u> industrialisation in labour-intensive manufactures and productivity-enhancing <u>investments in agriculture</u>, had been deemed out on the basis of faulty assumptions and analysis. Industry needs no protection to flourish (Bauer 1957)

[2.22] Zero marginal productivity?

The central assumptions in the Lewis model are that "traditional" agriculture is (1) inefficient, (2) has little potential for savings and productivity growth and (3) that labour here have zero marginal productivity.

The Lewis model is internally consistent, but if the underlying assumptions are false, the model falls apart, or has to be substantially modified. Theodore Schultz (1964) produced empirical evidence showing that:

1) There is a fundamental difference between *inefficiency* and *low productivity*. Schultz demonstrated with empirical data from several countries, that efficiency was extremely high in "traditional" agriculture. By efficiency he meant that given the *existing* resources (tools, water technology, and knowledge), the allocation of these resources was close to *optimal*! Productivity was still very low because the <u>available</u> productive resources were so inadequate.

2) Savings and investment in such circumstances were not low because the farmers are irrational (as argued by many at the time). Savings were low because additional investments in *traditional* inputs did not increase production over and above the (marginal) cost of these investments. Given the available techniques and inputs, traditional farmers had already reached an optimal steady-state investment level (which is then equal to depreciation and zero net investment).

[2.23] Assumptions questioned (cont'd)

3) **Marginal labour productivity in traditional agriculture is not zero. Schultz argued that this assumption in the Lewis model was not based on strict empirical study, but casual, erroneous observations. He provided the first relatively rigorous test of this assumption, acknowledging that the measurement problems involved are large. Test: What happens to agriculture output when suddenly a large share of the labour force disappears and everything else remains unaltered?**

Best test: India in 1918-19, when the Pandemic Influenza outburst took the lives of about 8-10 per cent of the Indian labour force. Most of Indian agriculture at the time fitted well the characteristics of "traditional" agriculture, i.e. low technology intensity, very labour intensive, static and with low productivity.

Population in 1911 census: 252 million. In 1921 census: 251 million. Expected population in 1921: 280 million (based on population growth rates 1901-1911 and 1921-31). 29 million "missing"! (11-12%)

Controlling for several confounding factors (e.g. rainfall), Schultz found that (1) agricultural output declined notably, indicating a marginal productivity of labour of 0.4. (That is, when the labour force declined by 10%, production fell by 4%.)

He also found that (2) the relative decline in agriculture output was correlated to the percentage of the population that perished in different Indian states.

[2.24] Implications for the Lewis model

Step 9: Relaxing the assumption of zero marginal productivity
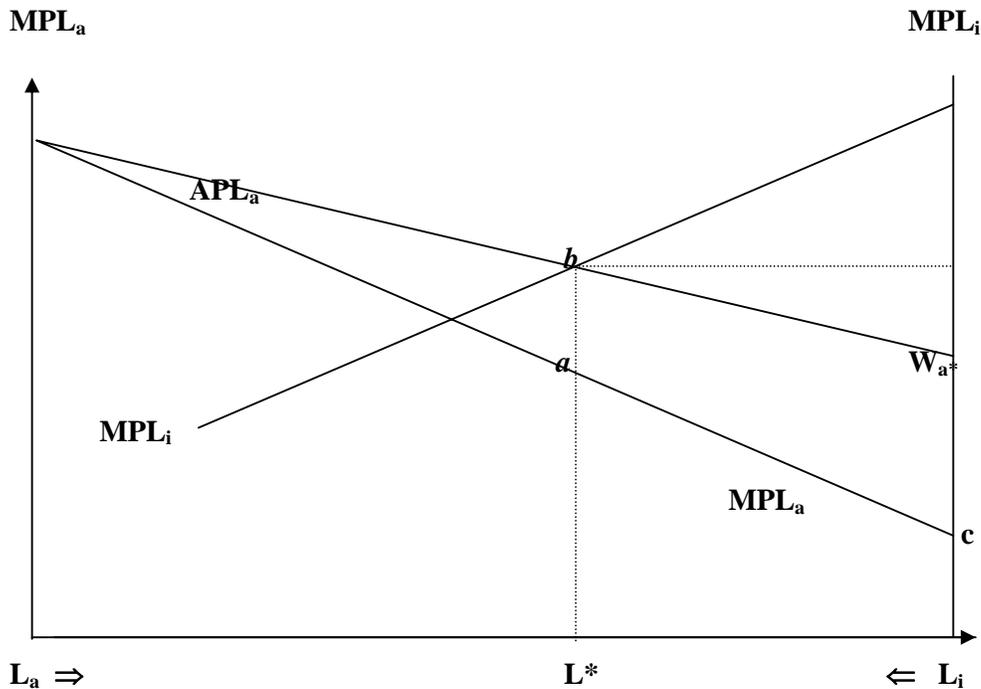
Implications:

a) **Early industrialization no longer cost-less; production in agriculture declines (by the area   acL$_i$L*). L not unlimited!**

b) **Higher wages have to offered by industrialists in order to attract labour from agriculture (> W$_a$*).**

c) **When food production declines, the <u>relative price</u> between food and industry goods (so far not considered) must change (food becomes relatively more expensive).**

[2.25] Zero productivity (cont'd)

d) In terms of step 9 in the Figure, a higher price for food and lower for industry goods means that the marginal and average productivity curves shifts. Agriculture becomes relatively more productive (in monetary terms) and industry less so. The gain from moving labour out of agriculture into industry will hence be less.

e) The confinement of the Lewis model to a closed economy is no longer tenable. If per-capita food production was very low at the outset, as envisaged by Lewis and others, reductions in the wake of industrialisation must mean that people cannot stay well nourished and hence productive. Trade and imported food are then necessary. But what to export in order to be able to import food? Industry products are ruled out because of protection and high costs.

f) Unless productivity increases in the food producing sector, the Lewis Model tends to break down (become internally inconsistent). With a potential for productivity increases in the agriculture sector, which were held to be practically non-existent in the Lewis world, the model can be saved. Such feasible productivity gains had been severely under-estimated according to Schultz, who gave many examples.

[2.26] Other early critique of the structuralist models

a) The "underdeveloped" countries in 1950 were already a much more varied group, and much more internally diverse, than the structuralists proclaimed (Bauer).

b) For an industry sector, catering for the domestic market, to be viable in countries with low incomes and low demand, high protection would be necessary, which means high production costs and little incentive for productivity improvements.

c) The scope for <u>exports</u> of labour-intensive <u>manufactures</u> from low income countries much greater than predicted by the structuralists. This was vividly demonstrated by Taiwan, Singapore, Korea and Hong Kong, that embarked on an export-oriented growth path already in the early 1960s – The so called miracle economies!

d) The structuralists' belief in the effectiveness of governments to control and direct resources in the economy was naive and wrong-footed (Bauer). <u>Government failure</u> as common as market failures, he argued.

[2.27] Linger controversies and new issues

The controversies among development economists in the 1950s and 1960s are broadly the same as the ones we have today, although the actual policies have tilted towards the more outward -oriented industrialization strategy, as advocated by the dissidents in the 1950, in most countries.

With some 40 years of hind-sight, we should be able to tell who had the most relevant analysis among the pioneers in development, e.g. the cost of protection and the case for more open trade regimes (later lecture)

Many of the issues high on the development agenda today were not considered in much esteem in the early days:
- Income distribution and poverty
- Environmental and resource consequences of economic growth and population growth
- The political economy of development — The role of government and well functioning institutions

The prediction that the <u>terms of trade</u> for primary commodities will inevitably deteriorate over time, which was one of the main reasons for the widespread belief in inward-oriented industrialisation (import substitution) has materialized at face value, but may be a statistical mirage due to distorted data.

All these issues will be covered in later lectures!

[2.28] Revival of the Lewis model?

Does the Lewis model help explaining the Chinese growth miracle? According to many Chinese economists, yes.

Selected indicators of the Chinese economic and social accomplishments 1980-2002

	Indicator	1980-2002
A.	Annual growth of GDP per capita (%)	9.0
B.	Annual growth of mean household per person consumption expenditures (%)	10.0
C.	Change in poverty (headcounts) %	53 $\Rightarrow$ 8
D.	Decline in child stunting (0-5years) %	50 $\Rightarrow$ 14
E.	Change in income distribution (Gini)	28 $\Rightarrow$ 45

Sources: Ravallion and Chen, 2004; Svedberg 2006

[2.29] Revival of the Lewis model? (cont'd)

* The labour force in the booming urban construction and industry sectors is to a large extent migrant workers. These 100 to 150 million migrant workers make up more than **one-eight of the total labour** force in China (at about 760 million in 2001) and between **one-third and half** the urban labour force. (The data are uncertain).

* The **incentives** for this mass-migration of former farmers to jobs in the urban sectors are mainly huge **income differences**:
- Average annual income for **urban low-skilled** workers is 8,000 to 12,000 yuan.
- Average annual income in the **farm sector** is less than 2,000 yuan.
* The **average** agricultural income masks the fact that the **marginal** productivity of labour at the individual farm is probably much lower (and approaching nil in many cases). The main reason for the low incomes and marginal labour productivity is the very **small size of the average farm** (0.6 ha = 60 x 100 meters). This is a legacy from the **de-collectivisation** of the farm system in the early 1980s.

Some estimates put the "redundant" labour in agriculture at 200-300 million (UNDP 2006).

[2.30] Lewis applied to China (cont'd)

* The Chinese experience **deviates** from the Lewis model in two main respects:

1) Lewis original model was one of a **closed economy** in which the industry sector was thought to be catering for the local market (**import substitution** with tariff protection).
China's rapid industrialisation is to a large extent **export-oriented** and free-market driven (WTO membership in 2001).

2) In **Lewis'** model, income growth was generated mainly be the **re-allocation** of labour from agriculture to industry, while capital investment was in the background.
In the **Chinese** case, high growth no doubt relies on very **high savings and investment ratios (40-50% of GDP)**. Even poor rural households are "forced" to save since they have to pay for their pensions, child education and almost all health care!

However, **without** the huge and rapid mass-migration of cheap labour from the overpopulated rural sector, the urban investment boom would not have been **feasible** on the scale we witness.

Conclusion: massive rural to urban labour migration has been a <u>necessary</u> (but not <u>sufficient</u>) precondition for the rapid growth.

[2.32] Literature

Mandatory readings: Only lecture notes

Literature cited:

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